IICE

# IRELAND INTERNATIONAL CONFERENCE ON EDUCATION (IICE-2017)

April 24-27, 2017
Dublin, Ireland




## IICE-2017 PROCEEDINGS

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Ireland International Conference on Education (IICE-2017)

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# Ireland International Conference on Education

**April 24-27, 2017**

**www.iicedu.org**

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# Message from the Steering Committee Chair

Welcome to the Ireland International Conference on Education (IICE-2017) biannual conference (April and October). The IICE-2017 provides an opportunity for academicians and professionals from various educational fields with cross-disciplinary interests to bridge the knowledge gap, promote research esteem and the evolution of pedagogy. The IICE-2017 themes are Curriculum, Research and Development.

We received 920 papers (206 Abstracts, 93 Extended Abstracts, and 621 Full Papers - see Figure 1) from 67 countries of which 101 (44 Abstracts, 15 Extended Abstracts and 30 Full Papers) were given consideration for acceptance (see Figure 2) and finally 73 submissions (37 Abstracts, 8 Extended Abstracts and 28 Full Papers), 1 invited workshops, 11 speakers proposals and 14 posters were accepted for publication (see Figure 3). The IICE double blind paper evaluation method was adopted to evaluate each submission and selected papers will appear in high impact International Journals published by Infonomics Society.

Figure 1. Total Submissions

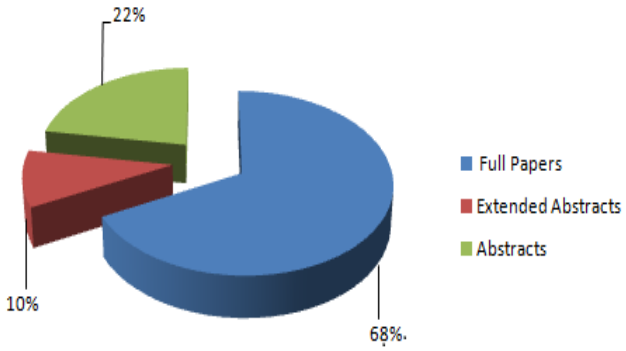


Figure 2. Consideration for Acceptance

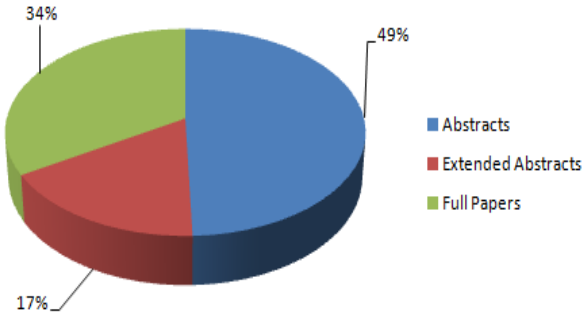


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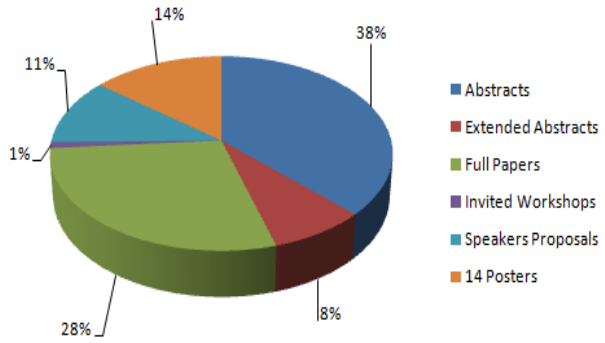
Figure 3. Final Accepted Papers and Workshops




Many people have worked very hard to make this conference possible. I would like to thank all who have helped in making IICE-2017 a success. The Steering Committee and reviewers each deserve credit for their excellent job. I thank the authors who have contributed to IICE-2017 and our Keynote Speakers: Dr Saeeda Shah, Dr Michelle Morgan and Professor Conor Mc Guckin for agreeing to participate in IICE-2017. I also like to acknowledge my appreciation to the following organisations: Infonomics Society, University of Leicester, Bournemouth University, Trinity College Dublin, Harvard University and Canadian Teacher Magazine. It has been great pleasure to serve as the Steering Committee Chair for IICE-2017. The long term goal of IICE is to build a reputation and respectable conference for the international community.

On behalf of the IICE-2017 Executive members, I would like to encourage you to contribute to the future of IICE conference as authors, speakers, panellists, and volunteer conference organisers. I wish you a pleasant stay in Dublin, and please feel free to exchange ideas with other colleagues.

Professor Charles A. Shoniregun
IICE-2017 Steering Committee Chair

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# Keynote Speakers

## Keynote Speaker 1

Dr Saeeda Shah is a Reader at the School of Education, University of Leicester and a visiting Professor of Education at the University of Derby. Previously, she has worked in higher education in Pakistan in senior leadership positions. Currently, Saeeda teaches on Masters and Doctoral programmes, and is the Director of PhD and Member International Strategy Forum. She was also Chair of the College of Social Sciences Equality and Diversity Committee till July 2016 and was recipient of the Inspirational BME Life Achievement Award, 2015. Her research interests include educational leadership with a focus on diversity, gender, cultural and belief systems, Islam and society and Islamic philosophy of education.

**Title:** Seeing 'the universe from a centre lying within us': sharing perspectives

**Abstract:** Michael Polanyi (1958) argues that 'As human beings, we must inevitably see the universe from a centre lying within us'. For me, this 'centre' defines the focus and remit of my research. In this presentation, I will seek to briefly share some strands of my research that certainly overlap and intersect, but at the same time flag up how this 'seeing the universe from an inner centre' evolved in interplay with multiple complex outer factors.

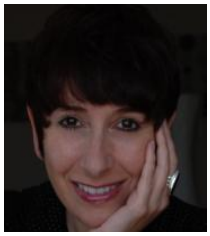
Polanyi continues that 'Any attempt rigorously to eliminate our human perspective from our picture of the world must lead to absurdity' (p.2); and my attempt will be not to 'eliminate our human perspective'. I make no claims to high intellect but I agree with Professor Lawrence Summers of Harvard University (November 16, 2015) that 'ignorance is not sufficient bar to attempting to offer some provocative observations'.

As a Muslim woman in educational leadership in a conservative Muslim society, gender emerged as the first concern for my research. How women experience gender in a patriarchal culture with its traditions of sex-segregation, role-stereotyping, women as subjects and objects of izzat (honour), public/domestic divide, gendered power-relations and other issues has its own challenges. The resulting discourses and practices, generally legitimised in the name of religion, intensify these challenges particularly for the women moving into visible leadership positions, and contribute to perpetuating confinement to margins in many cases.

Secondly, my re-location to the UK of post-9/11 brought awareness of racial and ethnic discrimination that intensified after 7/7 London bombing, with implications for experiences of Muslim youth in particular. This extended my research focus to include other expressions of marginalisation linked to issues around ethnicity, diversity, and faith identity. Increasing expressions of Islamophobia and demonization of Islam, and its implications for Muslim students' education and their experiences of schooling, as well as the leadership challenges facing schools with substantial number of Muslim students contributed to the development of a third strand exploring Muslims' educational needs and aims in a complex context, faced with possible threats of annihilation or exclusion (Bauman, 1997), and the diminishing possibilities or opportunities for reciprocal dialogue and engagement.

We increasingly define the world as a global village but paradoxically this coming together of the world has heightened the awareness of differences. As a teacher, I perceive this responsibility of the educationists to actively search for ways to promote respect for differences across divides of gender, race, class, ethnicity, faith, and others, and to encourage productive co-existence in cohesive democratic societies through critical research.

## Keynote Speaker 2



Michelle Morgan is Associate Professor and Associate Dean of the Student Experience in the Faculty of Media and Communications at Bournemouth University. Previously, she was creator and PI/Project Lead of a £2.7 million 11 university collaborative HEFCE grant looking at the expectations and attitudes towards postgraduate taught (PGT) Science, Technology, Engineering and Mathematics (STEM) study, and post study outcomes from the perspective of students, universities and employers to support and sustain PGT growth in the UK'. The project report has received praise from across the sector including UKCGE, OFFA, the HEA and the Engineering Professor Council. Before that, she was L+T Coordinator and Student Experience Manager at Kingston University. During her career, Michelle has been a Faculty Manager, Researcher and Academic. She describes herself as a student experience practitioner who develops initiatives based on pragmatic and practical research. Michelle is extensively published in the area and as a result of her experience has developed a detailed practical student transitions model to help guide colleagues who are at the coal face improve the experience of students across academic and non-academic activities. In 2005, she was recipient of a special award from the University of Sussex's Students' Union for Outstanding Achievement and Excellence. In 2009, she was made a Fellow of the AUA and she is a National Associate and Principal Fellow of the Higher Education Academy. She was nominated for Teacher of the Year in 2011 and in 2015 she received a Student Led L&T from the Students Union at Kingston University. She co-wrote and co-presented a 5 part Radio series for BBC China in 2011 on the student experience. Michelle has presented over 80 national and international conference papers (12 keynotes and 25 invited papers), has had 12 book chapters published and has 5 national and international published peer reviewed journal articles focusing on the UG and PG student experience. She is editor and substantive contributor to two books that revolve around her new Student Experience Practitioner Model which is designed to help colleagues support UG and PG students. She has developed a free portal for staff which provides a range of information and links for anyone interested in improving the student experience in higher education.

**Title:** Postgraduate study- future challenges

**Abstract:** In the past 20 years, postgraduate study has grown across the western world. The reasons suggested for this are numerous. They include commitment by many governments to widen participation at all levels of study in order to increase social mobility as well as furnishing the market economy with the necessary skills to prosper and achieve sustainability. Also, in recent years, due to the substantive increase of first degree graduates entering the employment market thus increasing competition for jobs, it is argued that more graduates have seen the postgraduate qualification as a means of helping them gain 'employment' rather than a vehicle to develop 'employability' skills later in their career through using this level of study as continuing professional development.

The UK higher education (HE) sector has very much been part of this credential inflation of qualifications and been criticised for neglecting to understand the reasons for growth and addressing the concept of the student experience at PG level. It is argued that this has contributed to the declining student numbers participating in UK postgraduate study in past 7 years. This keynote will report the key findings from the ground breaking £2.7m HEFCE funded Postgraduate Experience Project (PEP) comprising 11 UK universities which looked at

understanding the expectations and attitudes towards postgraduate study and post-study outcomes from the perspective of applicants, students, universities and employers. The speaker will argue that it is now time to rethink this level of study in order to make it sustainable and return it to the concept of continuing professional development rather a qualification to secure employment.

## Keynote Speaker 3

Based in the School of Education at Trinity College Dublin, Professor Conor Mc Guckin's research interests are in the areas of bully/victim problems among children and adults, psychology applied to educational policy and processes, and the need for a fully inclusive education environment for all children and young people (e.g., special educational needs, disability, rare disease). He has a long track record of involvement in, and management of, collaborative research projects. Conor is a Chartered Psychologist (CPsychol) with The British Psychological Society, a Chartered Psychologist (C.Psychol., Ps.S.I.) with The Psychological Society of Ireland, and a Chartered Scientist (CSci) with The U.K.'s Science Council. He is also an Associate Fellow of both The British Psychological Society (AFBPsS) and The Psychological Society of Ireland (A.F.Ps.S.I.). He is a member of the Project Management Institute. Conor is the founder and Co-Director of Behavioural Insights, an innovative and solution focused consultancy that designs and delivers highly effective solutions to those working in the areas of applied psychology, education, and marketing. He was also a founder and a Co-Director of Selection by Design, the leading provider of psychometric training, assessment, and consultancy solutions to the academic and business communities.

**Title:** Bullying and Cyberbullying - Game Over? New player: Online Radicalization and AI / Robotics! Issues for Children, Adults, and Educators

**Abstract:** Technological advances are truly transformative in terms of personal and societal identity. As custodians of society with a shared responsibility for the emerging and developing identities of our citizens, both young and not so young, it is incumbent upon us to not only embrace the tools of modernity, but to ensure that these are harnessed for positive and ethical outcomes for everyone. If we understand ethics to be about the concepts of right and wrong, then what is it that we need to debate about the cyber-ethics of the phenomena that society calls cyberbullying? In addition, the new focus of research in this area is upon online radicalisation, racism, and xenophobia. And . . . we are actively planning and thinking about what bullying will look like when we see an increase in Artificial Intelligence (AI) and robotics. What will bullying look like in 2020 when the bully(ies) could be a mixture of children and AI / robotics?

Just when society was getting to an understanding of how to deal with 'traditional', or 'face-to-face (f2f)' bullying in schools, along came the internet, smart phones, and issues related to 'cyberbullying'. As a society, we now have more connected devices in the world than there are humans, and the 'always on' generation are the digital natives and pioneers in this emerging new world. However, we must remember that childhood and basic psychological development (e.g., emotional development, identity development) still develops at the same rate as when each of us were young – it does not speed up just because of the exponential speed of development of technology.

To understand cyberbullying, we need to understand the fundamental characteristics of traditional bullying. But - we also need to understand the separate, and thorny, issues that are related to the law, technology / marketing, and the modern lives of children and young people. We generally tend to consider traditional bullying and cyberbullying as 'old wine - new bottles'. But - to what extent will old approaches work with this new form of bullying? What are the central issues that we, as a society, need to consider in terms of helping young people

make ethical decisions when engaging in new post-modern relationships? How do we help children, adults, and educators 'cope' with the issues that new technology brings – both positive as well as negative? These issues are all discussed - in the hope that you may develop your thoughts and considerations of how we, as a society, can intervene to help protect our citizens in their quest to lead lives that are ethical and moral – lives that are free from harm and harassment.

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# Invited Workshop: Theatre of the Oppressed as a Creative Strategy to Cope with School-Based LGBTQ Bullying and Cyberbullying

It includes theory of bullying, innovative approaches to intervening in cyberbullying and LGBTQ in the form of Theatre of the Oppressed, shares two research studies evaluating the therapeutic value of each of the two Theatre of the Oppressed Performance and shares ideas with the audience about how Theatre of the Oppressed can be used in a school district. The purpose for the workshop is to inform attendees about how Theatre of the Oppressed could be used as a creative strategy to inform, prevent and intervene in school-based LGBTQ Bullying and Cyberbullying.

Goal 1: To describe current forms of school-based cyberbullying and LGBTQ bullying and to detail the emotional, social, physical, and cognitive effects that these forms of bullying can have on students, bystanders and even the bullies themselves, not to mention the school climate at-large.

Goal 2: To describe how Theatre of the Oppressed can be used as a therapeutic tool to help students, parents and the community understand the impact of school-based bullying.

Goal 3: To describe two applications of Theatre of the Oppressed: a) The It Gets Better Project, a dramatic musical about LGBTQ Bullying and b) The Out of Bounds Project, a stage production about school-based cyberbullying.

Goal 4: To demonstrate the effects of Theatre of the Oppressed through two research reports of surveys of audiences attending either of these two Theatres of the Oppressed productions: It Gets Better or Out of Bounds

Goal 5: To provide an opportunity for sharing of ideas among workshop attendees about other creative ideas that originate from the spirit of Theatre of the Oppressed and apply them to school-based bullying.

**Organiser: Robert G. Harrington, The University of Kansas, USA**

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## PhD and Doctorate Consortium

The idea of writing a research paper or developing a topic of research interest that can lead to a PhD / Doctorate degree or proposal is always an endless thinking of where, when, why, what and who. Therefore, becoming an experienced researcher and writer in any field or discipline takes a great deal of practice. The Consortium has the following objectives:

- Provide a supportive setting for feedback on current research that will stimulate exchange of ideas;
- Guide on the future research directions;
- Promote the development of a supportive community of scholars and a spirit of collaborative research;
- Contribute to the conference goals through interaction with other researchers and conference events.

The PhD and Doctorate Consortium highlights possible solutions in response to the lack of competence demonstrated by young researchers and PhD and Doctorate students, and the understanding of what contributes to knowledge gap.

**Organiser: Charles A. Shoniregun, Infonomics Society UK and Ireland**

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# Sessions

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## Session 1: Inclusive Education

Title: Women Superintendent Research: Content Analysis of 2014 – 2016 Dissertations
(Authors: Gloria Gresham, Pauline Sampson)

Title: Literacies of Land: Decolonizing Narratives, Storying and Literature
(Author: Sandra D. Styres)

Title: The Importance of Social Support to Bullying Victims: A Case Study in Indonesia
(Authors: Zainudin Abu Bakar, Syahruddin M.)

Title: The Mechanism and Effectiveness of Music Therapy for Non-fluent Aphasia Patients in Relation to the Right Hemisphere
(Author: Ying Luo)

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# Women Superintendent Research: Content Analysis of 2014 – 2016 U.S. Dissertations

Gloria Gresham, Pauline Sampson
*Stephen F. Austin State University Nacogdoches, Texas, USA*

## Abstract

*Women remain underrepresented in the role of school superintendent in the United States. Current literature revealed women are oppressed when considering gender, characteristics differ from men, and barriers deter women from seeking the role. Content analysis is useful in determining trends and patterns of documents. In this study, a content analysis was conducted of 2014-2016 U.S. dissertations to ascertain who are the researchers, what are the publication types authors are pursuing to disseminate research, and what are the dominate themes. Findings revealed approximately .002 percent (43 of 175,198) of 2014-2016 dissertations dealt with women superintendents. The compilation revealed 1946 references and 1433 authors. Analysis indicated Björk, Brunner, Glass, Grogan, Kowalski, Shakeshaft, Skrla, and Tallerico were cited most often with 636 authors cited only once. The most often used publication type was peer-reviewed journals, with books second, and chapters in books third. Themes revealed leadership, districts, African American, and gender often researched. Topics such as role, barriers, boards, career, experience, social, and power occurred less often and may offer future researchers with gaps to pursue. Through showcasing issues related to women superintendents, strategies can be implemented to address the low numbers of women superintendents in the field of education.*

## 1. Introduction

Women issues rose to the forefront in the 2016 United States presidential election. For the first time in history, a woman ran for president of the United States as candidate of a major political party. During the campaign, capturing the votes of women voters was essential for each candidate, and topics important to women voters included access to planned parenthood, paid family leave, gender pay gap, minimum wage increase, and debt-free higher education [25]. As evidenced in the presidential campaign, women issues are still unresolved, and when considering school superintendents in the United States, women remain underrepresented [1].

According to the American Association of School Administrators, in 2000 just over 13 percent of school superintendents were women [28]. A more current study by Glass and Franceschini [30] revealed an upward trend in that 22% of school superintendents were women in 2006. Kowalski et al. [15] indicated that in 2011 about 24.1% of superintendents in the United States were women. Even though growth in the percentages of women to men superintendents was evidenced, the percentages still remain low.

Since research is a beacon for educators and fuels current and future practice, it stands to reason studying women superintendents and their concerns should be prevalent in current literature. Doctoral candidates who are emerging researchers review recent literature in chosen areas, and those dissertations provide educators in the field with current review of occurring studies. A content analysis of current dissertations can reveal the volume of research and the topics pertaining to women school superintendents included in prevailing studies and recent research literature in the field. The purpose of this study was to determine who are the cited authors, what are the chosen types of publications, and what are the major themes in 2014 – 2016 U.S. dissertations referring to women superintendents.

The research questions guiding this study were:

1. Who are the major researchers cited in 2014 – 2016 U.S. dissertations pertaining to women superintendents?
2. What types of documents are authors publishing to disseminate research findings?
3. What are the dominant themes in 2014 – 2016 U.S. dissertations pertaining to women superintendents?

## 2. Literature Review

The concepts and theories forming and supporting this study were gender inequality or inequity and feminist theory. Gender inequality relates to unfairness and unequal access for both men and women. In all societies, gender exists in a consistently unequal manner [2]. Education is one of

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the most overt examples of gender segregation in the United States [21].

Feminist theory was a major construct grounding this study. Feminist theory focuses on social problems, trends, and issues consistently neglected by the dominant male viewpoint within social theory. When defining feminist critique, Thomas [26] stated the assuming of different gender roles is not biological but as a result of social conditioning. Feminist research methodology is a way that holistically incorporates the research process on issues that are overlooked or marginalized [6]. Feminist theory tenets adhered to in this study were (a) a commitment to halting gender inequality; (b) a review of gendered practices; (c) an acknowledgement for epistemological diversity [10]. The conceptual framework provided insight into the review of literature.

To prepare for the study, the researchers reviewed current literature pertaining to gender issues, women superintendents and reasons for fewer in the role of superintendent, barriers, and content analysis. Following is a discussion of each topic.

## 2.1. Gender inequity or inequality, gender bias, and the school superintendent

Gender inequity or inequality most often relates to women because they are the population usually marginalized. Women are oppressed when considering gender [20]. Acker further stated leadership ranks currently contain women, but women still serve more as secretaries, clerks, and care providers [13]. Furthermore, Acker reiterated inequity is often created in organizations, and Acker found that while pay is usually unequal, inequality regimes "tend to be fluid and changing", but in the field of education, inequity is paramount. Glass, Björk, and Brunner [29] found that less than 13.2 percent of school superintendents were women

Gender bias is experienced by women who hold the role of superintendent. In 2006 Whitaker implemented a study to investigate gender bias for nine women superintendents. Whitaker found that all had experienced gender bias. Bañuelos [24] completed a study of 35 women superintendents in California. Bañuelos surveyed these superintendents concerning gender bias as it affected their jobs and personal lives. This researcher discovered these women were very aware of gender bias in their jobs and believed they were perceived negatively as leaders. Additionally, these women thought they were not respected, and their authority was challenged. Oftentimes, gender was raised during conversations with their peers, the board, and the community. Many of these women reported they were emotionally or physically abused.

Some assume women are treated differently when considering the hiring of a superintendent. Tallerico [23] conducted a study to review search and selection practices for superintendents considering equity for females and those of color. Tallerico discovered access to the job of superintendent was limited for minority males and females. In contrast, Wiggins and Coggins [31] studied 15 school districts in Oklahoma in the United States to determine if school board members favored men over women for the job of superintendent. Six resumes (three for women and three for men) for hypothetical candidates were presented to a random sample of school board members. After review, Wiggins and Coggins reiterated gender was not established as significant in superintendent selection. When seeking the job of superintendent, women need to navigate issues men do not and lag behind in superintendent numbers.

## 2.2. Women superintendent and reasons for lagging behind

Women experience issues differently and have characteristics that are different from men who hold the job of superintendent. Glass relayed seven reasons why women lag behind in superintendent numbers (2000): (1) they are not in jobs that normally lead to the office of superintendent; (2) women are not preparing for the role: (3) they do not have the interest or experience in fiscal management; (4) their personal relationships are barriers; (5) school boards do not embrace hiring women; (6) there are different reasons why women enter the field than in times past; (7) women are older when they enter administration.

Derrington and Sharratt [22] completed a study of 15 women superintendents in Indiana to determine if these women fit the normal profile of superintendents and what characteristics were helpful in pursuing the role of superintendent. These researchers discovered that Indiana women superintendents had higher qualifications than their male counterparts. Women were found to delegate tasks more than men. Hard work, the influence of mentors, tenacity, and independence were found to contribute to the success of women. In November 2016, Superville published an article in Education Week [11]. In this article, the author discussed why few women lead school districts. Superville stated many find the job of superintendent unappealing. Superville also discussed

that traditionally superintendent candidates are sought from secondary principals, and women most often occupy the job of elementary principal. Differences do exist for women and men who seek the office of superintendent, and their networking differs.

Networking and mentoring are different for women when compared to men. Muñoz et al. [3] stressed women lack role models which provide mentoring and networking opportunities. Women use networking for social support, and men use networks to advance their careers [33]. As Brunner and Grogan [7] discovered, women who seek the role of superintendent are more interested in networking and seeking mentors than are women who do not seek the role. Most women superintendents have men and women mentors, and women seek support and friendship from mentors [4]. Limited networking is a reason women do not seek the office (Superville, 2016). In contrast, Searby and Tripses [18] and Whitaker [14] showed some women are reluctant to seek or mentor other women and actually resist mentorship opportunities. Situations and characteristics are different for women when compared to men, but women have barriers that hinder their pursuing the role of superintendent.

## 2.3. Barriers for females entering the superintendency

Across the literature, barriers are cited preventing or deterring women from seeking the job of superintendent. In a 2007 study conducted by Derrington and Sharratt [1], barriers women faced were overwhelming and remained similar to a 1993 study of these authors although the emphasis or ranking of these barriers changed. It was found barriers were often self-imposed due to family responsibilities, immobility, and motherhood. Balancing the work of home and school was perceived by women as difficult. Also found was the expectations of the role of superintendent conflicted with gender-related and cultural expectations. Derrington and Sharratt also reported women who have young children through high school age represent the lowest percentage of women in the superintendency. Gender, characteristics, and barriers faced by women kept many from pursuing the job of superintendent.

An additional barrier women face is that of low self-efficacy [3]. Dobie and Hummel (2006) discovered many times women question whether or not they have the ability to be a superintendent. According to Dobie and Hummel, finance and management is a critical role of a superintendent, and women, who are usually more experienced in curriculum and instruction, believe they are not competent in these areas.

School board members, at times, are blockers for women superintendents. Muñoz et al. [3] indicated often school board members do not see women as good finance managers and do not want women to lead school districts. When superintendent vacancies occur, usually search teams are employed. Search firms are essentially gatekeepers who may weed out women from the process. Skrla, Reyes, and Scheurich [19] stated during the hiring process unwritten criteria are employed hindering women candidates.

Since numbers of women in the superintendency remain low when compared to men, understanding who and what is currently being considered in the field is important. A content analysis of current U.S. dissertations provided insight in the numbers of researchers and the emphasis on women issues and the superintendency.

## 2.4. Content Analysis

Content analysis is useful to determine if there are trends and patterns in different documents on women superintendents [16]. The steps for content analysis determine: (a) which data are analyzed; (b) how are they defined; (c) what is the population from which they are drawn; (d) what is the context relative to which the data are analyzed; (e) what are the boundaries of the analysis; (e) what is the target of the inferences [16]. Content analysis was described by Leavy [17] as a methodical review of texts and other data forms and is a methodology developed from this idea that important information can be gathered from a thorough examination of artifacts [17], [10].

Content analysis was used among several researchers to ascertain content of theses, doctoral research, and dissertations. Weber's research [32] design for content analysis was used as a method to examine the themes displayed in dissertations pertaining to women superintendents. Using content analysis as a methodology was Horton and Hawkins [12]. These researchers conducted an analysis of 252 dissertations to find out if social work doctoral programs encouraged candidates to participate in intervention research. Another study implementing content analysis of dissertations was completed by Mete [27]. In this study, the purpose was to show

experiences of nursing students and their advisors by using theories and models displayed in their Ph.D. dissertations. Dirliki et al. [9] used content analysis methodology to analyze cooperative learning contained in 1993 to 2014 theses.

Theses and Ph.D. dissertations were analyzed using content analysis by Atmaca [5] to determine the similarities and differences of contextual features. Content analysis is a form of methodology used by researchers to analyze content of dissertations and the like.

## 3. Methods and Methodology

A content analysis was conducted with a systematic examination of the last three years (2014-2016) of U.S. dissertations published on the ProQuest database. ProQuest dissertations and theses databases are a major repository of dissertations. First a search was made on the ProQuest database for 2014 – 2016 dissertations with the key words, "female superintendents" and "women superintendents". If it was unclear if the dissertation was a match, then the abstract for the dissertation was read to determine if the study was related to female or women superintendents.

After the search was conducted and the dissertations downloaded, the reference lists were copied to a Word document. Each reference list was read to remove references not relating to the determined research terms of female or women superintendents. Citations including these terms were transferred and categorized on a table (Citation Table): superintendents, female, women, administrators, educational leadership, leadership, gender, and feminist. The Citation Table included these categories: (1) dissertation title; (2) Proquest number; (3) citation including author name; (4) publication type [peer-reviewed article, chapter, book, other (papers, presentations, blogs, etc.)].

In further analysis the Citation Table was sorted according to citations. Researchers reviewed the sorted Citation Table to determine the authors displayed. Then, the authors were counted to determine how many times each author's name was mentioned in the dissertations. For citations with multiple authors, each author's name frequency was counted.

To display the count for each author, the researchers created an additional table (Author Count) with these categories: (1) author (frequency the author's name appeared in the references lists); (2) count (the number of authors displaying the frequency). Author names and count were transferred to the Author Count Table. After the Author Count Table was completed, the table was sorted by count to obtain the frequency for the authors.

Dissertations are exhaustive research and usually focus on one topic; therefore, the review of literature section from the last three years of dissertations showcased the major research themes on female or women superintendents. The next analysis was of headings.

All of the headings in the Chapter two, Review of Literature, were typed into an Excel database. This document was imported to NVivo11, a software program to run a frequency "Word Query", to determine the major words used. Next, the Chapter two, Review of Literature in entirety for each dissertation was uploaded to NVivo 11 to ascertain themes. The use of NVivo 11 eased the management of a large volume of text-based data.

## 4. Analysis of Findings

There were 175,198 dissertations written in U.S. and published in Proquest for 2014-2016. Of these, 43, approximately .002 percent, pertained to topics concerning female or women superintendents.

After analysis of the 43 dissertations' reference lists and Review of Literature sections, the research questions for this study were answered. Following are data gathered and organized by research question.

### 4.1. Who are the major researchers cited in 2014 – 2016 U.S. dissertations pertaining to women superintendents?

The compilation of references yielded 1,946 cited references and 1,433 cited authors. The number of citations for each author ranged from one to 243. Most of the authors had one citation (636). This led to the determination of who were the leading authors for this research topic (frequency of 40 or more).

The analysis provided a snapshot of who was impacting scholarly work in the field of women superintendents in research. Table 1 outlines the frequency that an author's name was displayed on the references lists and the number of authors with the same frequency count.

For example, when viewing the table, it reveals that 636 authors were cited one time on the combined references lists. See Table 1.

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Table 1. Author Count

| *Frequency referenced* | *Number of authors* |
|---|---|
| 1 | 636 |
| 2 | 157 |
| 3 | 76 |
| 4 | 43 |
| 5 | 28 |
| 6 | 12 |
| 10 | 7 |
| 11 | 3 |
| 12 | 2 |
| 13 | 5 |
| 14 | 4 |
| 15 | 2 |
| 16 | 4 |
| 17 | 3 |
| 18 | 1 |
| 20 | 1 |
| 21 | 2 |
| 22 | 3 |
| 23 | 1 |
| 24 | 1 |
| 26 | 1 |
| 27 | 2 |
| 29 | 2 |
| 30 | 1 |
| 49 | 1 |
| 50 | 1 |
| 57 | 1 |
| *62* | *2* |
| 65 | 1 |
| 148 | 1 |
| 243 | 1 |

Authors who exhibited frequencies of 40 or more citations were Björk, L. G. (44); Brunner, C. C. (243); Glass, T. E. (59); Grogan, M. (160); Kowalski, T. (60); Shakeshaft, C. (55); [19], and Tallerico, M. (57). The latest publication dates in the 43 dissertation references lists cited ranged from 2004 to 2012 (see Table 2).

Table 2. Latest Publication Year of Frequently Cited Authors

| *Author* | *Year* |
|---|---|
| Björk | 2008 |
| Brunner | 2012 |
| Glass | 2007 |
| Grogan | 2011 |
| Kowalski | 2012 |
| Shakeshaft | 2011 |
| Skrla | 2008 |
| Tallerico | 2004 |

## 4.2. What types of documents are authors publishing to disseminate research findings?

Determining publication types included reading each citation, determining the publication type, and sorting the Citation Table according to type. After the sort, the frequency of publication types for the 43 dissertations were clustered.

Then, the researchers counted the number of times a publication type was displayed. Table 3 outlines the number of publications for the categories of peer-reviewed articles, books, chapters in books, and other (newspaper articles, magazine articles, papers, presentations, blogs, etc.). Most (965) of the publications were peer-reviewed articles.

Table 3. Publication Type

| *Articles* | *Books* | *Chapters* | *Other* |
|---|---|---|---|
| **965** | **542** | **180** | **108** |

## 4.3. What are the dominant themes in 2014 – 2016 U.S. dissertations pertaining to women superintendents?

An analysis of the literature reviews from all 43 selected dissertations was conducted for headings, subheadings, and frequency of words in the reviews. The headings and subheadings from all chapters were copied to a Word document. The document then was imported into the NVivo 11 software program.

A "Word Query" from NVivo was then conducted to determine the frequency of words in the headings and subheadings to ascertain the major themes. Table 4 displays the frequency of the words in headings and subheadings. The range of occurrences reported were seven to 185.

The literature review from the 43 selected dissertations provided a document of 790 pages in length. This analysis focused on the most frequent words used and provided a snapshot of the words that were the major content of the literature reviews. The word document with the combined dissertations was imported to NVivo 11 software program. A "Word Query" was conducted in NVivo with the results displayed in Table 5.

The most frequent words (above 1900 occurrences) in the combined Review of Literatures from the 43 dissertations were women/female, superintendents, leadership, school districts, and men/male.

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Table 4. Heading and Subheading Word Count

| *Word* | *Number* |
|---|---|
| Women/female | 185 |
| Superintendents | 131 |
| Leadership91 | |
| Theory | 60 |
| History/historical | 41 |
| Barriers | 38 |
| African American/black | 36 |
| Role | 34 |
| Gender | 27 |
| School | 27 |
| Feminist | 21 |
| Educational | 20 |
| Social | 19 |
| Research | 17 |
| Development | 11 |
| Cultural | 9 |
| Public | 9 |
| State | 9 |
| Context | 8 |
| Critical | 8 |
| Demographics | 8 |
| Framework | 8 |
| Approach | 7 |
| Board | 7 |
| Instructional | 7 |
| Mentoring | 7 |
| Networks | 7 |
| Position | 7 |
| Power | 7 |
| Professional | 7 |
| Review | 7 |
| Studies | 7 |
| Support | 7 |

Table 5. Chapter Two Review of Literature Word Count

| *Word* | *Number* |
|---|---|
| Women/female | 9,094 |
| Superintendents | 6,943 |
| Leadership3,385 | |
| School/districts | 2,967 |
| Men/male | 2,071 |
| African American | 1,978 |
| Study | 1,281 |
| Gender | 1,280 |
| Education | 1,047 |
| Positions | 1,045 |
| Role | 908 |
| Research | 836 |
| Barriers | 726 |
| Career | 694 |
| Social | 639 |
| Work | 603 |
| Board | 573 |
| Districts | 572 |
| Experience553 | |
| Power | 530 |
| Theory | 517 |

## 5. Discussion

The purpose of this study was to determine who were the cited authors, what were the chosen types of publications, and what were the major themes displayed in 2014-2016 U.S. dissertations referring to women superintendents. Review of U.S. dissertations findings indicated approximately .002 percent of the 2014-2016 U.S. dissertations in Proquest related to female or women superintendents.

Data for research question 1 (Who are the major researchers cited in 2014-2016 U.S. dissertations pertaining to women superintendents?) revealed 1946 cited references and 1433 cited authors. 636 authors were cited once with eight authors cited more than 40 times. Major researchers displayed were Björk, L. G.; Brunner, C. C.; Glass, T. E.; Grogan, M.; Kowalski, T.; Shakeshaft, C.; Skrla, L.; and Tallerico, M. When considering the number of U.S. dissertations (175,198), few (about .002 percent) related to female or women superintendents. Additionally, data revealed the latest years of publication ranged from 2004 to 2012 for the most referenced authors indicating dissertation candidates did not seek the most current research, some candidates did not update literature reviews prior to defense, or there was little current research in the area of female/women superintendents.

When considering research questions 2 (What types of documents are authors publishing to disseminate research findings?), data indicated most authors published in peer-reviewed journals (965). According to this study, peer-reviewed journals were where most current research on female or women superintendents was located. The second most often used type was books and third chapters. Findings showed doctorate candidates sought traditional publication types more than other types when crafting dissertations.

Data related to research question 3 (What are the dominate themes in 2014-2016 U.S. dissertations pertaining to women superintendents?) showed, after extracting more common terms like the words research, female/women, men/male, and superintendent, literature reviews contained these themes most frequently (over 2000 times): leadership and school districts. African American, gender,

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education, and positions were displayed in a range of 1045 to 1978 times. The themes of role, barriers, career, social, board, experience, and power occurred less often (530 to 908) showing areas where research can increase.

## 6. Conclusions

Women are underrepresented in the role of superintendent in the United States [29], [30], [1]. The 2014 – 2016 analysis of current U.S. dissertation research indicated study in the area of women superintendents remained a low priority with only about .002 percent (43 of 175,198) of U.S. dissertations focused on these issues. Educational leadership doctorate preparation programs can enhance critical need area research through assisting candidates with developing skills to methodically analyze current research to determine what important areas exist such as women in the superintendency and how to highlight those areas through research and publications. Also, doctorate program faculty can insist and encourage candidates to use current research.

Through further analysis of the authors cited in the dissertations, it was noted the dissertation authors cited research from major investigators [19] from the years 2004 to 2012. Most authors cited published in peer-reviewed journals and books. Further analysis is necessary to determine if there is more recent emphasis by these researchers and others on issues related to women superintendents.

Through an investigation of themes displayed in the 43 dissertations, beyond the terms women/female and superintendents and after removing terms occurring having little bearing on themes such as study and theory, the topics such as leadership, gender, school districts, African Americans, and position appeared often in the dissertations. Topics such as role, barriers, career, social, board, experience, and power occurred less often and may offer future researchers with gaps to pursue.

The researchers of this current study urge practitioners, doctoral candidates, and other researchers to continue and to increase publications with emphasis on women superintendents. Highlighting women superintendent issues will influence more women to enter the superintendency and more school boards and/or search teams to value women as school leaders. Through showcasing issues related to women superintendents, strategies can be discussed and implemented to address the low numbers of women superintendents in the field of education. In addition, this emphasis on women superintendents has the potential of drawing public attention to the discrimination of women in leadership roles.

## 7. References

[1] A. B. Derrington, G. Sharratt. “Female Superintendents: Breaking Barriers and Challenging Life Styles”, *Delta Kappa Gamma Bulletin,* Delta Kappa Gamma, Austin, Texas, 2009, pp. 8-12.

[2] A. Curthoys. “Gender Studies in Australia: A History”, *Australian Feminist Studies*, Australia, 2015, pp. 19-38.

[3] A. J. Muñoz, Pankake, A., Ramalho, E. M., Mills, S., and Simmonsson, M. “A Study of Women Central Office Administrators and Their Aspirations to the Superintendency”, *Educational Management Administration and Leadership,* 2014, pp. 764-784.

[4] A. Peters. “Elements of Successful Mentoring of a Women School Leader”, *Leadership and Policy in Schools,* 2010, pp. 108-129.

[5] Atmaca, C. “Comparison of Hedges in M. A. Theses and Ph.D. dissertations in ELT”, *ZfWT*, 2016, pp. 309-325.

[6] Brooks, A. and S. N. Hesse-Biber. “An Invitation to Feminist Research”, In S. N. Hesse Biber and P. L. Leavy (Eds.), *Feminist Research Practice*, Sage Publications, Thousand Oaks, California, 2007.

[7] C. C. Brunner, and Grogan, M. (2007). *Women Leading School Systems: Uncommon Roads to Fulfillment.* Rowman and Littlefield Education, Lanham, Maryland, 2007.

[8] D. F. Dobie and Hummel, B. “Successful Women Superintendents in a Gender-biased Profession”, *Equity and Excellence in Education*, pp. 22-28, DOI: 10.1080/1066568010340204, 2006).

[9] Dirliki, K. Aydin, and Akgün, L. “Cooperative Learning in Turkey: A Content Analysis of Theses”, Educational Sciences: Theory and Practice, 2016, DOI 1012738/estp.2016.4.0142, pp. 1252-1273.

[10] D. K. Nelli. “Gender Representation in U. S. Ed.D. Dissertations: A Feminist Content Analysis”, ProQuest Dissertations and Full Theses, 2014.

[11] D. R. Superville, “Few Women Run School Districts. Why?”, *Education Week*, 2016, pp. 9-10.

[12] E. G. Horton and M. Hawkins. “A Content Analysis of Intervention Research in Social Work Doctoral Dissertations”, *Journal of Evidence-Based Social Work,*

Routledge Taylor and Francis Group, 2010, DOI: 10.1080/15433710903344066, pp. 377-386.

[13] J. Acker. "Inequality Regimes: Gender, Class, and Race in Organizations", *Gender and Society*, Sociologists for Women in Society, Lawrence, Kansas, 2006, pp. 441-464.

[14] J. E., Whitaker. "Women in the Middle: A Qualitative Study of the Leadership Experiences of Women Central Office Administrators", (Doctoral dissertation). ProQuest dissertation database (# 3226986), 2006.

[15] Kowalski, T. J., McCord, R. S., Petersen, G. I., Young, P. I., and Ellerson, N. M. (2011). *The American School Superintendent 2010 Decennial Study*. Rowan and Littlefield Education, Lanham, Maryland, 2014.

[16] Knippendorff, K. *Content Analysis: An Introduction to its Methodology* (2nd Ed). Sage Publications, Newbury Park, California, 2004.

[17] Leavy, P. L. "The Feminist Practice of Content Analysis. In S. N. Hesse-Biber and P. L. Leavy (Eds.), *Feminist Research Practice: A Primer*. Sage Publications, Thousand Oaks, California, 2007.

[18] L. Searby, and Tripses, J. (2006). "Breaking Perceptions of 'Old Boys Networks": Women Leaders Learning to Make the Most of Mentoring Relationships.", *Journal of Women in Educational Leadership*, 2006, pp. 179-195.

[19] L. Skrla, Reyes, P., and Scheurich, J. J. (2000). "Sexism, Silence, and Solutions: Women Superintendents Speak Up and Speak Out", *Educational Administration Quarterly*, 2000, pp. 44-75.

[20] McLean, L.L., A. C. La Guardia, J. A. Nelson, and R. E. Watts. "Incorporating Adlerian and Feminist Theory to Address Self-objectification in Couple'sTtherapy, *Sage Publications*, Newbury Park, California, 2016.

[21] M. D. Young. "Shifting Away from Women's Issues in Educational Leadership in the US: Evidence of a backlash?", *International Studies in Educational Administration*, 2005, pp. 31-42.

[22] M. L. Derrington and G. Sharratt, "Female Superintendents: Breaking Barriers and Challenging Life Styles, *Kelta Kappa Gamma Bulletin*, Delta Kappa Gamma, 2008, pp. 8-12/

[23] M. Tallerico, "Gaining Access to the Superintendency: Headhunting, Gender, and Color", *Educational Administration Quarterly*, University Council for Educational Administration, 2000, pp. 18-43.

[24] M. V. Bañuelos, "Breaking the Silence: Gender Bias in the Top Ranks", *Leadership*, Association of California School Administrators, 2008, pp. 28-30.

[25] P. Mosendz. "5 Important Issues that Matter to Women in the 2016 Presidential Election," TeenVogue, [Internet], USA, March 2016, para. 15. http://www.teenvogue.com/story/important-womens-issues-2016-election. (Access Date: 30 November, 2016).

[26] S. A. Thomas "Theory and Practice in Feminist Therapy", *Social Work*, 1997, pp. 447-454.

[27] S. Mete. "Using a Nursing Theory or a Model in Nursing PhD Dissertations: A Qualitative Study from Turkey", *International Journal of Nursing Knowledge*, NANDA International, Inc., 2014, pp. 62-72.

[28] T. E. Glass, "Where Are All the Women Superintendents?", American Association of School Superintendents, [Internet], Alexandria, Virginia, 2000, para. 39.http://www.aasa.org/SchoolAdministrator Article.aspx?id=14492. (Access Date: 25 November, 2016).

[29] T. E. Glass, L. Björk, and C. C. Brunner, *The 2000 Study of the American School Superintendency*. American Association of School Administrators, Arlington, Virginia, 2000.

[30] T. E. Glass and L. A. Franceschini. *The State of the American Superintendency*. American Association of School Administrators, Alexandria, Virginia, 2007.

[31] T. Wiggins and C. Coggins, "Gender Bias in Superintendent Selection: A Projective analysis", *Journal of Educational Research*, American Education Research Association, 2001, pp. 115-120.

[32] Weber, R. P. *Basic Content Analysis. (2nd Ed.)* Sage Publications, Newbury Park, California, 1990.

[33] V. Singh, Vinnicombe, S., and Kumra, S. "Women in Formal Corporate Networks: An Organizational Citizenship Perspective", *Women in Management Review*, 2006, pp. 458-482.

# Literacies of Land: Decolonizing Narratives, Storying and Literature

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## Abstract

*As an Indigenous professor at a mainstream Canadian university, I focus on ways Indigenous and non-Indigenous students and professional practitioners explore Indigenous perspectives on literacies of Land (capital "L") within academia. Indigeneity and working within Indigenous contexts is first and foremost about reciprocity and relationships. These relationships involve an acknowledgement and understanding of cultural positionalities and relations of place. Using "First Voices" in culturally aligned and place conscious texts, stories, oral traditions, and symbolically rich themes that support literacies of Land as living and emergent, I explore the ways these literacies can inform decolonizing frameworks for exploring the importance of understanding and acknowledging place not only in literacy education but across all educational contexts for the benefit of all learners. Emphasis is placed on the philosophical nature of Land in relation to critical literacies that include narratives, storying, and literature together with constructions of self in relation to educational contexts. Storying refers to the ways we describe, by means of stories, our experiences through personal, community, national, and global narratives. Both storying and literacy are social constructions combining orality and narratives to communicate not only amongst individuals but also between human beings and their world.*

*Language is never neutral – it can teach us, inform us, entertain us, persuade us and manipulate us – it can misguide and misdirect truths thereby perpetuating colonial myths and stereotypical representations, or it can disrupt normalizing and hegemonic dominant discourses and liberate critical thought. Critical literacy encourages students to actively analyze and engage with meaning making through a variety of texts, media and popular culture looking for and exploring underlying messages and symbolic representations - in this case the ways Land is an articulation of ancient knowledges grounded in the experiences of self-in-relationship to place. Indigenous literacy is based on reading the cosmos - it is about reading all of the things around us that are not necessarily the written word but nevertheless contain valuable information.*

*One of the main goals of critical literacy is to open up opportunities for learners to understand themselves first and, through critical self-reflection and to gain a better understanding of each other and the ways power, privilege, and colonial relations continue to inform our ways of knowing and being in the world. The concept of Land as a philosophical underpinning along with understandings of self-in-relationship draw upon deeply intimate, sacred and ancient knowledges thereby centering, legitimizing, and grounding teaching and learning within Land as the primary foundation of all our teachings. Ancient knowledges are (re)membered*

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*experiences that form deeply intimate and spiritual expressions of our connections to Land.*

*Drawing upon instructor and student experiences from several courses, but more particularly from a course I developed and taught over several terms called Literacies of Land: Narratives, Storying and Literature I explore ways these literacies can inform decolonizing frameworks for exploring the importance of understanding and acknowledging place across all educational contexts for the benefit of all learners. Indigenous literacy is based on reading our world and the cosmos and opens opportunities for critically troubling and disrupting colonial myths and stereotypical representations embedded in normalizing, hegemonic discourses and relations of power and privilege while exploring Indigenous narratives across diverse educational contexts.*

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# The Importance of Social Support to Bullying Victims: A Case Study in Indonesia

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## Abstract

*Bullying behaviour among student creates problem at school. It affects to the school environment. In Indonesia, the bullying behaviours at school remain critical and complex. This case study was conducted to explore the importance of social support in reducing the prevalence of the bullying behaviours among victims. The Province of South Sulawesi was purposely selected for this study as its bullying cases were considered as high among other parts of Indonesia. Quantitative data were collected through a set of questionnaire from 545 respondents in six districts in the province. The result showed that the dominant effect on the victims was depression and they feel uncomfortable in their learning at school. It was also appeared that the teacher support was always regarded as a critical immediate help by the students especially in the classroom learning activities, followed by the parents and classmates. It is expected that every immediate people to the students such as the school, the teachers, the parents and the peers to be available when help is needed. This finding is expected to provide useful information for those who are involved in bullying prevention programmes, school administrative staff, teachers as well as the students.*

## 1. Introduction

Bullying is a worldwide problem that has deleterious effects on the school environment in general and the students in specific. It becomes a major concern of learners, parents, educators, and researchers to try to understand and to offer solution to the problems.

## 2. The Effect of Bullying

According to Blazer [1], bullying is not just a personal matter but more to holistic problem in the school and community which has deleterious effect on the school climate and students' rights in the secure and safe environment. The body of literature in bullying indicates that bullying is usually divided into two types: the direct and the indirect behaviour [2], [3]. Direct bullying behaviour is an attack done openly against the victims [4], [5], [3] and conducted face to face [2]. Indirect bullying behaviour is usually done in the form of socially isolating and intentionally excluding the victim from a group [3]. Hallford et al. [6] argued that bullying could consist of direct behaviours such as teasing, taunting, threatening, hitting, stealing and other physical behaviours and indirect behaviours also called relational bullying such as causing victims to be socially excluded or spreading rumours. In many ways however, bullying is normally manifested in physical bullying, verbal bullying and social relational bullying [7], [2].

Physical bullying can be categorised as hitting, kicking, beating, etc. This type of bullying can be fatal to students [7]. That is why, according to Coloroso [8] the most detectable type of bullying is physical bullying. The effect usually can easily be detected based on the physical changes as well as the psychological changes.

Verbal bullying, which is categorised as direct bullying such as showing low respect to someone or calling names towards a victim, has been acknowledged to be more often in the school playground as compared to physical bullying [9], [7]. Lee [2] and Coloroso [8] also looked at the issue from a slightly different angle by investigating the bullying types from a gender perspective. At this point, words are considered to be a powerful equipment that may reduce the spirit of the victim, those who receiving verbal bullying [8].

Relational bullying or also named social bullying is defined as a form of bullying that intends to create 'isolation' among individuals which can influence the person who have been isolated to withdraw from the social relationship [10]. The behaviour usually related to rejection, alienating and excluding individuals from society [11], [2]. According to Nixon [12] this indirect type of bullying emphasises on exclusion, alliance building, ignoring and social manipulation, including gossiping and spreading rumours [13]. Current development in the informational technology era such as internet and mobile phones has created a new way of bullying that is cyber bullying [14]**.** This type of bullying moved away from usual terms to something more sophisticated and complex through websites and online social networking over email, and/or by using text message over mobile phones [7]. **S**imilar to social, physical and verbal bullying, the bullies

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utilise messages, pictures, and website to broaden rumours, abuse, secrets, or threats to harm or socially exclude their victims [15].

Bullying is a behaviour which causes problems at school. It has gained the interest of many due to people concern as a result of crime [16] and as a result of mental, physical and academic problems [17] which affects both the bullies and the victims [1]. It has also become as a major problem among learners, parents, educators, and researchers which manifested through significant amount of researches in the past fifteenth years [18]. Moon, Hwang and Mc Cluskey [19] supported that the impact is widely carried out in many countries and consistently showed that school bullying is a global phenomenon and has detrimental impacts on students. In some respect, bullying can lead to serious problems at school.

Hawker and Boulton [20] revealed that in the long term bullying can cause school problems such as truancy and school drop-outs. These playing truancy and dropping out is usually a result of fearing coming to school [21]. A **s**urvey conducted by National Institute of Child Health and Human Development in USA [22] showed that bullying may hamper good relationship among classmates. Moreover, it can also trigger a fear of being the next victim which leads to the reduction in the feeling of safety among the students at school [23]. On the extreme cases Olweus [4] argued that the victims may also suffer from depression, loneliness, anxiety and suicidal thoughts. Some studies have even predicted that this effect will continue until adulthood (see Craig and Pepler [24] on substance used, domestic violence and other domestic crimes).

## 3. Social Support

Demaray and Malecki [25] posited that social support is absolute help behaviour that contributes as a protective aid to human being both physical and mental to somebody who suffers mental illness. Since the past two decades, social support has been measured in various ways. According to Demaray and Malecki [26] and Wenz-Gross and Siperstein [27], researchers who have identified social support have largely viewed social support as a massive construct without specifying the specific forms. Some trying to look based on issues such as direction, disposition, description/evaluation, content, and network (refer to Wenz-Gross and Siperstein [28] for more conceptual classification of social support). These issues reflected through the individual perception on what they are likely to have when they have problems. As such the social support indicators were constructed based on a person's perception of support from diverse sources.

Schaefer, Coyne and Lazarus [29] categorised the social support into five types, namely: emotional, esteem, network, information and tangible social support. Emotional support is a form of support that is related to an individual's emotional communication. These include the expression of care and concern. These expressions do not directly solve the problem but it can reduce or cure someone's negative mood. The esteem support is a support that encourages someone to take action and convince someone that they are able to cope with the difficult problem/s that they face. The network support is a support that focuses on the network available as support provider. Therefore, the members of network may receive and provide support in the situation they are facing. The information support provides worthwhile and needed information. Finally, the tangible support which refer to physical or concrete help to the victims. This type of support provides nonverbal communication support which is more important than word expressions [29].

Social support is crucial both in maintaining optimal life and also in reducing the likelihood of negative effect when someone experiences the stresses of life. Cobb [30] asserted the positive influence of social support in a typical picture of social support such as the feelings of belonging, being appreciated, and being valued/ esteemed in different interaction and environments. Social support was also sometimes regarded as a "buffer" which can be accessed by everyone who is in need [31], [32]. In some respects, social support might influence success at school. Students who get high social support from parents, friends and teachers show a range of positive results such as high school engagement, and academic achievement [33][34]. In contrast, low levels of social support are related with negative psychological, social, and academic outcomes, such as internalising and externalising behaviours, and low school engagement, social skills, self-concept, and adaptive skills compared to those with more social support [33], [26]. Lubber et al. [35] ascertained that approval by friends can support academic success. Therefore, teachers and classmates become the main provider of students' social support in school.

Caplan [36] conceptualise social support as "continuing social aggregates (namely, continuing interaction with another individual, a network, a group, or an organization) that provide individuals with opportunities for feedback about themselves and for validation of their expectations about others, which may offset deficiencies in these communications within the larger community context. One of the aspects that we emphasise on social support is the medium of the service whether verbal or nonverbal.

Previously Caplan [37] have suggested that social support systems were interrelated between individual and groups that encourage mastery, recommend assistance and supply comment about conduct and

character. Thus, from many concept and definition about social support above, we may conclude that social support is physical and psychological comfort, care, reward or help that is received from individual or group to eliminate negative feelings and/or thinking.

In the context of schools in Indonesia, the student's behaviours at school have become a main concern of the educational authority. However, many teachers and staff at school consider that bullying is a normal phenomenon in Indonesia [38]. Siswati and Widayanti [39] claimed that teachers and students lack the knowledge about bullying at school. Humonggio [40] also argued that since the awareness of bullying in Indonesia is very low, there are many cases harmful for students which presumably resulted from bullying. In fact, bullying behaviours at elementary and junior high schools are becoming critical.

The effects of bullying were no longer on the psychological but on the physical of the person. The actions have now changed to group bullying which sometimes could be fatal if not taken under control. There are cases where students suffered bleeding lips and mouth after being bullied by a group of students [41] during school orientation [42]. This group bullying shows incremental tendencies all over Indonesia which attracted serious attention by educational authorities including researchers and school teachers [43], [44], [45] for South Sulawesi schools where this case study was conducted, the bullying behaviours usually goes unreported. The reason for this is that the educational authorities are not aware of the occurrences. They tend to consider bullying as a normal part of school and not as a serious violence that should be curbed.

Statistically, between 2011 to 2012, the number of bullying cases is around 106 cases. These cases are only recorded in one sub region called Bone [46]. Another report from KPAI [47] revealed there is significant numbers of the total cases of bullying in schools in South Sulawesi province in 2009 around 1308 cases and it increased worryingly to 1696 cases in 2010. It was predicted that these figures would double for the South Sulawesi Province [46]. Another research about bullying in the Pangkep region concluded that students feel unsafe and uncomfortable when they are at school [42].

Teachers' social support at this point is crucial to social and academic achievement [34] and student interaction [48]. Davidson and Demaray [49] also reported that social support given by teachers can reduce the effects of bullying like stress and anxiety. According to Rensi and Sugiarti [50] support from family and classmates can significantly influence the students' achievement. This case study was conducted to explore the bullying effects and what kind of social support were expected by bullied students at school. These two variables are important to the understanding of the bullying nature at school. By large we managed to identify the support that we can provide in absorbing the magnitude of the behaviour to the student's learning especially in the classroom activities.

## 4. Methodology

A total of 545 senior high school students from six districts in South Sulawesi Province Indonesia namely Pangkep, Maros, Gowa, Luwu, Tator and Palopo were purposefully selected for the study. They were students who have personally experienced being bullied at school. These six districts were purposely selected due to relatively higher unreported bullying cases in South Sulawesi. The data was collected through a set of questionnaire which explored two main variables: the bullying effects and the social support expectance. Analysis of mean and percentages were executed to answer the research objectives.

## 5. Result

### 5.1. The Bullying Effect

The analysis was based on the mean and percentages of the students' responses. There were five constructs that were used to measure the effects of bullying namely depression, self-esteem, anxiety, academic achievement and shyness. These indicators were important in inferring the students' difficulties after being bullied.

Table 1. Effect on Depression

| Item | Mean | Level |
|---|---|---|
| I felt sad when someone or group of people bully me | 3.93 | High |
| I am difficult to concentrate on my lesson when I was bullied | 4.11 | High |
| I feel restless and cannot relax in the time when I was bullied | 4.27 | High |
| All joy and pleasure seem to have disappeared from my life | 4.32 | High |
| I feel confined and imprisoned when I was bullied | 4.28 | High |
| I find it hard to make decision when I was bullied | 4.28 | High |
| I begin paying less attention to my school work | 4.11 | High |

### 5.2. Depression

Table 1 above shows the degree of depression level that the students were experiencing after being bullied. The mean scores for every item were recorded as high. Four items recorded the highest were *joy and pleasure disappeared from life*

(mean=4.32; N=545), *confined and imprisoned* (mean=4.28; N=545), *hard to make decision* (mean=4.28; N=545) and *feeling restless and cannot relax* (mean=4.27; N=545).

### 5.3. Self-Esteem

Another interesting finding from this analysis is related to the unmotivated impact. More than half of the respondents felt demotivated in their life as the effect of bullying in their school. Frequency and percentage of the effect of bullying on self-esteem can be seen in Table 2 below.

Table 2. Effect on Self Esteem

| Item | Mean | Level |
|---|---|---|
| I began thinking that I did not have much to be proud | 3.42 | Moderate |
| I began feeling like I was ugly | 3.43 | Moderate |
| I began having less respect for myself | 3.40 | Moderate |
| I began something my skills as something negative | 3.46 | Moderate |
| I felt unmotivated in life | 3.41 | Moderate |
| I hate myself when I was bullied by someone or group of people | 3.42 | Moderate |
| I did everything wrong when someone bullying me | 3.46 | Moderate |
| I am not good at all | 3.41 | Moderate |

### 5.4. Anxiety

The other effect of bullying is anxiety. Quite similar to self-esteem effect, Table 3 below shows that the anxiety effect to the students was also moderate. In general however shows the tendency for the students to experience anxiety and it potentially increases if not treated well.

Table 3. Effect on the Anxiety

| Item | Mean | Level |
|---|---|---|
| I feel fearful for no reason | 3.21 | Moderate |
| I am easily alarmed, frightened, or surprised | 3.29 | Moderate |
| I have less interest in activities that I normally enjoyed | 3.23 | Moderate |
| I get nervous and confused when I was bullied by someone | 3.24 | Moderate |
| I am afraid that the other students or group of people laugh at me | 3.19 | Moderate |
| I feel like not going to school | 3.29 | Moderate |
| Bullying create fear and anxiety | 3.33 | Moderate |

### 5.5. Academic Achievement

Table 4 below displays the motivation to engage in the learning activities at school. The mean score recorded for every aspect measured was moderate. However in most situations the bullying does affect their academic performance at school. The actions in most situations affect their focus which in turn affects their school performance.

Table 4. Effect on Academic Achievement

| Item | Mean | Level |
|---|---|---|
| My school work suffered during time of bullying | 3.13 | Moderate |
| I am lazy to do my task when I was bullied | 3.06 | Moderate |
| I feel like to leave the school when I was bullied | 3.05 | Moderate |
| Bullying has negatively affected my academic | 3.11 | Moderate |
| I have done poorly on an exam and assessment at school caused by bullying | 3.20 | Moderate |

### 5.6. Feeling Shy

Bullying created mixed feeling and experience to the students. It seems like feeling shy is not a major effect of bullying. It suggested something different at the same time in a way that the behaviour created different responses such as anger or hatred. This can be seen in the Table 5 below where there responses distributed quite equally from one end not feeling shy to the other end of feeling shy.

Table 5. Effect on Feeling Shy

| Item | Mean | Level |
|---|---|---|
| I feel shy when somebody or group of people bullied me | 3.09 | Moderate |
| It embarrassed me when I was psychically bullied | 3.01 | Moderate |
| I feel shy when someone send me nasty word | 2.91 | Moderate |
| Being bullied make me shy to come forward | 2.90 | Moderate |
| It is embarrassed me when I was called terrible name | 2.96 | Moderate |

Statistically, from the five categories above, it is obvious that depression is the most significant effect of bullying at mean score of 4.18 followed by self-esteem at mean score 3.42, feeling anxiety at mean score 3.25, decreased in academic performance at 3.11 and feeling shy at 3.09 (see Table 6 below on overall mean score).

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Table 6. Mean Score of Bullying Effect

| Bullying Effect | Mean | Level | S.D |
|---|---|---|---|
| Depression | 4.18 | High | 0.57 |
| Academic Achievement | 3.11 | Moderate | 1.02 |
| Shy | 3.09 | Moderate | 1.08 |
| Anxiety | 3.25 | Moderate | 1.03 |
| Self esteem | 3.42 | Moderate | 1.02 |

### 5.7. The Social Support

The social support sources comprises of three sub construct such as teacher support, parent support, and classmate support. It appears that a moderate parental support (mean=3.24) is always available at any moment for the students. However, the teachers' social support is recorded as high (mean=4.10). As mentioned earlier, this could be related to the framework of perception of the participants towards the bullying experiences at school. Various potential reasons can be proposed such as the location and the time of the bullying itself which influence the support provider expectancies. Interestingly, the classmate support recorder the lowest score (mean=2.96) among the available support tested. It is assumed that although the experience of being bullied is a 'nightmare' to school activities but to share and to talk about it is difficult for most of the respondents. It is indicated that in many occasions the working with the school tasks were more expected in order for the victims to overcome those experiences.

To sum up, from the whole analysis data of social support sources above presents that teachers social support is the most frequent social support expected by the students. The data indicates that teachers' social support are greater in the mean score, while in classmates' social support and parent's social support mean score are relatively lower. (see Table 7).

Table 7. Score of Social Support Source

| Social Support Sources | Mean |
|---|---|
| Parents | 3.24 |
| Teachers | 4.10 |
| Classmate | 2.96 |

Further analysis of correlation was also executed to explain how the social support is correlated to the bullying effects. It appears that the social support is significantly related to the bullying effect ($r$=0.530; $p$=0.05). It is argued that the social support provided will have the potential of affecting the magnitude of the bullying effect on the students. Below is the core of the analysis of correlation between social support and the bullying effects among students. (see Table 8)

Table 8. Analysis of Correlation Between Bullying Effect and Social Support

| | Bullying Effect | Social Support |
|---|---|---|
| Correlation Coefficient | 1.000 | .530 |
| Sig, (2 tailed) | | .000 |
| N | 545 | 545 |

N=545; *p=.005*

## 6. Discussion

Depression is identified as the most frequent of detrimental effect of bullying in South Sulawesi schools Indonesia. This aligns to previous studies where the different forms of bullying in school such as physical bullying, social bullying, verbal bullying and cyber bullying causes direct effects to the bullying victims in the school [51]. It also supports the belief that bullying in childhood and adolescence have serious effects to the victims such as the feeling of loneliness, interpersonal problem and stress [52], [53], [54].

The participants have the tendency to experience restlessness, feel sad, imprisoned and less able to concentrate in school when they are bullied. In many occasions the bullying victims were prone to have many deleterious effects when students are bullied such as depression, low self-esteem, feeling of shyness and anxiety [55] and health problems [33], [56]. Other studies highlighted a more serious effect such as post-traumatic stress and suicide [17], [57], [54].

The negative effect of bullying is substantial. Many studies have revealed that the victims developed potential depression, loneliness, and physical health [58], [59], [60] which in turn will result in low academic achievement at schools. Several studies have also acknowledged depression as a detrimental effect of bullying and associated with suicide cases. Kaltiana-Heino and Fröjd [58] stated that bullying victims are more likely to have depression symptoms and plan to commit suicide. Although the current study does not investigate the deeper effects of depression such as suicide, but the complaints by the respondents to experiencing imprisonment and cannot concentrate in their study indicated similar potential effect of bullying may lead to negative behaviour including suicide.

The findings indicate the importance of social support in reducing the magnitude of impact of bullying among students. Cohen et al. [61] proposed that social support could provide positive feelings such as love, self-esteem and belonging to avoid low self-esteem and alienation in their environment. Furthermore, they claim that social support can also be protective and causes reductions in the negative effect of bullying. Students who experienced depression and stress, according to their study will

have better psychological feeling stability, safe, and personal worth from the social support that they received.

The has strengthened previous findings that the level of depression and stress are significantly related with support from adults. This will in in turn to increase the self-esteem [62].

One way to assess the panacea of the social support is acknowledged by Rigby and Slee [63]. They found that there is a significant influence between the suicidal effect and social support. Those who received enough social support especially support from their parents have less tendencies to commit suicide. Similarly, Davidson and Demaray [49] identified that social support among the bullies and victims are associated with the buffer from detrimental effect of bullying and distress. They proposed that the effect of bullying is reduced when the level of perceived of social support increased. In a similar study conducted in 19 schools in England, the result identified that more than half those respondents who inform their current situation to adult support such as parent and teachers improved and their problem was solved [64].

The current research clearly supports some previous findings and indicated the positive influence of social support on the students' outcome. Depression and delinquency are connected with social support [65], stress and depression with parent and classmate support [52]. It is also acknowledged that lower academic achievement is much influenced by the availability of the social support for the students [66][67].

In some respect, the effect of bullying such as low academic achievement and low self-esteem significantly associated to social support provider [68]. It is proven that the students' perception about social support in the school are strongly connected with the sense of school belonging [69] and better academic performance [70].

## 7. Recommendation

The functions of social support are critical to the personal well-being of the bullying victims. Bullying effects such as depression, academic achievement, stress and feeling shy could influence the way the social support provider acts. The support that students receive is identified as tools for the students to reduce the impact of the negative experience. In other words, the supportive connectedness to students towards parents, teachers, classmates and counsellors are crucial to reduce the psychological effect of bullying and increase an adjustment. Several recommendations can be highlighted as follows:

1. Schools, teachers, parents and peers should always aware and available if help is needed
2. Especially teachers, their awareness upon the problems faced by the students is crucial
3. The bullying behaviours should be considered as interconnected matters
4. Specific programmes related to student's behaviour is recommended

## 8. Conclusion

Past studies have examined the support that the students received in school and at home are critical in bullying situation. Less teachers support have facilitated the increasing number of bullying in the school and in fact in some cases affected the individual psychological well-being [3]. Although the social support sources have long been connected with psychological well-being, and in particular, depressive symptoms, few studies have examined the causal association between social support and depressive symptoms. This study had showed that there is evidence that social support is very crucial in maintaining someone's well-being.

The continuity of research on the relation between social support and effect of bullying (depression, anxiety, feeling shy, low self-esteem, low academic achievement) will enable us to understand better the positive effect of social support towards the detrimental effect of bullying. The result of the research found that depression among students should be brought to attention to prevent students' depression, therefore, optimising their environment for learning.

By examining the nature of the behaviours and its effects to the student's learning, school staff are able to devise specific approach or intervention such as social support. In this sense, more studies will be initiated and conducted in order to understand the behaviour such as the involvement, the effects, the factors underlying the behaviours and so forth.

## 9. References

[1] C. Blazer. "Literary review on bullying research services." Miami, Florida. Retrieved from http://drs.dadeschools.net/Reports/Bullying.pdf. (2005). (Access Date: 29 November 2016).

[2] C. Lee. Preventing bullying in schools a guide for teachers and other professionals. London: Paul Chapman Publishing. (2004).

[3] M.J. Boulton, M. Trueman, and I. Flemington. "Associations between secondary school pupils' definitions of bullying, attitudes towards bullying, and tendencies to engage in bullying: Age and sex differences", Educational Studies, 28(4), 2002, pp. 353–370.

[4] D. Olweus. Bullying at School: What We Know and What We Can Do. Understanding Children Worlds (p. xii, 140p.) Blackwell. Retrieved from http://www.amazon.co. uk/dp/0631192417. 1993. (Access Date: 21 December 2016).

[5] J.D. Smith, J.B. Cousins, and R, Stewart. "Anti-bullying Interventions in Schools: Ingredients of Effective Programs", Canadian Journal of education, 28(4), 2005, pp. 739–762.

[6] A. Hallford, C. Borntrager, and J.L. Davis. "Evaluation of a bullying prevention program". Journal of Research in Childhood Education, 21(1), 2006, pp. 91-101.

[7] K. Berger. "Update on bullying at school: Science forgotten?", Developmental review, 27(1), 2007, pp. 90–126.

[8] B. Coloroso, B. The bully, the bullied, and the bystander. New York: Harper Collins Publisher. (2003).

[9] J.Z. Elizabeth. School Counsellor Perspective on Bullying Behaviour In Urban Middle School Setting. Northampton, Massachusetts. (2009).

[10] N. Crick, D. Nelson, J. Morales, C. Cullertonsen, J. Casas, and S. Hickman. Relational victimization in Childhood and adolescence. In J. Juvonen and S. Graham (Eds.) School- based peer harassment; The Plight of vulnerable and victimized (pp.196–214). New York. (2001).

[11] N. Crick, J. Casas, and D. Nelson. "Toward a more comprehensive understanding of peer maltreatment: studies of relational victimization". Current Directions in Psychological Sciences, 11, 2002, pp. 98–101.

[12] C. Nixon. "Peering into the world of covert aggression: Relational aggression". Paper presented at National Bullying Prevention Conference. Atlanta, Georgia. (2005)

[13] E. Young, A. Boye, and D. Nelson. "Relational aggression: Understanding, identifying, and responding in schools". Psychology in the Schools, 43(3), 2006, pp. 297–312.

[14] J. Blair. New breed of bullies torment their peers on the Internet. Education Week, 22(21). Retrieved from http://global.factiva.com.web.lib.lib.umt.edu: 048/ha/ defaultaspx. (2003). (Access Date: 19 December 2016).

[15] J. Raskauskas. "Text-bullying: Associations with traditional bullying and depression among New Zealand adolescents". Journal of School Violence, 9, 2010, pp. 74–97. doi:10.1080/15388220903185605.

[16] J.A. Dake, J.H. Price, S.K. Telljohann, and J.B. Funk. "Teacher perceptions and practices regarding school bullying prevention". The Journal of School Health, 73(9). 2003, pp. 347-355.

[17] G. Anderson. The impact of bullying in school on the adolescents' sense of self. University of Pretoria. (2007).

[18] W.M. Craig, K. Henderson, and J. Murphy. "Prospective teachers' attitudes toward bullying and victimization". School Psychology International, 21(1), 2000, pp. 5–21.

[19] B. Moon, H.W. Hwang, and J.D. Mc Cluskey. "Causes of School Bullying: Empirical Test of a General Theory of Crime, Differential Association Theory, and General Strain Theory". Crime and Delinquency, 57(6), 2008, pp. 849–877. doi:10.1177/0011128708315740.

[20] D.S. Hawker and M.J. Boulton. "Twenty years research on peer victimization and psychosocial maladjustment: A meta-analytic review of cross-sectional studies". Journal of Child Psychology and Psychiatry, 41, 2000, pp. 441–455.

[21] K.A. Berthold and J.H. Hoover. "Correlates of Bullying and Victimization among Intermediate Students in the Midwestern USA". School Psychology International 21(1), 2000, pp.65–78. doi:10.1177/0143034300211005.

[22] T. Nansel, M. Overpeck, R. Pilla, W. Ruan, B. Simons-Morton, and P. Scheidt. "Bullying behaviours among US youth: Prevalence and association with psychosocial adjustment". Journal of the American Medical Association, 285, 2001, pp. 2094–2100. doi:10.1001/jama.285.16.2094.

[23] D. Cooper and J.L. Snell. "Bullying - not just a kid thing". Educational Leadership, 60, 2003, pp. 22-25.

[24] W.M. Craig and D.J. Pepler. "Understanding bullying: from research to practice". Canadian Psychology, 48(2), 2007, pp. 86-94.

[25] M.K. Demaray and C.K. Malecki. "Importance ratings of socially supportive behaviors by children and adolescents". School Psychology Review, 32, 2003, pp. 108–131.

[26] M.K. Demaray and C.K. Malecki. "Critical levels of perceived social support associated with school adjustment". School Psychology Quarterly, 17, 2002, pp. 213–241.

[27] M. Wenz-Gross and G. Siperstein. "Students with learning problems at risk in middle school : Stress, social support and adjustment". Exceptional Children, 65, 1998, pp. 91–100.

[28] Junainor Hassan, Salleh Abd Rashid, Suliadi Firdaus Sufahani, Mohd Kasturi Nor Abd Aziz. "Buli Di Kalangan Pelajar Sekolah Rendah Luar Bandar: Kajian Kes Di Kawasan Felda Utara Kedah-Perlis, Malaysia (Bully Among Rural Primary School Students: A Case Study Of North Kedah-Perlis Felda Territory, Malaysia)". Jurnal Psikologi Malaysia, Vol. 30 (1), 2016, pp. 113-125.

[29] C. Schaefer, J. Coyne and R. Lazarus. "The Health Related Function of Social Support". Journal of Behavioral Medicine, 4, 1981, pp. 381–406.

[30] S. Cobb. "Social support as a moderator of life stress. Social support as a moderator of life stress". Psychosomatic Medicine, 38(5), 1976, pp. 300–314.

[31] P. Vedder, M. Boekaerts and G. Seegers. “Perceived social support and well being in school: The role of student ethnicity”. Journal of Youth and Adolescence, 34(3), 2005, pp. 269–278.

[32] S. Cohen and T.A. Wills. “Stress, social support, and the buffering hypothesis”. Psychological Bulletin, 98(2), 1985, pp. 310–357.

[33] A.B. Brewster and G.L. Bowen. “Teacher Support and the School Engagement of Latino Middle and High School Students at Risk of School Failure”. Child Adolescent Social Work Journal, 21(1), 2004, pp. 47–67. doi:10.1023/B:CASW.0000012348.83939.6b

[34] J. Chen. “Relation of academic support from parents, teachers and Peers to Hong Kong adolescents’ academic achievement: The mediating role of academic engagement”. Genetic, Social, and General Psychology Monograph, 131(2), 2005, pp. 77–127.

[35] M. Lubbers, M.P. Van Der Werf, T.A. Snijders, B.P. Creemers and H. Kuyper. “The impact of peer relations on academic progress in junior high”. Journal of School Psychology, 44(6), 2006, pp. 491–512.

[36] G. Caplan. The family associal support In G.Caplan and Killilea (Eds.), Social support and mutual help. New York: Grone and Stratton. (2006).

[37] G. Caplan. Support systems and community mental health. New York:: Behavioral Publishing. (2004).

[38] T. Rudi. “Informasi Perihal Bullying”. Retrieved from http://bigloveadagio.files.wordpress.com/2010/03/informasi_perihal_bullying.pdf. (Access Dates: 29 October 2016)

[39] S. Siswati and C.G. Widayanti. “Fenomena Bullying di Sekolah Dasar Negeri Di Semarang”, Jurnal Psikologi Undip, 5(2), 2009, pp. 114-126.

[40] W. Humonggio. Managing and Leading Anti-Bullying Policy at School. Flinders University, South Australia. (2007).

[41] N. Widhi. “Lima kasus bullying SMA di Jakarta. Jakarta”. Retrieved from http://news.detik.com/read/2012/07/31/105747/1979089/10/2/. (Access Date: 27 December 2016)

[42] I. More. “Polisi siap proses laporan bullying di SMA Don Bosco, Jakarta”. Retrieved from http://edukasi.kompas.com/read/2012/07/26/17455250/Polisi.Siap.Proses.Laporan.Bullying.di.SMA.Don.Bosco. (Access Date: 10 October 2016).

[43] B. Hinitz, M. Shore and A. Kumara. (2010). “Making Anti-Bullying Research a Part of Early Childhood Classroom Practice in Comparative International Context: The United States and Indonesia”. Retrieved from http://psikologi.ugm.ac.id/uploads/resources/File/Database%20Penelitian%20Dosen/combined_manuscript.pdf. (Access Date: 1 February 2017).

[44] KPAI: “Pelaku dan Korban Bully SD Bukit Tingi Harus Peroleh Sentuhan Psikologis”. Retrieved from http://www.republika.co.id/berita/nasional/hukum/14/10/13/ndd6yq. (Access Date: 5 January 2017).

[45] “Bullying, Kekeliruan yang Membudaya”. Retrieved from http://www.republika.co.id/berita/nasional/hukum/14/10/13/ndd6yq. (Access Date: 3 December 2016).

[46] M. Madjid. “106 Kasus kekerasan terhadap perempuan. Watampone”. Retrieved from http://jakarta.tribunnews.com/2012/03/04/terjadi-106-kasus-kekerasan-terhadap-perempuan-di-bone. (Access Date: 3 November 2016).

[47] KPAI. “Kekerasan Seksual Anak Meningkat. Makassar”. Retrieved from http://www.ujungpandangekspres.com/view.php?id=54889 (Access Date: 3 December 2016).

[48] S. Pavri and L.M. Amaya. “Social Support in Inclusive Schools: students and Teacher perspective”. The Council for Exceptional Children, 67(3), 2001, pp. 391–411.

[49] L.M. Davidson and M. Demaray. “Social support as a moderator between victimization and internalizing/externalizing distress from bullying”. School Psychology Review, 36, 2007, pp. 383–405.

[50] Rensi and Sugiarti, L. (2010). Dukungan sosial, konsep diri, dan prestasi belajar siswa SMP Kristen YSKI Semarang. Jurnal Psikologi, 3(2), 148–153.

[51] Raskauskas, J., and Stoltz, A. (2004). Identifying and intervening in relational aggression. Journal of School Nursing, 20, 209–215.

[52] C.K. Malecki and M.K. “The role of social support in the lives of bullies, victims, and bully-victims”. In D.L. Espelage and S.M.Swearer (Eds.), Mahwah, NewJersey: Lawrence Associate. Bullying in American schools: A social-ecological perspective on prevention and intervention (pp. 221–225). Mahwah, New Jersey: Lawrence Erlbaum Associates. (2002).

[53] H. Cowie, P. Naylor, I. Rivers, P.K. Smith and B. Pereira. “Measuring workplace bullying. Aggression and Violent Behavior”, 7, 2002, pp. 33–51.

[54] M. Agervold and F. Mikkelson. “Relationships between bullying, psychosocial work environment and individual stress reactions”. Work and Stress Journal, 18, 2004, pp. 336–351.

[55] M. Leary, R. Kowalski, L. Smith and S. Phillips. “Teasing, rejection and violence: Case studies of the school shootings”. Aggressive Behavior, 29, 2003, pp. 202–214.

[56] K. Sullivan, M. Cleary and G. Sullivan. Bullying in secondary schools. London: Paul Chapman Publishing. (2004).

[57] Nourhagen, Nielsen, A., Stigum, H., and Kohler. (2005). Parental Reported Bullying Among Nordic

Children. Child Care Health, 31(6), 673–701. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/16207227 (Access Date: 30 November, 2016)

[58] R. Kaltiala-Heino and S. Fröjd. "Correlation between bullying and clinical depression in adolescent patients". Adolescent Health, Medicine and Therapeutics, 2, 2011, pp. 37-44. doi: 10.2147/AHMT.S11554.

[59] Y.S. Kim, B.L. Leventhal, Y.J. Koh, A. Hubbard, W.T. Boyce. "School bullying and youth violence: causes or consequences of psychopathologic behavior?" Arch Gen Psychiatry, 63(9), 2006, pp. 1035-41. DOI: 10.1001/arch psyc.63.9.1035

[60] M. Fekkes, F. Pijpers, A. Fredriks, T. Vogels, S. Verloove-Vanhorick. "Do bullied children get ill, or do ill children get bullied?: A prospective cohort study on the relationship between bullying and health-related symptoms". Pediatrics. 117, 2006, pp. 1568–1574.

[61] J. Devine and J. Cohen. Making your school safe: Strategies to protect Children and Promote Learning. New York: Teacher College Press. (2007).

[62] M. Meraviglia, H. Becker, B. Rosenbluth, E. Sanchez, and T. Robertson. "The expect respect project: Creating a positive elementary school climate". Journal of Interpersonal Violence, 18(11), 2003, pp. 1347–1360.

[63] K. Rigby and P. Slee. "Suicidal ideation among adolescent school children, involvement in bully-victim problems, and perceived social support". Suicide life threatening behavior, 29(2), 119–130. Retrieved from http://research.bmn.com/medline/search/results?uid=MDL N.99336303. (Access Date: 5 January 2017).

[64] P.K. Smith and P. Brain. "Bullying in Schools : Lesson from Two Decades of Research". Aggressive Behaviour, 26, 2000, pp. 1–9.

[65] P.K. Smith and S. Shu. "What Good Schools Can Do About Bullying: Findings from a survey in English schools after a decade of research and action". Childhood, 7 (2), 2000, pp193–212.

[66] G. de la Iglesia, J.B. Stover and M.F. Liporace. "Perceived Social Support and Academic Achievement in Argentinean College Students", Europe's Journal of Psychology, 10(4), 2014, pp. 637-649. doi:10.5964/ejop.v10i4.777

[67] J.F. Mattanah, L.J. Brooks, B.L. Brand, J.L. Quimby and J.F. Ayers. "A social support intervention and academic achievement in college: Does perceived loneliness mediate the relationship?", Journal of College Counseling, 15(1), 2012, pp. 22-36.doi:10.1002/j.2161-188 2.2012.00003.x

[68] J.F. Mattanah, J.F. Ayers, B.L. Brand, L.J. Brooks, J.L. Quimby and S.W. McNary. "A social support intervention to ease the college transition: Exploring main effects and moderators". Journal of College Student Development, 51(1), 2010, pp. 93-108. doi:10.1353/csd.0. 0116

[69] K. Siris and K. Osterman. "Interrupting the cycle of bullying and victimization in the elementary classroom". Phi Delta Kappan, 86(4), 2004, pp. 288–191. Retrieved from http://www.kappanmagazine.org/ content/86/4/288. Abstract. (Access Date: 23 November 2016).

[70] P. Flaspohler, J. Elfstrom, K. Vanderzee, H. Sink and Z. Birchmeier. "Stand by me: The effects of peer and teacher support in mitigating the impact of bullying on quality of life". Psychology in the Schools, 46(7), 2009, pp. 636–649.

# The Mechanism and Effectiveness of Music Therapy for Non-fluent Aphasia Patients in Relation to the Right Hemisphere

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## Abstract

*Music Based Therapy has largely been used for the treatment of patients with non-fluent aphasia. Currently, its efficiency and mechanism is being probed to provide better understanding of the etiology of such disorders, focusing primarily on the right hemisphere. The current study offers a detailed exploration of the neuroanatomy of speech and how effective and widely used music therapy, such as Music Intonation Therapy (MIT), could enhance current treatment strategies, and offers insights into the importance of the right hemisphere in the speech recovery. Furthermore, the co-relation between grey matter and language recovery, which is crucial in recuperating stroke patients, is examined. Moreover, the potential links implying that music therapy may increase the volume of grey matter in right hemisphere would revolutionize current therapy is examined so that concerned individuals may have a better chance of rehabilitation and lead a normal life.*

## 1. Introduction

Music therapy, the intoned based therapy, is effective for non-fluent aphasia patients who have difficulty producing meaningful words or sentences due to the lesion in the brain that usually occur after stroke. Specifically speaking, it is left-hemisphere lesions (in right-handed people) after stroke that often cause severe non-fluent aphasia, which typically does not have a natural recovery or recovery from conventional speech therapy. Though, there has not been an unified rule stating which is the most effective treatment for severe non-fluent aphasia, the music therapy has proven effective for non-aphasia patients.

The purpose of this article is to explore the effectiveness and mechanism of music-based therapy for non-fluent aphasia. Initially, it describes the mechanism of language processing in the brain, particularly the Broca's area (Speech control) and Wernicke's area (Language comprehension), which explains the neuroanatomy of speech and etiology of Aphasia.

Furthermore, among all the music-based treatments, Melodic Intonation Therapy (MIT) is the best known and has been studied extensively through neuroimaging. Starting from MIT, this review outlines the main feature of MIT, which is the use of intoned speech, a technique in which the clinician stylizes the prosody of short sentences using simple pitch, rhythm pattern, and the use of left hand tapping. Accordingly, neuroimaging research has provided evidence that there is a shared pathway in the brain for processing speech and singing; consequently, language disorders may benefit directly from singing exercise, including non-fluent aphasia. Though language rehabilitation is a long-term process, most therapists would agree that a patient shows improvement in speech output if they are able to gradually transit the speech ability to untrained language, which are the words or sentences that are not trained during the intervention session, structures, or context [1]. Generally the amount of Correct Information Units (CIU) in a speech sample measures the connected speech improvements in functional communication. This measurement has been validated to assess language in the connected speech of people with aphasia and healthy individuals [2]. It is therefore important to determine the mechanism behind the MIT, why it works better than traditional speech therapy, and the roles that rhythm and pitch play in the treatment effect. Based on these inquiries, [9][3] has found that there are four mechanisms of the therapeutic effects of melodic intonation therapy: the reduction in speed, syllable lengthening, syllable chunking, and engagement of right-hemispheric articulatory sensorimotor network.

Except MIT, the article also reveals other seven effective music-based speech therapy techniques for non-fluent aphasia in terms of articulation, fluency, prosody, and breath control, which were concluded from observation and studies based on seven non-aphasia patients conducted by Tomaino. Noticing the common characters of music-based therapy, the current review proclaims the speculation on the inducive effective of music on the grey matter based on the recent study done by Xing et al. [4], which has found that the volume of grey matter in the right hemisphere of stroke patients with aphasia positively correlates with the ability to recover language and

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may provide a new vantage point for further research in the area of music-based speech therapy in non-fluent aphasia patients.

## 2. Neuroanatomy of Speech and Language and Etiology of Aphasia

Verbal communication, the oral form of language presentation, plays an important part in daily life. From the conceptualization of an idea, to the production and articulation of conversation, King [5] reviewed multiple parts of the brain that are involved in this complicated process. Azar states that it is time to look past antiquated psychology textbooks that only highlight two main language centers in the brain-Wernicke's area in the temporal lobe and Broca's area in the frontal lobe (as cited by King [6]) express the coexisting idea that "numerous brain areas are recruited in speech production and that they hang in a precarious balance that is easily affected by neurological disease and dysfunction." (p. 1461). However, a comprehensive basic brain structure (as indicated in Figure 1) review is beyond the scope of this review paper; more graphs will be focused on the non-aphasia related brain parts.

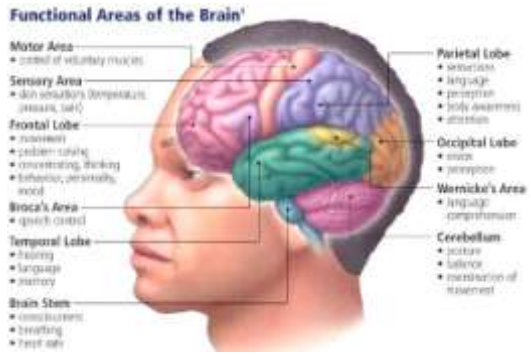


Figure 1. Basic structure of the brain from Human Brain Facts

Aphasia, a neurological disorder, can be grouped into two types: fluent aphasia and non-fluent aphasia. Fluent aphasia closely relates with lesions in Wernicke's area, a cylindrical- shaped section in the temporal lobe of the language dominated hemisphere, usually left hemisphere, while non-fluent aphasia results from the trauma in Broca's area, a region in the frontal lobe of the left hemisphere. It is a disorder of language that can lead to "Convoluted syntax and meaning" [7].

The Broca's area is named after the French surgeon Paul Broca, who found that it plays a crucial part in the generation of speech. Broca's area constitutes a significant portion of the Cerebral Cortex, which has been recognized to be a critical component of speech related disorders. Brodmann, a German neurologist, first identified the classification system of cerebral cortex, which is widely used by speech language pathologists even today.

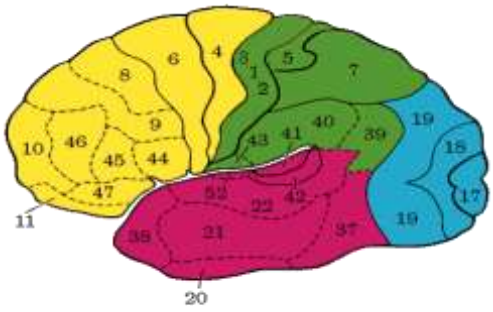


Figure 2. Brodmann's system from Human Bran and Facts

Figure 2 shows his system. Three components of language could be more or less affected by the aphasia due to its severity and lesion locations: cognition, linguistics and pragmatics [8]. Nonfluent cases may cause impaired speech output, while fluent cases do not. Non-fluent aphasia, also named Broca's aphasia because the Broca's area of non-aphasia patients, was found to consist of the posterior inferior frontal gyrus surrounding Brodmann's area 44 and 45 [9]. This is heavily featured by non-fluent verbal output with shortened phrases, incomplete sentences and disturbances in prosody [10]. Speech language therapists tend to embrace negative expectation on the natural recovery from severe non-aphasia, and the traditional speech based therapy does not show any effective result either. Schlaug et al., (2010), state that most post-strike language intervention used in the subacute and chronic stroke phases are administered by speech therapists who evaluate the patient's individual needs and use a combination of techniques tailored to the individual patient's impairment profile. At present, there are no universally accepted methods or a 'Gold Standard' for the treatment of severe nonfluent aphasia against which new or existing interventions can be compared, nor has any criteria been established for measuring meaningful treatment efficacy.

Nevertheless, most therapists, clinicians and researchers in the aphasia field would probably agree that a treatment should be considered effective if a patient shows improvement in speech output the generalizes to un trained language structures and/or contexts.

However, the music therapy for non-fluent aphasia was first put forward by neurological researchers Albert, Sparks, and Helm [13] who developed MIT at first place. MIT has long been regarded as promising treatment by some therapists, and it has been noted that certain stroke patients with aphasia have unimpaired musical skills, especially the ability to sing [11]. Since several studies have

shown that right hemispheric regions are more active during singing than speaking, which enables the music therapy to be a potential effective treatment for non-fluent aphasia, considering singing might activate patients' right hemisphere to compensate for their left hemisphere, where the lesion is located. However, there are still questions about the relationship between music and language and the mechanism of efficient music therapy.

## 3. Brain Hemispheres and Language Recovery

According to statistics, the left-hemisphere is the dominant hemisphere for language in 95% of right-handed people, including people with non-aphasia. Surprisingly, there is no unified saying that hemisphere controls the after-stoke language recovery. Since late 19th century, the significant role of the right hemisphere in aphasia recovery has been put forward and discussed, which was triggered by the evidence of right hemisphere's involvement in aphasia recovery starting with Barlow's 1877 study of a boy who developed aphasia after a stroke involving Broca's area and who recovered from aphasia but later worsened again after another stroke to the same location in the right hemisphere. However, previous studies done by Cappa and Vallar, and Heiss, Kessler, Thiel, Ghaemi, and Karbe [3] have led to a general consensus regarding the role of left and right hemisphere in recovery from aphasia that there are two routes to recovery, which has been used by many speech therapists as guidance and rationale when designing the treatment plans afterwards. In other words, for patients who have small or mild lesions in the left hemisphere, the language dominant hemisphere, it shows that the left hemisphere perilesional cortex tends to be involved with recovery together with right- hemisphere of the same region in the recovery process [3]. For patients who have serious left-hemisphere lesions that involve the Broca's area, the only recovery path is through the recruitment of homologous language and speech motor regions in the right hemisphere [9].

## 4. Link Between Music and Language

The link between music and language has been found in previous research and is commonly accepted by speech therapists who engaged in daily practical work. Even before birth, the fetus starts the process of language development. In the third trimester of pregnancy, after the development of ears, the external sounds are perceived by the fetus. Because babies are sensitive to high pitches, if the words are expressed in an exaggerated 'Sing-Song" voice, it will be much easier to attract their attention. Infants naturally have the tendency to imitate, react, match and vocalize maternal sounds and speech [12]. When infants are around 8-20 months old, they will present the first signs of gross oral activities, which are required for speech development. Draper proposed that these learning abilities in infants are pre-musical or pre-linguistic, which emphasizes the close relationship between music and language. Based on this explanation, it could be argued that musical ability is possibly embedded in human nature from birth [11].

There also exists a link between music and language in people who have speech and language disabilities. In terms of singing, it has been observed and concluded that some stroke patients with aphasia have unimpaired singing skills. This finding has led to the development of MIT [13], one of the music-based treatments for non-aphasia patients. Evidence suggests that MIT has specific benefits for the recovery of non-aphasia following stroke.

## 5. MIT

According to Zunbansen [14], MIT is a combination of rhythm and pitch relating to music therapy that aims to improve untrained speech ability of non-fluent aphasia patients. This is based on the fact that most severely aphasia patients are able to produce well-articulated, linguistically error-free words while singing, but not during speech in terms of the same words.

MIT is a systematically structured treatment that aids in exaggerating the normal melodic content of speech. According to Schlaug [9], the two unique elements set it apart from other music- based language therapies:

1. The melodic intonation with its inherent continuous voice
2. The rhythmic tapping of each syllables using the left hands.

By using only two pitches, prosodic speech patterns (spoken phrases) can be translated into melodically intoned patterns. The higher pitch stands for the syllables that are supposed to be stressed during regular speech. At the basic level, patients would only be asked to sing a series of two-syllable words or phrases, such as 'Water' 'Ice-Cream' or 'Bath-room', or simply speak two or three syllable daily use phrases, such as 'I'm thirsty.' 'Coffee, please.' This would gradually be replaced by some lengthened phrases. Another crucial feature of MIT is the left-hand tapping as it triggers the activity of right-hemisphere in the sensorimotor network that may provide an impulse to produce speech: it works like a 'Pacemaker' for motor activities. In the experiment, they found that when the testers heard the intoned words, their blood flow changed drastically in the right hemisphere. including the right temporal lobe and right central operculum. Schlaug, Norton, Marchina, Zipse and Wan (2010)

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confirmed and restate that singing accompanied with left hand tapping may engage the right-hemispheric sensorimotor network that coordinates with hand, orofacial, and pronunciation movements. This was likewise supported by Zumbansen, Peretz and Hebert, who found further evidence supporting the benefits of melodic intonation by examining the combination of rhythm and pitch. They designed an experiment that studies the relative function of rhythmic and pitch features, which works for MIT's generalization effect on non-trained speech. They compared the melodic therapy (MT) with two control treatments: rhythmic therapy RT, which is the MT without pitch, and spoken therapy (ST), which is the MT without pitch and rhythm [9], [14].

Before conducting the experiment, the authors explicitly explain the common method that speech pathologists and researchers use to measure connected speech improvements in functional communication: the presence of Correct Information Units (CIU). According to Nicholas and Brookshire (1993):

IU are words that are intelligible in cortex and accurately convey information relevant to the eliciting stimulus. Informativeness, the efficiency in conveying and transmitting correct information to the listener, can be calculated by dividing the number of CIUs in a speech sample by the number of words in the sample. This measure has been validated to assess language in the connected speech of people with aphasia and healthy individuals [2].

In the experiment, three right-handed men with non-aphasia were recruited. All participants had developed aphasia after a stroke that impacted their left hemisphere a year before taking a part in the experiment. None of them had received any speech–language therapy since they left the standard public rehabilitation services. The first participant, FL, is 57-year-old with 17 years of education and a moderate level of Broca's aphasia. FS, the second participant, is 50 years old and has 13 years of education experience. He has severe Broca's aphasia. The third participant, JPL, is a 48-year-old with 16 years of education and moderate Broca's aphasia. During the intervention treatment, a total of 240 daily used phrases or words（2-8 syllable-long each）were utilized as verbal material for three consecutive treatments. All verbal material was recorded as stimuli in three modes at the same time-intoned, rhythmically spoken and normally spoken by a natural voice (see Figure 3 as an example).

While, in the normally spoken mode, both pitch and rhythmical elements were absent in the stimuli. All the sentences were spoken with clear and slow articulation with a prosody consistent with the French morpho-syntactic rules, as speech language pathologists would do in standard aphasia therapy.

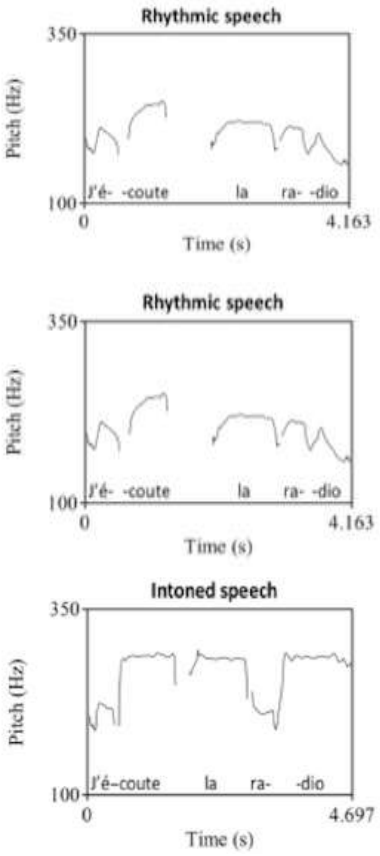


Figure 3. 'I listen to the radio.' recorded in three different modes

The significant differences among these three modes have been found through software analysis. On average, compared to melodic syllables (M=1130, SD=146), rhythmic syllables (M=1040, SD=146) were 90 MS shorter, while spoken syllables (M=556, SD=94) were twice as short. It correlates well with the point given by Schlaug (2010) when describing the feature and mechanism of MIT: lower speed and longer syllable.

The treatment lasted for six weeks with one-hour sessions each week. In the MT, patients had to tap the rhythm with their left hands while repeating the intoned sentences. The RT consisted of rhythmically spoken stimuli and hand-tapping. In ST, patients were presented with normally spoken stimuli and no hand tapping was presented. All three participants went through the three treatments in a random order. Treatment evaluation was conducted before and after each treatment phrase, and was measured three times within each evaluation period: one for MT, once for RT, and once for ST. The author announced that significant differences were found.

## 5.1. Treatment outcome

All three forms of therapies showed improvement in trained sentences, which is called direct effect.

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However, in terms of information in connected (Untrained) speech, the indirect effect, which is the ability of generalizing the speech to the untrained words, phrases or sentences, the three participants in MT had a significant generalization effect, whereas for RT and ST it did not.

Based on this experiment, it has been summarized that only the MIT treatment, which has both pitch and rhythm, had a drastic positive impact on the ability of trained speech as well as untrained speech. Yamaguchi et al. [15] declared that music therapy could activate the remaining speech function in a patient with severe aphasia. This validates the opinion put forward by Kim and Tomaino [16], which asserts that the use of rhythmic therapy would be more effective when it involves the variation of pitch.

## 6. Other Effective Music Therapy Techniques in the Treatment of Non-fluent Aphasia

A detailed observation of abilities and deficits among aphasic patients is necessary for a clearer and more comprehensive personalized music therapy treatment because it can help to identify which music-based technique - Rhythm, Melodic contour or pre-learned song lyrics - is more beneficial to a certain clinical condition. Apart from MIT, there have been some other music-based techniques that not only focus on solving speech deficits, but also address sensory, motor, and cognitive issues. The combination of experimental and clinical study done by Kim and Tomanio [16] is crucial to further understanding the shared neurological mechanisms behind language and music. From the observation, it has been found that, except for general music-based training, some patients may have more than one cue combined with music, such as exaggerated facial signs along with singing, whereas others may need only simple cues such as finger tapping. Several clinical studies and different music techniques have helped to obtain a clear analysis of the efficiency of various music-based speech techniques in people with non-fluent aphasia. Tomaino (2012) analyzed and evaluated the effectiveness of the music-based technique on articulation, fluency, prosody and breath support. Seven patients with non-fluent aphasia participated in the study: two males and five females. The participants were between nine months to over 20 years post-stroke. Groups of 8-12 individuals partook in a 30-minute music therapy session three times a week for four weeks.

The seven techniques and their key treatment elements are listed below:

1. Singing familiar songs: During this, the patient is asked to repeat a popular song that the music therapist initiates. It is observed that the patients find the lyrics easy to reproduce though they have speech impairment.
2. Breathing into single-syllable sounds: In this exercise, the patient is made to focus on naturally occurred breathing patterns, such as sighing and yawning, which would help the patient to relax. The vocal quality of the patients can be strengthened when the sounds were superimposed on slow and long exhales.
3. Musically assisted speech: When speaking daily conversational phrases combined with musical melodies that are familiar to the patients, they show signs of better recognition of the phrases.
4. Dynamically cued singing: Pausing the last words of each phrase in a song back and back
and forth enhances the patient's motivation and leads to an effective conversation-like context triggers, which are similar skills to those outside the realm of music (Speech).
5. Rhythmic speech cueing: In this process, the patient claps or taps the rhythm of the phrase that is being practiced. Slow and steady beats are integrated and are evaluated in accordance to the patient's speech tempo and the prosodic rhythms for the song's lyrics.
6. Oral motor exercise: A short portion of a familiar song is exaggerated in a manner of mounting along with tongue movement. When the therapist coordinates the exaggerated expression to the temporal order of the familiar song the patients performed better.
7. Vocal intonation: The intentional exaggeration of variations in intonation works as additional contextual cues, through which the patients can regain some of the ability to differentiate inflection, pitch and intensity in their speech, which are similar to normal conversational prosody.

Based on these music techniques, Toamino demonstrated that music therapy or music- based speech protocols are effective tools for the rehabilitation for non-fluent aphasic patients. The study found that the temporal and rhythmic components are the most important aspects among all techniques as they have proximity to normal speech rhythms. Manipulating rhythm helps to develop the patient's expectancy and is a central to helping patients enhance word retrieval, and improve prosody and articulation [16].

## 7. New Findings in after Stroke Brain Image

A recent study conducted at the Georgetown University Medical Center found that an increase in gray matter volume in the right hemisphere leads to better language outcomes in stroke patients with aphasia, providing the rationale for targeting the right hemisphere during aphasia rehabilitation [4]. According to the experiment result, the volumes of

grey matter in right temporo-parietal cortex contributed significantly to the verbal communication production outcomes according to the neuron image, demonstrating that right hemisphere recruitment does function positively to aphasia recovery.

Furthermore, they identified a relationship between the grey matter volumes of right hemisphere regions and forward digit span, a measure of verbal working memory capacity, and pseudo word repetition, which relies on both verbal working memory and other phonological output process. These findings suggest that right temporo-parietal areas may be good candidates to compensate for damage in the left hemisphere language network after brain injury. These areas may undergo hypertrophy after stroke due to the increased reliance on either learned compensatory strategies, or due to the extra verbal working memory load associated with communicating with aphasia.

The results suggest that compensation by right hemisphere grey matter structures may serve as a general mechanism of aphasia recovery. Gottfried Schlaug, MD, PhD, an associate professor of neurology at Harvard Medical School and Beth Israel Deaconess Medical Center, agrees that "This study makes a strong case that the non-dominant side of the brain potentially contributes to recovery", and that "For patients with significant aphasia, the only way to recovery may be through the right hemisphere" [9]. However, research must "identify those critical regionsin the right hemisphere that are involved naturally and figure out if there are behavioral techniques to facilitate their recovery". In addition, Dr. Roy Hamilton commented on this research result.: "This is pretty strong evidence that increased volume of these areas likely plays a compensatory role with respect to language recovery in patients with stroke and aphasia. This gives us the wherewithal to create novel hypotheses about where and how we should use stimulation to our patients".

Surprisingly, studies show grey matter changes after stroke are associated with listing to music [17]. The newly found relation between the amount of grey matter in right hemisphere and recovery from after stroke of aphasia may lead to further studies on music treatment of non-aphasia and grey matter in right hemisphere, which may explain the mechanism of music-based speech therapy for non-aphasia patients.

## 8. Conclusion

Even though there still exists various research results that demonstrate how music therapy works efficiently compared to conventional speech therapy for non-aphasia patients, which is plagued with poor attention, depression, a lack of motivation, and deficits in motor timing and slow cognition. Previous studies by Cappa and Vallar, and Heiss, Kessler, Thiel, Ghaemi, and Karbe [18] have led to a general consensus regarding the role of left and right hemispheres in the recovery from aphasia. They agree that there are two routes to recovery: patients with large lesions in the language-dominant hemisphere and milder forms of aphasia are more likely to recover through recruitment of the perilesional cortex, while patients with large lesions in the language-dominant hemisphere and moderate to severe forms of aphasia are more likely to recover through recruitment and training of rudimentary language-capable structures in the right hemisphere. There is a wealth of literature pertaining to the music therapy for non-aphasia patients with particular focus on MIT. There are two elements that make MIT unique: the melodic intonation and its inherent continuous voicing, and the rhythmic tapping of each syllable, using the patient's left hand, while phrases are intoned and repeated. In addition, the MIT uses seven techniques mentioned in Tomaino's study based on the clinical observation:

1. Singing familiar songs.
2. Breathing into single-syllable sounds.
3. Musically assisted speech.
4. Dynamically cued singing.
5. Rhythmic speech cueing
6. Oral motor exercises
7. Vocal Intonation.

These and other studies that indicate that music therapy and music-based speech protocols provide useful tools for rehabilitation of patients with non-fluent aphasia, which is similar to the findings of Zumbansen, Peretz and Hebert [14], who found that the combination of rhythm and pitch can account for the beneficial effect of melodic intonation therapy on connected speech improvement in Broca's aphasia. As for the mechanism of the therapeutic effects of melodic intonation therapy, they are reductions in speed, syllable lengthening, syllable chunking, and engagement of right-hemispheric articulatory sensorimotor network. The new finding of a positive relationship between grey matter in the right hemisphere and language recovery of after stroke aphasia patients may provide potential evidence of the effective mechanism of music- based therapy for non-fluent aphasia.

The factors that make singing an effective treatment is crucial for the clinical treatment in terms of different types of speech impairment recovery and can aid in the future study of music therapy for non-fluent aphasia patients.

## 9. References

[1] Horne-Thompson, A. & Grocke, D. (2007). A project investigating music therapy referral trends within palliative care: An Australian perspective. Journey of Music Theory 44(2), 139-155.

[2] Nicholas, L. E., & Brookshire, R. H. (1993) A system for quantifying the informativeness and efficiency for the connected speech of adults with aphasia. Journal of Speech Languag
and Hearing Research. 36(2), 338-350

[3] Heiss, W.D., Kessler, J., Thiel, A., Ghaemi, M., & Karbe, H. (1999). Differential capacity of left and right hemispheric areas for compensation of post-stroke aphasia. Annals of Neurology, 45(4), 430–438.

[4] Xing, S., Lacey, et al., (2016). Right hemisphere grey matter structure and language outcomes in chronic left hemisphere stroke. Brain, 139. 227-241.doi:10.1093/brain/ awv3

[5] King, B. (2007). Language and speech: Distinguishing between aphasia, apraxia, and dysarthria in music therapy research and practice. American Music Therapy Association, 25(1), 13-18. doi:10.1093/mtp/25.1.13

[6] Dronkers, N., & Ogar, J. (2004). Brain areas involved in speech production. Brain, 127(7), 1461-1462.Retrived from http://dx.doi. org/ 10.1093 /brain/awh233

[7] LaPointe, L. L. (1997). Aphasia and Related Neurogenic Language Disorders. New York, NY: Theme.

[8] Murray, L. L., & Chapey, R. (2001). Assessment of language disorders in adults. In R. Chapey (Ed.), Language intervention strategies in aphasia and related neurogenic communication disorders (pp. 55-126). Philadelphia, PA: Lippincott, Williams & Wilkins.

[9] Schlaug, G. (2008). From sing to speaking: Why singing may lead to recovery of expressive language function in patients with Broca's aphasia. Music Perception, 25(4), 315-323. doi:10.1525/ MP.2008. 25. 4.315

[10] Kearns, K. P. (1997). Broca's aphasia. In L. LaPointe (Ed.), Aphasia and related neurogenic language disorders. New York: Thieme.

[11] Draper, K. (2016). Music and stroke rehabilitation: A narrative synthesis of the music -based treatments used to rehabilitate disorders of speech and language following left-hemispheric stroke. Voices: A World Forum for Music Therapy, 16(1). doi:10.15845/voices.v16i1.789

[12] Briggs, C. A. (1991). A model for understanding musical development. Music Therapy, 10, 1–21. doi:10.1093/mt/10.1.1

[13] Albert, M. L., Sparks R. W., & Helm N. A. (1973). Melodic intonation therapy for aphasia. Archives of Neurology, 29, 130–131. doi:10.1001/ archneur.1973.0049
0260074018

[14] Zumbansen, A., Peretz, I., & Hébert, S. (2014). The combination of rhythm and pitch can account for the beneficial effect of melodic intonation therapy on connected speech improvements in broca's aphasia. Front Hum Neuroscience, 8, 1. doi:10.3389/fnhum.2014.00592

[15] Yamaguchi, S., Akanuma, K., Hatayama, Y., Otera, M., & Meguro, K. (2011). Right hemisphere grey matter structure and language outcomes in chronic left hemisphere stroke. International Journal of Rehabilitation Research, 35, 78-81. doi: 10.1097/MRR.0b013e32835032f 8

[16] Kim, M., & Tomaino, C. M. (2008). Protocol evaluation for effective music therapy for persons with non fluent aphasia. Topics in Stroke Rehabilitation, 15, 555–569. doi:10.1310/tsr1506-555

[17] Hafteck, L. C. (2006). Music and language development in early childhood: Integrating past research in the Two Domains. Early Child Development and Care, 130(1), 85-97.

[18] LaPointe, L. L. (1997). Aphasia and Related Neurogenic Language Disorders. New York, NY: Theme.

## Session 2: Learning / Teaching Methodologies and Assessment

Title: Exploration of Signature Pedagogies for International Chinese Master of Science in Nursing (MSN) Education Students
(Authors: Huixin Wu, Lora Walter)

Title: International Schools in Russia, Tatarstan: the Problems of Multicultural Education
(Author: Achaeva Marina Sergeevna, Pospelova Nadezda Vladimirovna)

Title: Project-based Approach in Pre-Chemistry Education
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# Exploration of Signature Pedagogies for International Chinese Master of Science in Nursing (MSN) Education Students

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## Abstract

*The purpose of this project is to assess if the most effective teaching strategies for the International Chinese MSN (ICMSN) education track students at a private university in the United States (US) have been used by nursing faculty. An initial survey suggests that the teaching strategies currently used are different from those preferred by the ICMSN students. Signature pedagogies will be explored to provide nursing education-focused pedagogies that support the cultural learning differences between American and Chinese nursing students. An educational intervention will be used to inform the faculty of the best signature pedagogies for these students. This intervention will bridge the disconnect between teaching strategies currently used and those desired by the ICMSN students. The survey will be repeated after the implementation of the signature pedagogies to measure the effectiveness of closing the gap on used and preferred strategies.*

## 1. Introduction

Globalization, global aging, and a nursing shortage make nurses a valuable healthcare workforce. There are an international nursing and nursing faculty shortage. There is a need for MSN-prepared nurses to teach nurses in China to fill the shortage of nurses. International nursing students, including Chinese, are attracted to American higher education institutions. They prefer the higher American nursing standards, curricular models, and clinical opportunities. The American institutions benefit from the internationalization of nursing as it builds cultural understanding and competency in American nurses and nursing faculty [1]. The cultural differences in teaching and learning beliefs can be problematic. Confucian philosophy and Chinese cultural values profoundly influence the Chinese students' learning styles [2]. Most faculty lack knowledge of effective pedagogies for ICMSN students which challenge both faculty and students. Signature pedagogies focus on a specific profession and can be specific to nursing [3]. There is a paucity of literature on teaching strategies that benefit ICMSN students on a cohort basis.

## 2. Background

This project was implemented over a 24-month period in a mid-sized private university. Through a Chinese government-supported scholarship, Chinese Nursing students attain a prestigious MSN degree from a US university. A convenience sample of two cohorts of ICMSN education track students and nursing faculty members who taught these students at least one semester was collected. Instructional Strategies Survey, a 52-item Likert descriptive survey, was modified for faculty and student use in this project [4]. The student survey has an additional open-ended question allowing them to add activities or teaching strategies that they deem useful but were not listed in the survey. The ICMSN students anonymously completed surveys in class during the last week prior to graduation. The nursing faculty received an emailed faculty survey after the students' graduation. They voluntarily completed and anonymously returned the surveys.

## 3. Results

Data was collected in August 2015 and 2016 from 29 ICMSN students (7 percent male, 93 percent female, 100 percent response rate) and nine nursing faculty members (100% female, 90 percent response rate). Descriptive statistics were conducted and the mean and standard deviations of each item response were reported. The items of each construct were ranked based on the magnitude of the calculated mean score and the top five items in three categories were reported. Valuable in-class/online activities and instructional strategies for the students used by the faculty included: student presentations, small-group student discussions, self-directed learning, participation in social networking, background knowledge probe/ just-in-time teaching, case study, field trips, literature review, campus events, annotated bibliography/ webliography, and student peer assessment. However, the students identified more teaching strategies than those implemented by the faculty. These strategies included games/ simulations, interactive lecture, guest lecture, problem-based learning, think/pair/share, role play, online, formative, quizzes,

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exercises/games/simulations, computer-based learning online collaborative projects, original research proposal, website development/ project, tutorials, service learning, major writing project/ term paper, analysis and design project, film/video critique, and personal reflection journal. Five students answered additional comments and emphasized that film, video, games, and increased interaction with native speakers would facilitate their English-speaking ability and understanding of American culture.

## 4. Discussion

The nursing faculty lacked experience teaching ICMSN students. None of the faculty was exposed to the findings from the initial survey. Based on their personal judgment, they adjusted teaching strategies used with the second cohort evolving from experience with the first cohort. Simultaneously, the second student cohort identified moderately different preferred teaching strategies from the first cohort. All of these reasons could account for the smaller overlap between teaching strategies used by the faculty and those desired by the students. Providing an educational intervention for involved nursing faculty may close the gap between implemented teaching strategies and those preferred by the students. Evidence-based teaching strategies for ICMSN education are lacking in the literature and thus an area for further research [5].

## 5. Conclusion

Signature pedagogies provide a method of effective teaching in a particular profession. This study demonstrated a disconnect in teaching strategies preferred by faculty and students. Pedagogies used by instructors reflected American styles of teaching. Students preferred teaching methods congruent with their cultural beliefs and education systems in China. Using signature pedagogies specific to ICMSN students' cultural values and education traditions will increase their learning in America and reinforce their teaching methodology upon their return to China.

## 6. References

[1] Terada, M., & Thompson, C. J. (2012). Educational considerations for international clinical nurse specialist students, part I. Clinical Nurse Specialist, 26(5), 283-287. doi: 10.1097/NUR.0b013e318267c2ec.

[2] Wang, C., Singh, C., Bird, B., & Ives, G. (2008). The learning experiences of Taiwanese nursing students studying in Australia. Journal of Transcultural Nursing, 19(2), 140-150. doi: 10.1177/1043659607312968

[3] Shulman, L. S. (2005). Signature pedagogies in the professions. Daedalus, 134(3), 52-59.

[4] Djajalaksana, Y. M. (2011, January 1). A national survey of instructional strategies used to teach information systems courses: An exploratory investigation. *ProQuest LLC, Ph D. Dissertation, University of South Florida*, 1-210.

[5] Scheele, T. H, Pruitt, R., Johnson, A., & Xu, Y. (2011). What do we know about educating Asian ESL nursing students? A literature review. Nursing Education Perspectives, 32(4), 244-249.

# International Schools in Russia, Tatarstan: The Problems of Multicultural Education

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## Abstract

*Modern society is characterized by multidirectional, complex interacting processes of unification, diversification, globalization and multiculturalism. These processes cause significant changes in the education system. One of them is multicultural education. The relevance of research on various aspects of multicultural education in modern Russia has led to the emergence of multidimensional works. The multicultural orientation is reflected in the Federal educational standards of general education, in the standards of vocational education for bachelors and masters of pedagogical and psychological specialties. The objective of this work is to identify and theoretically substantiate the pedagogical conditions for the effectiveness of the formation of cultural pluralism in young professionals working in schools of a new type. The solution of the stated goal and verification of the proposed assumptions were provided by a set of complementary methods: retrospective, systemic, interviewing, included observation, conversation, testing, questioning, modeling and statistical method. The source of empirical data for this study was the questionnaire of young teachers of new type schools during the International School Teachers Festival in Tatarstan, Russian Federation, as well as the questionnaire of Alabuga International School teachers. As a result of the survey, the questionnaires were analyzed and problems encountered by young teachers were diagnosed. The authors of the article offer a number of recommendations for a more effective cross- cultural education for future bachelors, young English language specialists. Special emphasis should be laid on the role of the pedagogical university in modern society, in the formation of competencies of future teachers and young specialists in the polyethnic region. Polycultural education promotes harmonization of relations between representatives of different civilizations and cultures. The main directions of multicultural education are bilingual education, multicultural education, accompanied by measures against ethnocentrism. The presence of a multicultural environment allows stimulating the interest of learners in new knowledge and at the same time it offers different points of view on the world around us.*

## 1. Introduction

Modern society is characterized by multidirectional, complex interacting processes of unification, diversification, globalization and multiculturalism. These processes cause significant changes in the education system. One of such changes is multicultural education. The essence of multicultural education is the combination of several cultural traditions in the content, methods and organizational forms of education, leading to the recognition of students the cultural diversity as a social standard and personal value, to the appropriation of images of culture and of a human as a result of creative intercultural mutual enrichment [6],[7].

The relevance of research on various aspects of multicultural education in modern Russia has led to the emergence of multidimensional works of a generalizing nature on the history of the emergence and trends in the development of multicultural education in the world (A.N Dzhurinsky, 2002, 2008; O.K Gaganova, 2003; I.S. Bessarabova, 2009; I.B. Balitskaya, 2009, 2010 and others) [1], [2], [4]; on the essence, content and principles of implementation of multicultural education (L.L. Suprunova, V.V. Makaev, Z.A. Malkova, 1999; G.D. Dmitriev, 1999; E.V. Bondarevskaya, 2000; A.I. Danilyuk, 2001; G.V. Palatkina, 2003, O.V. Gukalenko, 2004; P.V. Sysoev, 2004; L.V. Kolobova; 2006, G.V. Beziulyova, S.K. Bondyreva and others, 2008 etc.) [9], [10]; on modeling of multicultural educational space (A.I. Danilyuk, V.P Borisenkov, O.V. Gukalenko, 2004; E.A. Khodyreva, 2006 etc.) [3]; on training teachers for the implementation of the multicultural approach in the system of modern education (A.G. Absalyamova, 2006; M.V. Dyuzhakova, 2009); on organizational aspects of managing the development of multicultural education in a separate region (A.U. Belogurov, 2003; M.F. Pafova, 2006; D.V. Gorodenko, 2010 etc.). In recent years, domestic pedagogical theory has proposed increasing the effectiveness of education practice through the use of a polyparadigmatic approach (I.A. Kolesnikova, 2001; E.V. Bondarevskaya, 2007; V.I. Matis, 2009) [8].

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## 2. The Main Part

The urgency of increasing the effectiveness of multicultural education was reflected in federal normative and legal acts: the National Doctrine of Education in the Russian Federation until 2025 (2000), the Concept of the National Educational Policy of the Russian Federation (2006), the Concept of Spiritual and Moral Development and Education of the Personality of a Russian Citizen (2009), the draft Concept of multicultural education in Russia (2010), etc. The multicultural orientation is reflected in the Federal educational standards of general education, in the standards of vocational education for bachelors and masters of pedagogical and psychological specialties.

The new requirements set forth in the Federal State Educational Standards presuppose not only the formation of educational and professional students' qualities, but also the formation of personal qualities and abilities: patriotism, love of the Motherland, respect for their people, their spiritual values and traditions, and at the same time respect and acceptance of other Cultures, the ability to achieve mutual understanding, constructive dialogue and the ability to live in a multicultural world.

Pioneers of the ideas of multicultural education, of course, are schools of a new type. In recent years, in order to optimize the educational process, such schools began to appear more often. For example, Alabuga International School ("Three Bears") is the first general educational institution of international level in the Republic of Tatarstan. The training is conducted under the British National Curriculum. Currently, Alabuga International School is actively working on the transition to the International Baccalaureate education program. The main goal of Alabuga International School is the development and education of inquisitive, erudite and caring young people who will contribute to the creation of a better and more peaceful future through intercultural understanding and respect in the ever- changing modern world. There are such schools in Kazan.

The purpose of this work is to identify and theoretically substantiate the pedagogical conditions for the effectiveness of the formation of cultural pluralism in young professionals working in schools of a new type.

## 3. Methods of research

The solution of the stated goal and verification of the proposed assumptions were provided by a set of complementary methods: retrospective, systemic, interviewing, included observation, conversation, testing, questioning, modeling, and statistical method.

The source of empirical data for this study was the questionnaire of young teachers of schools of a new type during the VII International School Teachers Festival in 2016 in Yelabuga, Tatarstan, as well as teachers of the Alabuga International School ("Three Bears"). As a result of the survey (30 respondents), the questionnaires were analyzed and problems encountered by young teachers were diagnosed. Such problems include:

• Organization of cooperation between students of different nationalities (in the "Three Bears" school children from England, Turkey, Bulgaria, Germany, etc.) study. Difficulties in teaching a child who knows neither Russian, nor English, nor the Tatar language. 45% of the respondents;

• Lack of multicultural communication skills during the conduct of extra-curricular international events. Difficulties in organizing events related to the traditions of English-speaking countries days of St. Andrew, David, Patrick, etc. 30% of respondents;

• Relatively weak understanding of the functioning of schools of a new type, including international ones. 20% of the respondents;

• Methods of teaching a foreign language in a multilevel multicultural class in an elementary school. 70% of the respondents. In particular, the methodology of teaching mathematics, literature, speaking, writing, etc. Team teaching - there is no practice of joint teaching (joint lesson - 2 teachers + 2 classes). Knowledge gaps in children's foreign literature. 60% of the respondents.

• Not a clear understanding of the international system of assessing knowledge (38%). For example, young specialists of this school are not sure about the parameters for determining the level of reading;

• Difficulties in communicating with parents of children (20%). Many parents are foreign specialists of the free economic zone and the Kama industrial hub, i.e. carriers of a different culture;

• Insufficient awareness of the education system abroad. 15% of respondents;

• Lack of sufficient experience in the implementation of inter-subject relations, meta-subject knowledge in the process of organizing the lesson, etc.

## 4. Conclusions and recommendations

Special emphasis should be laid on the role of the pedagogical university in modern society, in the formation of competencies of future teachers and young specialists in the polyethnic region. Polycultural education promotes harmonization of relations between representatives of different civilizations and cultures.

The main directions of multicultural education are bilingual education, multicultural education, accompanied by measures against ethnocentrism.

The presence of a multicultural environment allows stimulating the interest of learners in new knowledge and at the same time it offers different points of view on the world around us. As

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recommendations for a more effective cross- cultural education for future bachelors, young English language specialists, we would like to offer the following:

• Modeling of the multicultural educational process in the pedagogical systems of preschool and general education in schools of a new type;

• Media course, where educational and methodological materials are presented in the following areas: "Culture of different countries: customs and traditions"; "Culture and traditions of English-speaking countries"; "Yelabuga is a multicultural town"; "The Republic of Tatarstan is a polyethnic region"; "Culture of the peoples of Russia"; "Ethnic holidays of different countries"; "The best museums / galleries of Russia and the world"; "Museums of Elabuga town";

• Advanced training courses on the basis of Yelabuga branch of KFU in April-May 2017. The program of courses is “Modern approaches to teaching English at school”; The organization of an online seminar (Skype or Zoom) with Hope Johnson, a colleague from the State of the MEN (USA) "Intercultural Communication for teachers";

• Training and retraining courses for educators in August 2017 during the International Festival of Teachers in Yelabuga Institute of KFU on the program “Training and professional support of young teachers in the context of the implementation of new federal education standards”;

• Mentoring assistance, including training in the development of multicultural communication skills in the course of children's international events through museum, theatrical and tourist-local lore activities;

• Practical-oriented seminars on gaming technologies, on foresight methods and their effective use in the educational process; modeling of such events, for example, as excursions to “The City of Professions”, “Earth Day”, preparation of a cultural school diary (from the experience of the international school Kid Space in Kazan), implementation of “A week without walls” (from the experience of the international school "Three Bears"), staging fairy tales of the peoples of the world;

• Realization of the study of the experience of developed multicultural countries having traditions in multicultural education.

## 5. References

[1] Bessarabova, I.S. The current state and trends in the development of multicultural education in the United States, VSPU Publishing House, Volgograd "Peremena", 2008.

[2] Bessarabova, I.S. Goals, objectives and principles of multicultural education in Russia and the USA, “Modern science-intensive technologies”, Volgograd, 2008, pp.97-99.

[3] Danilyuk, A.Y.“Principles of Culturogenesis in Education”, Pedagogika, Moscow, 2008, pp. 3-8.

[4] Dzhurinsky, A.N. “Multicultural education: essence and development prospects”, Pedagogy, Moscow, 2002, pp. 92-96.

[5] Dmitriev, G.D. Multicultural Education, Public Education, Moscow, 1999.

[6] Hasan Arslan, Georgeta Rata, Multicultural education: from Theory to Practice, Cambridge Scholar Publishing, 2013.

[7] The International Encyclopedia of education, Pergamon Press, Oxford, 1994.

[8] Matis, V.I. “Poliparadigmal approach as a methodological basis for creating a modern school”, Siberian Pedagogical Journal, Novosibirsk, 2009, pp. 54-64.

[9] Palatkina, G.V. Multicultural education in a polyethnic region, Astrakhan State University Publishing House, Astrakhan, 2001.

[10] Suprunova, V.V., Sviridchenko Y.S. Polycultural Education: A Textbook for Student Institutions, "Academy" Publishing Center, Moscow, 2013.

# Project-based Approach in Pre-Chemistry Education

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## Abstract

*Project-based activity is the most interesting way to motivate students to choose chemistry for further learning. This pathway allows the students to overcome initial learning threshold and increase interest in chemistry.*

## 1. Introduction

The total number of students in math, physics, chemistry and life sciences has steadily decreased over the last decades [1]. Therefore, the increase of students' interest in these fields of education is much demanded. As mentioned in our previous works, the project-based approach is very efficient in educating of highly motivated students [2]. They learn how to formulate, present and discuss results of investigations and establish initial social links in the scientific community. The most significant result is the formation of students' understanding of the knowledge discovering process. It leads to higher publication activity at undergraduate level in comparison with other students.

The challenge for teacher is to motivate students to choose chemistry to learn. Can project-based approach help to solve this problem?

It is notorious that the beginning of general chemistry course is very complicated and a little bit boring. Students have to learn a lot of new terminology, large amount of empirical facts. Therefore, chemistry looks like having high learning threshold. One way to overcome threshold and increase interest in chemistry is the pre-chemistry education before basic school course.

## 2. Pre-chemistry projects

Well known that children like a lot to mix all they can try to create something new. In view of this, we have developed a new project-assisted course to fill the gap between science classes in elementary school and basic chemistry lessons. In addition, we have written Student's Book [3] supporting our course. Our approach is based on several scalable projects. Such type of experimental work compares favorably to common labs because it allows students to get practical results. Our curriculum prescribes a set of experimental rules and links it to chemistry laws. Therefore, pupils can simultaneously learn "chemistry language" and use it on practice. Experimental activity depends on the practical and theoretical skills of participants. In addition, project level varies with pupils' age. For instance, one of our projects is devoted to water paints preparation. 9-10 age pupils use food colorants, 11-13 age pupils can use natural and synthetic artistic pigments and elder pupils can synthesize pigments on their own. Anyway, the last step of the lab for all pupils is drawing pictures with self-made paints. This line of projects also has other growing-points. However, the main idea is to use chemical protocols and rules to create usual things – water paints etc.

This course was created and tested for Summer School in Pyeongtaek, Republic of Korea and had used for five years. Each year we met a number of students who learned our course on basic level (4-th grade) and come again to more high level.

The course has also partially evaluated during Moscow State University Summer School (LANAT) in 2011. Our course efficiently motivates students to learn chemistry. Taking into account its modularity and scalability, this course easily can be adapted to the student's level of education and to the available facilities and resources.

## 3. Conclusions

The project activity allows students to get an experience of work simultaneously with the learning of required theory. It is especially demanded at the beginning of chemistry learning.

The chemical rules became much more understandable and usable for students when they have an opportunity to try to test how that rules works in the daily routine. The chemistry language becomes more familiar and this allows students to overcome learning threshold.

We have showed that project-based approach in pre-chemistry education makes chemistry more familiar and interesting for students.

## 4. References

[1] Neher E.-M. "XLAB-Goettingen Experimental Laboratory for the Youth Bridging the Gap Between High School and University" NATO Security through Science Series - E: Human and Societal Dynamics, IOS Press, V 16, p 111-117, 2006.

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[2] Oleg V. Koliasnikov, Ekaterina A. Mendeleeva, Natalia I. Morozova, Marina G. Sergeeva, and Alexander S. Sigeev. Will high school projects help to choose a way to science for students? International Journal of Infonomics, 8(3):1074–1076, 2015.

[3] Ekaterina Mendeleeva, Alexander Sigeev, 2014 평택시 청소년 국제학교 과학 A B C 반 (Pyeongtaek Youth International School, Science A B C classes), SarangSarang, 2014, Pyongtaek.

## Session 3: Math and Science Education

Title: The Understanding of the Model of Microcosm in High School
(Author: Ourania Gikopoulou)

Title: The Mathematical Transition to Higher Education – A Case Study of Engineering Students in one Institute of Technology
(Authors: Louise Duggan, Pamela Cowan, Ian Cantley)

Title: The Formation of Motivation to Study a Physics of AESC Students Teaching in Non-Core Classes
(Author: Degtyareva A.P.)

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# The Understanding of the Model of Microcosm in High School

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## Abstract

*This research focuses on whether students of secondary education, in particular 7th graders (13 years old), are able to understand the microscopic model and use it to explain the macroscopic phenomena. The model of microcosm (or microscopic model) refers to the invisible particles that consist matter (solids, liquids, gasses) and the diversity of our world as well as to their constant movements. In bibliography it is supported that this model can help students approach phenomena about which they lack supervision, e.g. invisible gases, therefore a great deal of effort is spent worldwide to find the best educational approach of microcosm for students of as younger age as possible. The results suggest that students of this age are able to understand the microscopic model and this model facilitates their understanding of the macroscopic phenomena. Our research adds to previous studies exploring the ways of improving the learning process and facilitating the understanding of the scientific concepts.*

## 1. Introduction

In the last decades it is observed internationally a continuous interest about the model of microcosm and its best educational approach. This interest is growing also due to the constant discoveries of famous research centers such as CERN. It is widely expressed that this model is a valuable tool for understanding the scientific concepts and the particulate theory is one of the most important scientific theories, consisting of a few basic principles, offering precise and elegant explanations for all the macroscopic phenomena.

However, the introduction of the particulate theory to education seems to be a difficult and long-term issue, therefore a great deal of effort is spent worldwide to find the best educational approach of microcosm for students of as younger age as possible. In bibliography it is supported that this model can help students approach phenomena about which they lack supervision, e.g. invisible gases [4]. The basic difficulties regarding the microscopic model is that it is a model and not a real object and it is of a scale that students are unable to comprehend through their senses. For students matter appears to be continuous so it has to be continuous.

Researchers seem to have come to an agreement concerning the development of a simple microscopic model early by the students, which will guide them later to a more complicated sub-atomic model [1], [5], [6], [7]. Furthermore, the comprehension of a basic particulate model by the students appears to be a presupposition for them to approach the structure of the atom that is taught later. According to Eshach & Fried [2] science of early school years is an effective framework for scientific thought to be evolved and is expected to contribute to the formation of the groundwork on which the comprehension of difficult scientific concepts will be based so as they are approached later on in a more typical manner.

## 2. Research: Method, Sample, Questions

Contributing to the scientific debate around these issues our research question focuses on exploring whether students of junior high school are able to comprehend the processes of microcosm and use this model effectively to explain the macroscopic phenomena. Since the model of microcosm is not used systematically in the two last classes of high school in Greece, our research was limited to the 7$^{th}$ grade (13 years old). At this grade the official science textbook [3] covers several topics: measurements, heat, temperature, thermal equilibrium, changes of state, expansion and contractionn, light, electricity and electromagnetism. This book has a small appendix named “microcosm explains macrocosm” which describes briefly the microscopic processes presenting also static captures.

Our hypotheses were that students of this age are able to understand the microscopic model and use it to explain the macroscopic phenomena.

Our sample consisted of 1018 students of 7$^{th}$ grade from different schools (both public and private) across the country who participated in the National High School Physics Contest 2015. All the written documents of the Contest with the students’ answers were collected at the University of Athens (that organizes this Contest) and examined.

The last topic of the competition, consisting of two questions, asked students to describe microscopically (in written and with sketches), and compare with each other: a) two liquids at different temperatures (cold; hot) and b) a solid at two

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different temperatures (lower temperature; higher temperature).

Specifically, the first question was: "Describe and compare the movements of the molecules of the hot water with the movements of the molecules of the cold water at the beginning of the experiment." (At the beginning of the experiment described in the previous topic, the students put on a desk a bowl containing cold water and then in this blow they place a pot with hot water).

And the second question was: "Draw two snapshots that show the positions, distances and tracks of the movement of the molecules of the material from which the bowl is manufactured at two different temperatures (higher and lower). Explain your sketches".

The other topics of the competition, which are not addressed in this investigation, referred to temperature and its measurement as well as the thermal balance and the ways of heat transmission. These issues are not addressed directly, but we investigated the correlation between students' understanding of the model of microcosm and their explanations of these phenomena, according to our second hypothesis. We hypothesized that students who have acquired a better understanding of the microscopic model will also be able to explain the macroscopic phenomena more sufficiently.

## 3. Results

Based on their answers to the two questions of the last topic of the competition the students were categorized into four categories of explanations: Initial, Alternative, Correct and Complete.

The criteria used to categorize students' answers to both questions was: whether they just describe the process or give some explanation, if the explanation they give is correct or contains errors and misunderstandings if their explanation is macroscopic or microscopic, what they say about the random movements of molecules at lower and higher temperatures, and especially if they accept that these are the same molecules and whether their sketches are particulate or continuous.

Based on these criteria we distinguish for each case (heating liquid, heating solid) the four types of explanations described below.

Initial explanation: they simply describe the phenomenon without explaining it or their description is based on the time sequence (e.g. cold water is heated and hot water is cooled, when water is heated its temperature rises etc. ). They don't seem to understand the process, nor consider it necessary to give an explanation. They also don't draw a sketch or their sketch has no reference to the molecules.

Alternative explanation: They give some kind of explanation (at macroscopic or microscopic level) but their explanation contains errors and misunderstandings (e.g. hot molecules - cold molecules, expansion and contraction of molecules, molecules don't move in lower temperature, molecules are more in higher temperature, molecules rotate in lower temperature and move forward in higher temperature etc.) They mention erroneous procedures or transfer macroscopic properties of matter into the microcosm. Their sketches present continuous or microscopic patterns without displaying the molecules in a consistent way.

Correct explanation: They give a proper scientific explanation which describes the basic information about the movements or the distances of molecules but not for the whole process: the positions, distances and tracks of the movements of molecules. They draw microscopic sketches without many details concerning the movements of molecules or the distances between them.

Complete explanation: They give a complete scientific explanation which describes the positions, distances and tracks of the movements of molecules (e.g. when the temperature of the solid increases, the speed of the molecules and their distances from their permanent positions grows).

As shown at Table 1, some students gave alternative explanations for liquids (21%) and solids (24%) whereas the great majority of students was able to give scientific microscopic explanations for liquids (68%) as well as solids (65%), with 42% and 40% respectively providing complete microscopic explanations, with details about the movements, the distances and the tracks of molecules. These data seem to confirm our hypothesis.

Table 1. Students' explanations about heating liquid and heating solid (frequency and percentage)

| Explanation | Liquid | Solid |
|---|---|---|
| No answer | 35 (3 %) | 44 (4%) |
| Initial | 82 (8%) | 73 (7%) |
| Alternative | 217 (21%) | 242 (24%) |
| Correct microscopic | 425 (42%) | 411 (40%) |
| Complete microscopic | 259 (26%) | 248 (25%) |
| Total | 1018 (100%) | 1018 (100%) |

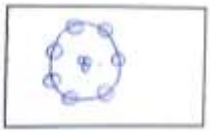
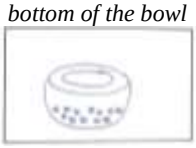
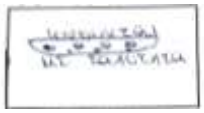
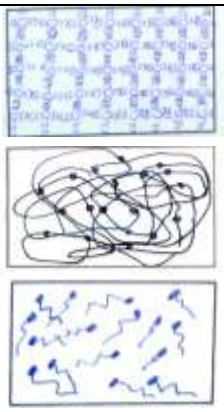
With regard to students' sketches they were categorized into three basic categories: continuous, microscopic with mistakes and microscopic correct. As shown at Table 2, the great majority of students (67%) drew correct microscopic sketches, 20% of them made sketches microscopic with mistakes and only 9% of them drew continuous sketches, without any reference to molecules.

Table 2. Categorization of Students' sketches (frequency and percentage)

| Sketches | Liquid |
|---|---|
| No answer | 42 (4 %) |
| Continuous | 90 (9%) |
| Microscopic with mistakes | 207 (20%) |
| Microscopic correct | 679 (67%) |
| Total | 1018 (100%) |

At Table 3 are presented some characteristic examples of students' sketches in each category (continuous, microscopic with mistakes, microscopic correct).

Table 3. Examples of students' sketches

| | Lower temperature | Higher temperature |
|---|---|---|
| Continuous |  |  |
| Microscopic with mistakes | *molecules don't move*  *molecules rotate*  *molecules at the bottom of the bowl*  | *molecules move*  *molecules spread*  *molecules get out of the bowl*  |
| Microscopic correct |  |  |

Additionally, in order to test our second hypothesis, we examined the correlation between students' understanding of the model of microcosm (through their explanations about the heating liquids and solids) and their explanations of the macroscopic phenomena (through their total performance).

We calculated students' total performance based on their answers to the other questions of the competition about the macroscopic phenomena. We divided the performance into 5 groups based on the score: 0-20. 20-40, 40-60, 60-80 and 80-100. We expected that students who do not understand the microscopic model and give initial or alternative explanations about solids and liquids will face greater difficulties in the explanation of the macroscopic phenomena and therefore achieve lower score in their total performance in comparison with the students whose explanations are in accordance with the microscopic model. The results seem to confirm our hypothesis, since Pearson R correlation Coefficient that was calculated showed high degree of correlation between students' microscopic explanations and their performance in macroscopic explanations, as shown in Table 4.

Table 4. Correlations between students' total performance and their microscopic explanations about solids and liquids calculated with Pearson R correlation Coefficient

| | | Explanation of liquids | Explanation of solids |
|---|---|---|---|
| Total performance | Pearson | ,865** | ,837** |
| | Sig. (2-tailed) | ,000 | ,000 |
| | N | 1018 | 1018 |

**. Correlation is significant at the 0.01 level (2-tailed).

These results can be seen more clearly in the following Table 5, correlating participants' explanations of heating liquid and their total performance, where the results are more obvious. Similar results are observed for the explanations of heating solid.

Table 5. Correlations between students' microscopic explanations of liquid and total performance on macroscopic explanations

| | Total performance | | | | |
|---|---|---|---|---|---|
| Explanation of liquid | 0-20 | 20-40 | 40-60 | 60-80 | 80-100 |
| No answer | **28** | **6** | 1 | 0 | 0 |
| Initial | **51** | **29** | 2 | 0 | 0 |
| Alternative | **40** | **161** | **16** | 0 | 0 |
| Correct | 0 | 0 | **295** | **117** | **13** |
| Complete | 0 | 0 | 7 | **158** | **94** |
| Total | 119 | 196 | 321 | 275 | 107 |

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All the students who gave correct and complete microscopic explanations also achieved higher score (80-100) at their total performance (in explaining the macroscopic phenomena), whereas all the students with initial explanations and almost all students with alternative explanations achieved also lower score (0-20 or 20-40) at their total performance (in explaining the macroscopic phenomena).

## 4. Discussion

The results of our study seem to support our first hypothesis that students of this age are able to understand the microscopic model and use it to explain the macroscopic phenomena, since the majority of students provided correct or complete microscopic explanations and sketches.

The results seem to confirm also our second hypothesis concerning the correlation between students' microscopic and macroscopic explanations, since we found that students who have acquired a better understanding of the microscopic model are also able to explain the macroscopic phenomena more sufficiently.

## 5. Conclusions

The results of our research suggest that students of junior high school can understand the microscopic model and are able to use this model to explain the macroscopic phenomena. We also found correlation between students' microscopic and macroscopic explanations, supporting our view that the microscopic approach helps students achieve a better understanding of macroscopic concepts.

Our results are in accordance with other researchers [8] who argue that this understanding of particulate theory helps students consolidate their initial understanding of matter and provides an important basis for understanding other important concepts that cannot be easily approached without it. Our research adds to previous studies exploring the ways of improving the learning process and facilitating the understanding of the scientific concepts. Traditional curricula often underestimate the ability of students to develop the bases needed for the transition from the based on senses explanations to explanations based on the more abstract scientific concepts of the particulate theory of matter. Our results suggest that the model of microcosm can be a very useful tool for promoting the understanding of scientific concepts even in the 7th grade.

## 5. Acknowledgments

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## 6. References

[1] J. Bouwma-Gearhart, J. Stewart, J. and K. Brown, (2009). "Student Misapplication of a Gas-like Model to Explain Particle Movement in Heated Solids: Implications for curriculum and instruction towards students' creation and revision of accurate explanatory models*". International Journal of Science Education*, 31(9), pp. 1157-1174.

[2] H. Eshach, and M. Fried. (2005). "Should science be taught in early childhood*?" Journal of Scien ce Education and Technology*, 14(3), pp. 315–336.

[3] G. Kalkanis,O. Gikopoulou, E. Kapotis, D. Gousopoulos, M. Patrinopoulos, P. Tsakonas, P. Demitriadis, L. Papatsimpa,K. Mitzithras, A. Kapogiannis, D. Sotiropoulos, S. Politis, (2013). "Physics through Experiments", official textbook for the 7th grade, Ministry of Education, Institute of Educational Policy Computer Technology Institute and Press "Diophantus", Athens

[4] G. Kalkanis, (2013). "From the Scientific to the Educational: Using Monte Carlo Simulations of the microKosmos for Science Education by Inquiry". Book: *Concepts of Matter in Science Education*, editors Georgios Tsaparlis and Hannah Sevian, Springer.

[5] H. Margel, B. Eylon and Z. Scherz. (2008). "A longitudinal study of junior high school students' conceptions of the structure of materials". *Journal of Research in Science Teaching*, 45 (1), pp. 132–152.

[6] J. Merritt, J. Krajcik. (2013). "Learning Progression Developed to Support Students in Building a Particle Model of Matter", Book *Concepts of Matter in Science Education*, Springer Series "Innovations in Science Education and Technology", Eds G. Tsaparlis and H. Sevian, Springer 2013, Vol. 19, p.11-45

[7] D.F. Treagust, A.L. Chandrasegaran, A.N.M. Zain, E. T. Ong, M. Karpudewan and L. Halim. (2011). "Evaluation of an intervention instructional program to facilitate understanding of basic particle concepts among students enrolled in several levels of study". *Chemistry Education Research and Practice*, 12 (2), pp. 15–28.

[8] M. Wiser, K. Frazier, V. Fox, (2013). "At the Beginning was Amount of Material: A Learning Progression for Matter for Early Elementary Grades", Book *"Concepts of Matter in Science Education"*, Springer Series "Innovations in Science Education and Technology", Editors Tsaparlis, Sevian, Springer Dordrecht Heidelberg New York London, Vol. 19

# The Mathematical Transition to Higher Education – A Case Study of Engineering Students in one Institute of Technology

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## Abstract

*Transitioning from post-primary to higher education is often a challenge for many students, both personally and academically. Widespread concern regarding students' lack of mathematical preparedness when negotiating the transition to higher education has also been widely documented. The issue of mathematical preparedness is colloquially referred to as the 'Mathematics problem' in the literature and specifically refers to the level of mathematical preparedness and skills of students as they commence their undergraduate studies. Mathematics is considered an important component of many degree programs and many students struggle with the mathematical demands of their degree programs due to inadequate and negative prior experiences. The number of disciplines affected by the existence of the 'mathematics problem' has also broadened to include disciplines classified as soft pure and soft applied. Several reasons are said to have contributed to the 'mathematics problem' within the Irish context and in an attempt to alleviate these concerns and to enable a smooth transition to higher education, the Irish government introduced the Project Maths curriculum This paper reports on first year engineering students' experiences of the Project Maths curriculum and provides insight into whether these students feel mathematically prepared for their higher education discipline.*

## 1. Introduction

Manifestation of the 'mathematics problem' typically occurs in the first year of undergraduate studies and is characterized by the following:
1. A lack of core mathematical knowledge and skills which would be expected at the transition to higher education [1];
2. A lack of fluency in applying mathematics and specifically an inability to solve and model unfamiliar problems [1] and
3. Students not studying sufficient mathematics prior to entry into higher education [2].

Consensus exists that the inability of students to successfully negotiate the transition to tertiary level mathematics is as a result of discrepancies between what students encountered in mathematics at school and what they are exposed to at third level [3], which [4] suggest leads to a "cooling off", a loss of enthusiasm for the subject and subsequent disengagement. Low retention rates within the STEM disciplines are also attributed to difficulties associated with the mathematical transition to higher education [5].

Several reasons are said to have contributed to the 'mathematics problem' within the Irish context including the policy of widening access to higher education which inevitably leads to variability in mathematical entry standards, large class sizes in higher education, changes in pedagogical approaches and general difficulties associated with the transition to higher education [6]. The Irish Leaving Certificate and the points system which is primarily used for selection purposes to higher education have exacerbated the situation [7]. The consequence of the 'mathematics problem' is such that many higher level institutions in Ireland now provide remedial support for those learners deemed 'at risk'.

Project Maths was introduced by the Irish government in an attempt to alleviate the difficulties associated with mathematics instruction and to enable a smooth transition to higher education [8]. The Project Maths curriculum attempts to foster in all learners five key skills including information processing, being personally effective, communicating, critical and creative thinking and working with others [8]. These key skills were identified as being important for all learners to maximise their potential, both in school and into their future careers.

## 2. Literature review

Research indicates that negotiating the transition from post-primary to higher education is a difficult time for many students both personally and academically e.g. [9], [10] and [11]. It is claimed in [11] that 'tertiary students' experiences during their first year of study appear to be crucial to their personal adjustment and academic performance' (p. 1) and problems associated with adjustment can result in students dropping out or deferring their

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courses. It is stated in [10] that it is during this transitional period that 'many students experience stress associated with academic concerns and encounter difficulties adjusting to an environment that presents new academic and social demands' (p. 3). The ease with which students negotiate the transition depends on how students adapt to different learning styles and their ability to become independent learners [9].

Over the past number of years, concerns have been raised in Ireland in relation to the mathematical ability and skills of students transitioning to higher education [12] and [13] and the problem is much more prevalent at smaller higher education institutions where the intakes are much smaller [14]. Mathematical preparedness is specifically concerned with the level of preparation that students receive in post-primary school in advance of their third level studies. Many terms are used in the literature to describe mathematical preparedness including mathematical readiness, college readiness, mathematical literacy and quantitative literacy, while the term 'mathematics problem' is specifically concerned with the sub-standard knowledge and skills of students progressing to higher education.

Transitioning from second level to higher education is theorized in [15] as a 'rite of passage'. Two important aspects of the transition identified by [15] included cognitive conflict and culture shock. The paper concluded by stating that the transition from second level to third level cannot occur outside a 'proper environment'. A successful transition can be tentatively described as accomplishing most of: the individual feeling a sense of belonging in their new role as a higher education student, the individual can achieve and work towards their goals, the individual shows good academic progress, the individual has support (both academic and otherwise), and can access it when needed and the individual enjoys mathematics [15].

Research conducted by [3] from the Irish context, suggested that the root of the problem was the result of a mismatch in the experiences of mathematics at post-primary level and the subsequent high expectations of mathematics-intensive courses at third level. The authors conducted a study of two second level mathematics classrooms. They found issues with students being taught using rote learning methods and exam focused instruction. The findings of their research seem to concur with the culture shock described by [15] during the transition and the resulting negative effect on students upon arrival in a third level mathematics classroom.

College readiness as defined by [16] is described as 'the level of preparation a student needs in order to enrol and succeed – without remediation – in a credit-bearing general education course at a postsecondary institution that offers a baccalaureate degree or transfer to a baccalaureate program' (p. 5). Applying Conley's definition, mathematics college readiness is a student's ability to be successful in college-level mathematics courses without the need for remedial or developmental coursework [16]. A number of factors have been identified as being relevant in determining whether learners are college ready [17], including factors from the cognitive and non-cognitive domains. Residing in the cognitive domain are content knowledge and cognitive skills; students need to have acquired core mathematical knowledge as well as problem solving, critical thinking, communication and metacognition skills.

Non-cognitive factors include attitudes, behaviors, mindsets as well as campus integration factors. Academic behaviours enable students to engage with content and maximise their learning [16]. College ready students also display a strong relationship with themselves and with others encompassing traits such as self-awareness and self-esteem. College ready students have developed a career-oriented identity in that they can identity their goals and recognise their strengths and weaknesses and understand how they fit into the larger campus community [16].

## 2.1. Project Maths

The Irish government recognised difficulties associated with mathematics instruction in 2005, and following a consultation process in 2006, the Project Maths curriculum was proposed [8]. Particular concerns identified include the following:

- Over-emphasis on procedural skills and rote learning to the detriment of understanding;
- Declining interest in mathematics and lack of commitment on the part of the students to making the effort required to understand the subject;
- Poor attitudes towards mathematics;
- Low levels of understanding on the part of students progressing to third-level education, even among those who had studied mathematics at higher level;
- A lack of in-depth knowledge by some teachers of mathematics, who tended to operate in a narrow 'comfort zone'.

As a result of these concerns and the concerns of the Irish government, Project Maths was introduced on a phased basis commencing in September 2008, with full implementation completed in September 2015. As well as improving attitudes towards mathematics in general one of the other aims of the Project Maths curriculum is to ease the mathematical transition to higher education [8].

Project Maths is based on socio-cultural theory which posits that students learn collaboratively and that language plays a central role in the development of their higher mental processes. In a socio-cultural learning environment, students are challenged to become active participants, while the teacher is no longer considered the provider of knowledge but rather the creator of a classroom environment which fosters engagement. Characteristics typical of the

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socio-cultural learning environment and implied by the Project Maths curriculum include: linking scientific and everyday knowledge by means of real world problems; allowing students the freedom to explore their own understandings and ideas with fellow students; mediating students' actions by material and symbolic tools; scaffolding – by means of the zone of proximal development and facilitating disclosure within the mathematics classroom [18]. The teacher and student must work collaboratively together until common knowledge ideally emerges and both must assume ownership of this knowledge and, eventually the students become more independent learners.

## 3. Methodology

Research conducted for this study involved quantitative analysis to determine whether students who completed the more rigorous Project Maths Higher level curriculum feel more mathematically prepared for their higher education course than students who completed the Ordinary level curriculum. The importance of the affective domain on students as they negotiate the transition to higher education mathematics cannot be underestimated [3]. In particular it was found in [3] that affective factors have an impact on the mathematical preparedness of both Higher and Ordinary level mathematical students as they make the transition to higher education mathematics. The survey therefore examines attitudes towards mathematics as well as non-cognitive factors which are deemed important in the mathematical transition to higher education [17]. The Attitudes Towards Mathematics Inventory (ATMI) by [19] was employed to measure attitudes in the three dimensions: value, enjoyment and self-confidence in mathematics. ATMI is based on a 5-point Likert scale that ranges from Strongly Disagree (1) to Strongly Agree (5). Participants were also required to specify their perceived level of mathematical preparedness for higher education based on a 4 point scale with 1 – not at all prepared, 2 – slightly prepared, 3 - well prepared and 4 – extremely well prepared.

Participants were also required to rate the following statements based on a 4 point Likert scale that ranges from 1(strongly disagree) to 4 (strongly agree):

- I belong in this academic community
- My ability in this course will grow with effort
- My competence in this course will grow with effort
- I can succeed at this course
- The course activities have value for my future career
- The institutional environment is supportive

Academic mindsets are strongly associated with academic perseverance and achieving good grades [20]. It was further stated in [20] that these academic mindsets are motivationally very powerful, and the more the student endorses these beliefs, the more the student will expand the effort to learn. This study examines whether the participants feel mathematically prepared for their higher education course based on previous academic performance (cognitive domain) and attitudes towards mathematics as well as mindsets (non-cognitive domain).

Students who participated in this study were first year engineering students from a variety of engineering disciplines including electronics, mechanical engineering, civil engineering, building services and fire technology. Of the 93 first year students enrolled in engineering disciplines, fifty students in total participated in this study (54% response rate). Only three of these participants were female, two of which are in the mechanical discipline and the other female is in the fire engineering discipline. Eight participants are in the electronics discipline, fifteen in the mechanical discipline, eleven in the civil discipline, seven in the fire engineering and nine in the building services discipline.

## 4. Analysis of findings

Following an exploratory factor analysis which revealed the presence of three factors, attitudes towards mathematics were examined under the three dimensions: value of mathematics, enjoyment of mathematics and self-confidence in mathematics. The reliabilities for each factor were .907 for value of mathematics, .908 for enjoyment of mathematics and .939 for self-confidence in mathematics. On a 5-point scale, the mean score for value of mathematics was 3.94 (std. deviation 0.62), mean score for enjoyment of mathematics was 3.42 (std. deviation 0.82) and the mean score for self-confidence in mathematics was 3.51 (std. deviation 0.74). The mean overall ATMI value was 3.63 (std. deviation .64). Only seven of the fifty participants completed mathematics at higher level, all of whom had completed the Project Maths curriculum, forty two had completed mathematics at ordinary level, thirty eight of which had experienced the Project Maths curriculum and one participant entered 'other' for this statement in the survey suggesting that they had completed mathematics outside the Irish jurisdiction. The overall mean ATMI score for the seven higher level participants was 4.34 (std. deviation .46) and was 3.49 (std. deviation .576) for participants who completed mathematics at ordinary level.

The mean ATMI score for the 45 participants who had experienced the Project Maths curriculum was 3.57, (standard deviation .62). In order to determine whether participants who completed the higher level mathematics have more positive attitudes towards mathematics, a Mann-Whitney test was performed. The Mann-Whitney test reveals a statistically significant relationship between attitudes

towards mathematics and previous level of study. From the test it is apparent that participants who completed the higher level mathematics curriculum have more positive attitudes towards mathematics (U= 37.50, p = .001, Z=3.132).

In order to determine if a relationship exists between previous level of study and mathematical preparedness for higher education, a Spearman's correlation test was performed. The test revealed a strong positive correlation exists between mathematical preparedness and previous level of study (rs = .557, p < 0.001). For mathematical preparedness 1 was coded as not at all prepared, 2 coded as slightly prepared, 3 coded as well prepared and 4 coded as extremely well prepared while ordinary level mathematics was coded as 1 and higher level mathematics was coded as 2. The results of this test suggest that mathematical preparedness increases as previous level of study increases.

Table 1 indicates the mean and standard deviation scores for each of the academic mindsets. Of the 44 participants who responded to these statements, 93% either agreed or strongly agreed with statement 1. The mean score of 3.25 out of 4 for feeling a sense of belonging was reported (with a standard deviation of .58). 98% either agreed or strongly agreed with statement 2. A mean score of 3.57 out of 4 (with a standard deviation of .54) revealed a positive perspective towards study. The mean score for statement 3 was 3.39 (with a standard deviation of .58) which suggests that 95% of participants have a growth mindset.

Table 1. Mean scores for academic mindsets

| **Academic mindset** | **Mean** | **Std.Dev** |
|---|---|---|
| 1. I belong in this academic community | 3.25 | .58 |
| 2. My ability in this course will grow with effort | 3.57 | .54 |
| 3. My competence in this course will grow with effort | 3.39 | .58 |
| 4. I can succeed at this course | 3.50 | .51 |
| 5. The course activities have value for my future career | 3.59 | .54 |
| 6. The institutional environment is supportive | 3.52 | .63 |

The mean score for statement 4 was 3.5 out of 4 (with a standard deviation of .51) and 100% of participants either agreed or strongly agreed which suggests that all students feel competent that they will succeed in their chosen academic discipline. 98% of participants either agreed or strongly agreed with statement 5 which suggests that the vast majority of students view classroom activities as interesting and hold value for their future careers. 96% either agreed or strongly agreed with statement 6 indicating that the majority of students feel supported within the institutional environment. These results would indicate that most of the participants have positive academic mindsets.

## 5. Discussion

Results for ATMI suggest that engineering students have positive attitudes towards mathematics in general, but in particular they appreciate the value of mathematics to their chosen career in engineering. As 90% of the respondents had completed Project Maths it would appear that Project Maths is having a positive effect in terms of students' attitudes towards mathematics. The results also indicate that students who complete the higher level curriculum tended to have more positive attitudes towards mathematics (mean = 4.34) than students who completed the ordinary level curriculum (mean = 3.49). Those who completed the higher level mathematics curriculum also tended to perceive themselves as more mathematically prepared for higher education than students who complete the ordinary level curriculum.

Academic mindsets are strongly associated with academic perseverance and achieving good grades. The six items from [20] revealed the engineering students possess strong mindsets with all items scoring above 3/4. Students who believe these statements are more likely to invest effort in learning and to persist in the face of any adversity. Research also suggests that when students care about what they are learning, set a clear path to developing their knowledge and skills, envision themselves on that path, and believe that their efforts will pay off, and trust that they will be supported when they need it are much more likely to work hard to learn [20].

## 6. Conclusion

While previous research do recognise the importance of the non-cognitive domain during the mathematical transition to higher education, this study suggests expanding the non-cognitive domain to include academic mindsets proposed by [20]. This has the potential to provide much greater information on the issues faced by students as they negotiate the transition to higher education and further demonstrates the multi-faceted nature of mathematical preparedness for higher education. Research also suggests that it is insufficient to consider grades alone and non-cognitive factors are equally important [21]. It is also stated in [21] that grades are becoming increasingly less useful as indicators of student achievement or as predictors of future student success and this is primarily due to grade inflation. Prior grades only provide a limited

view of one's potential [21]. While it is not possible to ignore grades, additional measures are important in assessing mathematical readiness for higher education. Non-cognitive factors typically refer to variables relating to adjustment, motivation and students' perceptions and differ from the traditional quantitative measures typically associated with examinations. Although this research focuses on first year engineering students, parallel studies could be considered across STEM disciplines to establish if these patterns exist in the wider group.

## 7. References


[1] Treacy, P., Faulkner, F. and Prendergast, M. (2016). Analysing the correlation between secondary mathematics curriculum change and trends in beginning undergraduates' performance of basic mathematical skills in Ireland, *Irish Educational Studies,* 35 (4), 1-21.

[2] Grove, M. (2012) The Mathematical Transition: A two-stage problem? MSOR Connections, 12 (1): 15-18.

[3] Hourigan, M. and O'Donoghue, J. (2007). Mathematical under-preparedness: the influence of the pre-tertiary mathematics experience on students' ability to make a successful transition to tertiary level mathematics courses in Ireland. *International Journal of Mathematics Education in Science and Technology.* 38(4), 461-476.

[4] Daskalogianni, K., and Simpson, A. (2002). Cooling-off: The phenomenon of a problematic transition from school to university. In Proceedings of the second international conference on teaching mathematics at the undergraduate level (pp. 103-110).

[5] Bourn, J. (2007). Staying the course: the retention of students in higher education. London: National Audit Office.

[6] Faulkner, F. and Hannigan, A. and Fitzmaurice, O. (2014) The role of prior mathematical experience in predicting mathematics performance in higher education. *International Journal of Mathematical Education in Science and Technology*, 45 (5). pp. 648-667.

[7] Gill, O. (2006) *What counts as Service Mathematics? An investigation into the 'Mathematics Problem' in Ireland*, (PhD): University of Limerick.

[8] National Council for Curriculum and Assessment (NCCA) (2012). "Project Maths Responding to current debate", [internet], Dublin, Ireland, http://www.ncca.ie/en/Curriculum_and_Assessment/PostPrimary_Education/Project_Maths/Information/Project_Maths_response_to_current_debate.pdf (Access Date: 2/12/2016)

[9] Kantanis, T. (2000) The Role of Social Transition in Students Adjustment to The First-Year of University. *Journal of Institutional Research*, 9(1), 100-110.

[10] Jones, B. and Frydenberg, E. (1998) Who Needs Help and When: Coping with The Transition from School to University, *Annual Conference of the American Educational Research Association*, 1-27.

[11] D'Souza, S., and Wood, L. (2003) *Tertiary Students' Views about Group Work in Mathematics.* Proceedings of the Australian and New Zealand Associations of Research in Education Joint Conference. Auckland, New Zealand.

[12] Treacy, P., and Faulkner, F. (2015). Trends in Basic Mathematical Competencies of Beginning Undergraduates in Ireland, 2003–2013. International Journal of Mathematical Education in Science and Technology, 46(8), 1182-1196.

[13] Carr, M., Bowe, B. and Ní Fhloinn, E. (2013). Core Skills Assessment to Improve Mathematical Competency. *European Journal of Engineering Education*, 38(6), 608–619.

[14] Higgins, P. J., Mullamphy, D., and Belward, S. R. (2010). Bridging the gap: teaching university mathematics to high school students. *Australian and New Zealand Industrial and Applied Mathematics Journal*, 51, C640-C653.

[15] Clark, M., and Lovric, L. (2009). Understanding secondary–tertiary transition in mathematics. *International Journal of Mathematical Education in Science and Technology*, 40(6), 755 - 766.

[16] Conley, D. T. (2007*). Toward a more comprehensive conception of college readiness.* Eugene, OR: Educational Policy Improvement Center.

[17] Duncheon, J. (2013). *The problem of college readiness*. Paper presented at annual meeting of the Association for the Study of Higher Education, St. Louis, MO.

[18] Killilea, M., O'Brien, S and Delargey, M. (2014) Sociocultural lessons for reform-based mathematics: Tracing pedagogical shifts in a transition year classroom CASTeL (Centre for the Advancement of STEM Teaching and Learning) (2014) *Science and Mathematics Education Conference*, pp.102-116

[19] Tapia, M. and Marsh, G. E. (2004) An Instrument to Measure Mathematics Attitudes. *Academic Exchange Quarterly*, 8(2), pp. 16-21.

[20] Farrington, C. A. (2014). Failing at School: Lessons for Redesigning Urban High Schools. Teachers College Press: place.

[21] Sedlacek, W.E. (2011) Using Noncognitive Variables in Assessing Readiness for Higher Education. Readings on Equal Education, 25, 187-205.

# The Formation of Motivation to Study a Physics of Aesc Students Teaching in Non-Core Classes

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## Abstract

*One of the most difficult and interesting questions of teaching physics at the Advanced Educational Scientific Center of Moscow State University is the teaching it for so-called non-core classes.*

*A particular challenge is the teaching physics at the biology and chemistry department due to the fact that the majority of students continue their studying at the university choosing interdisciplinary areas where they require a deep knowledge and understanding of physics processes.*

## 1. Introduction

Advanced Educational Scientific Center (AESC), so-called Kolmogorov School, one of M.V. Lomonosov Moscow State University departments, is one of the best Russian educational center that fulfills the program of secondary (complete) education for high school students. Students entering the AESC divide into 5 specializations: physics and mathematics, computer science, chemistry, biology. We had faced two problems recent years – how to motivate the AESC students of non-core classes for studying a challenging course of physics and how to make the adaptation to the new school less painful.

## 2. First stage of motivation: newcomers

AESC run two fruitful projects for the preAESC students – The AESC Correspondence School (AESC CS), The AESC Internet Olympiad (AESC IO) [1] - and had valuable experience at that field.

AESC CS aims at the instilling the interest of students to mathematics, physics, computer science, chemistry and biology. AESC CS concept lets students select 3 natural science subjects to build individual educational trajectory. Studying physics at AESC CS everyone has possibility to choose between basic level oriented on AESC subsequent programme for biology and chemistry students or advanced level.

AESC CS is for 12-15 age students and aims to raise their interest in mathematics, physics, informatics, chemistry and biology. In AESC CS, students can select three subjects from list to build individual educational trajectory. During AESC CS, students complete eight learning modules per year for every subject. Each module includes theoretical introduction and tasks based on theoretical material. This module extends general school program, so AESC CS does not focus on the exams prep. AESC CS teacher works individually with each student, discussing mistakes and weak points. Once a year the best students are invited to the AESC for one week intensive course where they study live and watch the verge of teacher personality.

Due to such approach and wide teaching experience, about 60% AESC CS students enter Kolmogorov School as highly motivated students and have the better results during the education than others. [2]

AESC IO is another way to motivate students. It is a three-stage science competition realized via the Internet. As well as AESC CS, AESC IO proceeds in five fields. The training and qualifying stages are open for all participants and runs in automatic mode. The final stage is for the most successful participants. It requires a detailed answer that checked manually by expert. Due to orientation on creative and unusual tasks, AESC IO becomes very challenging competition for all students and gives addition advantages for the winners. More than 30% AESC IO participants have entered the AESC; about 50% had continued taking part in other AESC projects. [2]

Learning in AES gives to students more challenges comparing to usual school. These projects allow students to test university style learning in mild condition and simplify adaptation. As a result for AESC we have qualitative selection of highly motivated students whom show the best results during AESC education and in future academic work.

## 3. Study at the AESC: second stage

According to the curriculum approved by the decision of the Academic Council of AESC (28.06.2010) [1], for each thread provides a different

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number of hours allocated to the teaching of physics - from 6 hours per week in all classes of physics and mathematics department of up to 4 hours for the biology students.

AESC student in the same class have different backgrounds: from absolutely “do not know” and to the participants of the regional stages of state physical competition. In connection with such stratification we decided not to use only one set of teaching materials. Students can choose from several sets of books (usually three) that they can use, taking into account their knowledge and needs.

In other words, each student chooses a tutorial that corresponds to his level. During the lessons students are asked to explain the material often is a compilation of several authoritative books. It is also recommended to use for each topic several reliable sources of information – not only books.

At the beginning of the term teacher sents work plan for the entire year, indicating the theory and problems that will be discussed and are given as a home. All tasks are selected taking into account the class specificity. There are two teachers in the classroom during the lesson, that allows provide flexibility in teaching physics parallel at different levels.

In the 2015-2016, the biological class was offered online support: to create a resource that is hosting the additional materials on the subjects dealt with an affordable level. Such system allows provide necessary minimum knowledge of physics for the weaker students. On the other hand, there is practically no limits possible level of knowledge on the physics of the students who are going in the future to enter the universities profile.

We are continuing our research on these issues.

## 4. References

[1] AESC web-site (Russian only) http://internat.msu.ru (Access Date: 12 January, 2017)

[2] Degtiareva A.P. *Projects aimed to continuous education: Advanced Educational Scientific Center experience*. Theses of 24th IUPAC International Conference on Chemistry Education, Kuching, Malaysia.

## Session 4: Learning / Teaching Methodologies and Assessment

Title: Teacher's Perceptions on Teaching Thinking Skills, Examined through the Lens of the Model of Computational Thinking
(Authors: Samyah Alshehri, John Woollard, Carol Evans)

Title: The Project "Schools: Future Labs"
(Authors: Ourania Gikopoulou, Anna Slavi, Penelope Sotiropoulou, Iliana Kikidou)

Title: Interdisciplinary Problem Oriented Approach and Project Work in Chemistry Teaching at AESC MSU
(Authors: Mendeleeva E.A., Kolyasnikov O.V., Sigeev A.S.)

Title: Indigenizing College Programming: Challenges and Successes
(Author: Karen Favell)

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# Teacher's Perceptions on Teaching Thinking Skills, Examined Through the Lens of the Model of Computational Thinking

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## Abstract

*Ever since the establishment of formal education, educators have aimed to teach students how to think, aspiring to offer learners a program that not only focuses on the transference of current knowledge, but one that also equips them with the dispositions and skills that will enable them to face novel challenges in the future [1].*

*Educational policymakers around the world emphasise the importance of teaching higher-order thinking as a crucial 21st-century skill [2]. This consensus is based on academic research that has shown a correlation between individuals' intellectual skill levels and society's economic progression [3]. In addition, according to the January 2016 World Economic Forum Report, by 2020, most jobs will demand skills such as complex problem-solving, critical thinking and creativity. In fact, there is a renewed interest in teaching thinking, kindled by the advancements of Internet-age technologies [4] and fuelled by the evolution of 21st-century skills [5] [6].*

*This study aims to explore and evaluate primary school teachers' perceptions on teaching thinking skills. The research uses a pragmatic worldview and structured mixed methods to investigate these fields. Moreover, this study provides essential academic reflection on the computational thinking framework, including its assessment as a suitable tool for teachers to evaluate their own practices with regard to teaching cognitive thinking. Additionally, the study will provide recommendations for the existing model based on the research findings.*

## References

[1] Wegerif, R. (2015a) Technology and teaching thinking: Why a dialogic approach is needed for the twenty-first century. In Wegerif, Li and Kaufman (eds) The Routledge International Handbook of Research on Teaching Thinking (pp. 427-440). Routledge: New York and London

[2] Collins, R. (2014) Skills for the 21st Century: teaching higher-order thinking. Curriculum & Leadership Journal, 12(14).

[3] Rindermann, H., & Thompson, J. (2011). Cognitive capitalism the effect of cognitive ability on wealth, as mediated through scientific achievement and economic freedom. Psychological Science.

[4] Wegerif, R. (2015) Toward Dialogic Literacy Education for the Internet Age , Literacy Research: Theory, Method, and Practice, 64(1), pp. 56–72.

[5] Higgins, S. (2015) A recent history of teaching thinking, The Routledge International Handbook of Research on Teaching Thinking, pp. 19–28.

[6] Dede, C., Mishra, P., & Voogt, J. (2013). Working Group 6: Advancing computational thinking in 21st century learning. EDU Summit 2013 TWG6.

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# The Project "Schools: Future Labs"

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## Abstract

*Schools: Future Labs (SFL) project is funded under the Key Action 2: Cooperation for innovation and exchange of good practices – Strategic partnerships in the field of education, training and youth of the Erasmus+ program. Its main objective is to increase the employability of young people, by getting them interested in STEM (Science, Technology, Engineering, and Mathematics) subjects and in the habit of using a foreign language. To reach its objective, Schools: Future Labs develops and tests a teaching methodology based on action research, involving task-based exploration of STEM subjects in combination with Content and Language Integrated Learning (CLIL). This methodology is student-led, self-directed and includes project planning and implementation skills. The purpose of this project is to spread out the methodology, at least, in the participating countries. The efficacy of this methodology is evaluated, both in quantitative terms and in qualitative terms. The evaluation results have been very positive as 82% of the students want to continue learning with the SFL methodology. Our work adds to previous studies exploring the ways of improving the learning process by motivating students and raising their interest both in science and FL.*

## 1. Introduction

During the last decades it became evident, in a worldwide scale, that it is imperative to modify curricula in order to ensure that graduating students possess the skills and competencies needed to make a successful transition to employment. These skills and competencies include the ability to communicate effectively in several languages, specializations in STEM subjects, learning how to learn, and having a sense of initiative. With respect to STEM subjects, the traditional approach leads to theoretical lessons that fail to engage students or motivate them to pursue these subjects in the future.

Likewise, the current approach to foreign language teaching, combined with large classroom sizes, makes it impossible for students to actually learn the language, and to engage with the foreign language in an active way or appreciate the practical use of it.

Schools: Future Labs proposes to develop a cost-effective methodology that will transform the teaching and learning of languages and STEM subjects so that students become active, self-directed, exploratory participants during their learning process [1]. With the appropriate support and guidance, as well as access to basic tools of scientific exploration, students discover that STEM subjects and foreign languages are interesting, useful, and open doors to their future.

## 2. The innovative aspects of the Project

Schools: Future Labs proposes an experimental, self-directed learning approach in order to put students' interest, curiosity and sense of initiative at the centre of the teaching process.

Further innovative aspects of Schools: Future Labs include:

- Teaching of a foreign language in combination with a STEM subject;
- Use of an "Action Research" teaching approach, which focuses on student-led, task-based learning;
- Use of an exploratory methodology both within the classroom (between teachers and their students) and as a method of teacher training (between the project trainers and the teachers);
- Strengthening of teacher profiles through the development and accreditation of a Teacher Training Course based on this methodology;
- Partnership and cooperation between different types of institutions all concerned with improving teaching practices: schools (teachers), teacher training institutes, Universities specialized in teacher training, two National Education Ministries in Spain and Romania, and two cultural institutes (Goethe-Institut, Instituto Cervantes);
- Implementation in primary schools, thereby nurturing an early interest in STEM subjects and reaching students before they reach an age wher they are too embarrassed to try to speak in a foreign language;
- Measurement and analysis, both qualitative and quantitative, of project outcomes and results

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which will support the implementation of the methodology on a broader scale.

## 3. The expected results

The efficacy and effectiveness of the Schools: Future Labs methodology is evaluated, both in quantitative terms and in qualitative terms.
With respect to the students, we anticipate that they: will be more interested in STEM and FL subjects; will achieve a deeper level of knowledge in STEM; will develop better fluency in the chosen foreign language; will acquire useful skills.

With respect to the teachers, we anticipate that they: will strengthen their professional skills; will find their classes more fulfilling, interesting and enjoyable; will derive great personal and professional satisfaction from being able to improve their students' learning outcomes.

Based on these results, we would be able to promote the adoption of the Schools: Future Labs methodology by public education authorities in the participating countries and its implementation in more schools, including in secondary schools.

## 4. The implementation

The project is carried out over a three-year period, from 1/9/2014 to 31/8/2017 and has 13 partners in Greece, Romania, Bulgaria and Poland. It is being implemented and tested in (1 or 2) primary schools in each aforementioned country enabling the participation of schools that teach Spanish and German as a foreign language in combination with physics, chemistry or biology.

In particular, it is implemented in the following schools. Romania: Ion Maiorescu (physics-German) and Miguel de Cervantes (physics-Spanish), Bulgaria: Uwekind (chemistry-German) and Benito Juarez (chemistry-Spanish), Poland: 4 STO Krakow (biology-Spanish), Greece: Ellinogermaniki Agogi (physics-German).

The foreseen outputs of this project are: A teacher training Course to train teachers on the Schools: Future Labs methodology; Accompanying lesson plans that teachers can use to implement the methodology in tandem STEM/FL classes; A virtual student learning portfolio which will document each student's learning outcomes. These outputs will be made available in English, German, Spanish, Bulgarian, Greek, Polish and Romanian.

All of these outputs will be made possible through the piloting of the methodology within these primary schools in the four countries, offering two languages (Spanish and German) as foreign languages in a variety of STEM subjects (Biology, Chemistry, Physics). In order to implement the SFL methodology, teachers are provided with two years of training and support. Mobile labs relevant to the science subjects they have selected are also provided to schools.

After the initial training of teachers the SFL project was implemented during the second semester of 2014/2015 school year (in the 5th Grade) and during the entire 2015/2016 school year (both in the 5th and 6th Grades). The implementation is also continued during the 2016/2017 school year (in the 5th and 6th Grades as well as in the 7th grade in one country).

During the piloting phase, teachers have developed lesson plans, according a relevant template based on the SFL methodology. The piloting and implementation is accompanied by on-going support to teachers, provided in the form of Initial Teacher Training sessions, as well as Local and Joint Teacher Training and Production Seminars. In the SFL project during the 2014/2015 school year 171 students of 5th Grade, 11 Science Teachers and 6 FL teachers were involved. During the 2015/2016 school year 119 students of 5th Grade, 146 students of 6 Grade, 9 Science Teachers and 6 FL teachers were involved. During the 2016/2017 school year 120 students of 5th Grade, 97 students of 6th Grade, 65 students of 7th Grade, and the same Science and FL Teachers are involved.

## 5. The evaluation

Evaluation is very important to this project and it is based on our research questions regarding students, teachers and the project in general.
With respect to the students, our research questions are:

- Do students achieve a higher and deeper level of knowledge in STEM-subjects than those not involved in this project?
- Do students develop better fluency in their chosen foreign language than those not involved in this project?
- Are students more interested in STEM subjects and in learning FL than those not involved in this project?
- Do students acquire useful skills (both curricular and transversal)?

With respect to the teachers our research questions are:

- Do teachers find their SFL classes more interesting, fulfilling and motivating?
- Are teachers' profiles strengthened by the acquisition of additional teaching skills?

With respect to the project in general, our research questions are:

- Is the project's methodology feasible and implementable?

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- Is this methodology useful and successful?
- Is it feasible to promote this methodology in more schools, including secondary schools and extend it to more countries?
- Are the Project Outputs sufficient to enable other schools to adopt it?

In order to find answers to all these questions, we designed an evaluation strategy, both quantitative and qualitative, to evaluate students' skills acquisition, learning outcomes, changes in level of interest in STEM and FL, students' and teachers' perceptions of, and satisfaction with, the methodology, using as tolls questionnaires, test exams, interviews and on-site observations.

More specifically, in order to evaluate students' learning outcomes and skills obtained we used their school tests performance and their assessment by their teachers, as well as their self-assessment, and we compared their performance before and after the implementation of the SFL project.

In order to evaluate students' and teachers' attitudes / motivation / interest regarding STEM and FL as well as their satisfaction with the methodology, we compiled questionnaires, after studying the relevant international literature and studies (on science learning, foreign language learning, STEM and CLIL programs). Based on this research (study of research methods, tools and questionnaires used, data analysis, statistical analysis, conclusions reached), and on the basis of our experience and taking into consideration the questions and goals of this Project, we selected to focus on seven factors for students and six factors for teachers (FL/STEM).

Namely, the factors for students are: interest / enjoyment, perceived competence, tension / pressure, value / usefulness, science learning, foreign language learning, cooperative learning. The factors for teachers are: interest / enjoyment, perceived competence, tension / pressure, value / usefulness, science teaching, foreign language teaching.

For each one of these factors we selected and adapted several questions from the ones commonly used in similar surveys (Intrinsic Motivation Inventory), and added some to meet the goals of our research. Therefore, we compiled three questionnaires for the pre-tests: for Students with 55 questions, for STEM Teachers with 19 questions, and for FL Teachers with 19 questions. A similar procedure was followed for the post-questionnaires, where we added some questions measuring participants' satisfaction with the Project and evaluating it: numbering 72 questions for Students, 44 questions for STEM Teachers and 41 questions for Foreign Language FL Teachers.

The participants completed the questionnaires before and after the implementation of the SFL project and we compared their answers. The same questionnaires (without the additional questions about the methodology) were also handed to non-participating students, in order to compare participants' answers with non-participants'.

We also collected qualitative data by in situ observations of the implementation of the project in all participating schools. We visited all the schools in the four countries, we observed the lessons and we talked to all the participating teachers, receiving feedback from them about the methodology implemented.

The overall evaluation of the SFL project will be completed by the end of the project, with the evaluation of its final outputs (i.e. the lesson plans, the teacher training course and the learning portfolio), the data collected in all of its phases, as well as through interviews with the teachers and observations of the lessons.

## 6. The Results

Regarding Students' attitudes / motivation / interest in science and FL after the implementation of the project, the Independent samples T-Tests performed showed statistically significant differences in all factors, with the participating students attaining higher scores in comparison to the non-participating, as shown at Figure 1. This was not the case before the implementation, where both groups' scores were similar and we did not find statistically significant differences in almost all factors.

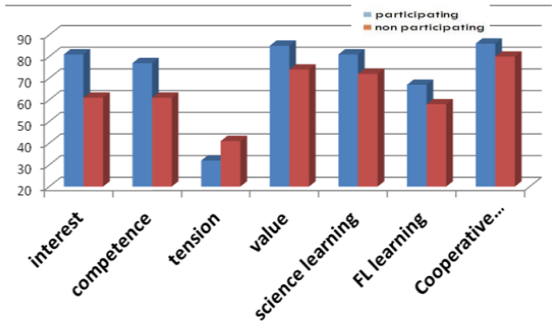


Figure 1. Comparison of participants'-non participants' answers after the implementation (in %)

We also compared participants' answers before and after the implementation and the paired samples

T-tests showed statistically significant improvement in almost all the factors after the implementation.

In order to evaluate participants' satisfaction with the methodology and their assessment of the project we examined their answers to the additional questions of the post-questionnaires. Some indicative results are: the majority of students perceived the lessons as more interesting (64%), had no difficulty understanding the concepts of science in the foreign language (61%), perceived lessons combining science with the FL as much more fun (62%), found it easier to cooperate with their teams (67%).

The most important result, as shown at figure 2, is that 82% of students want to participate in the project again.

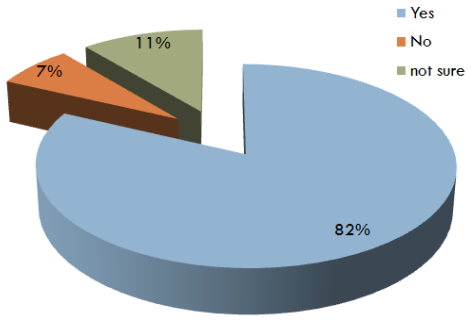


Figure 2. Percentage of participants answers to the question "I want to participate again in this program"

Regarding participants' performance in science and FL as well as their skills, we found statistically significant improvement after the implementation in all areas measured: fluency in speaking FL, vocabulary development in FL, accuracy of writing in FL, accuracy of speaking FL, experimental skills, hypothesizing / predicting, problem solving, critical thinking, ability to observe, taking initiative, autonomy, cooperating with other students.

With regard to teachers, the majority is satisfied with the methodology of the project, finds the lessons more fun and fulfilling would recommend this methodology to other colleagues and would like to participate in the SFL project again.

Finally, the on-site visits made to all schools gave us the opportunity to see implementation of the methodology on site and receive feedback directly from the teachers and students. Our basic observations are:

- Students show interest and participate willingly.
- They show great enthusiasm and seem to enjoy throughout the course.
- They respond successfully to the activities of the course (comparing, identifying, predicting …), they conduct the suggested experiments with great enthusiasm and complete the worksheets successfully.
- They use the German/Spanish language during most of the time of the course. They use known words with ease and have no difficulty compiling proper sentences and express their opinion freely in FL. They seem to understand the instructions they are given in the German / Spanish language and it is not difficult for them to answer or present their work in front of the rest of the class using this language.
- They can cooperate harmoniously (in smaller or larger groups)

With regard to the teachers, apart from the very careful preparation of the course (with worksheets, the necessary vocabulary and appropriate visual material), they also show considerable enthusiasm for the course and love for their work, which contributes decisively to the success of the project. Very good cooperation between the teachers also plays an important role, and has resulted in the lesson being predominantly taught in the German/Spanish languages with smaller interventions, when necessary, in the mother tongue of the students.

## 7. Discussion

The evaluation results showed that the SFL program is being implemented with great success in all schools. The methodology used in the project seems to be feasible, useful, and successful. The lessons seem to be more interesting and fun for students as well as for teachers.

Participating students improved their attitudes / motivation / interest significantly in almost all factors both in STEM and FL. They also improved their performance both in STEM and FL. We also observed improvement in their skill acquisition. Finally, both participating teachers and students are satisfied with the SFL methodology and feel more confident. The successful implementation of the project was also evident during the science fairs organized last summer in all participating schools during which the results of the students' work are demonstrated. These were organised as mini-competitions ending in the selection of a winning science project which will be presented during the Closing Conference in June 2017.

## 8. Conclusions

Our results are quite encouraging urging us to promote the adoption of the Schools: Future Labs methodology by public education authorities in the participating countries and its implementation in more schools. Our work adds to previous studies exploring the ways of improving the learning process by motivating students and raising their interest both in science and FL.

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## 9. References

[1] European Commission, EACEA, Erasmus+ Actions, Key Action 2: Cooperation for innovation and the exchange of good practices https://eacea.ec.europa.eu/erasmus-plus/actions/key-action-2-cooperation-for-innovation-and-exchange-good-practices_en (Access date: 10th April, 2017)

# Interdisciplinary Problem Oriented Approach and Project Work in Chemistry Teaching at AESC MSU

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## Abstract

*Thirteen-years-experience of teaching chemistry to motivated high-school students resulted in an effective approach to teaching, proven over time and again. The essential components are: tight coordination of teaching process with university programs and current academic research; intrinsically interdisciplinary problem oriented studies and discussions; individual project work, curated but highly independent; intensive hands-on practice.*

## 1. Introduction

Advanced Educational Scientific Center (AESC, Kolmogorov School) is a department of Moscow State University (MSU). It was founded 53 years ago by the Great Russian mathematician A. N. Kolmogorov as a boarding school for students, intellectually gifted in math and science from all over Russia. To be admitted, teenagers (15-16 years old) have to pass competitive entrance tests which ensure that the majority of our students are goal-oriented young people motivated to continue their education at MSU and to work in science. The defining feature of our school is its intimate association with MSU: most subjects are taught by the University staff and the teaching system is quite in line with the University system. At school, the students are able to choose an advanced focus, either on physics, mathematics, computer science, chemistry or biology. [1] [2]

The groups of biology-focused students are curated by the MSU Bioengineering and Bioinformatics department. Graduates are expected to be prepared for successful entrance and further study at MSU or other high-profile universities and to be able to participate in research at the forefront of science. Thus, the purpose of training in such a group is both to provide students with the scientific knowledge at an advanced level, and to develop the ability of systematic thinking and scientific problem solving skills. The most relevant research in modern biology is carried out at the confluence of different fields of knowledge; therefore, to be successfully prepared both for University courses and for further scientific occupations students have to gain deep fundamental knowledge in other fields, aside from biology —in mathematics, computer science and chemistry, especially organic.

This article deals with the specifics of teaching organic chemistry to groups of biology-focused students.

## 2. Our experience

For the biologists' student group, organic chemistry is a compulsory subject (6 hours per week during 2 semesters). Studying organic chemistry requires students' deep understanding of the subjects' logic. Tracing the interdependence between structure and properties of organic substances, as well as understanding the types of organic reaction mechanisms helps them to develop the skill of analytical thinking. Much attention is given to problem solution, including non-standard problems on the level of Chemical Olympics, which leads to the formation of critical thinking.

In the class, much attention is given to biochemistry topics: structure and properties of amino acids, proteins, fats, carbohydrates and so on. In addition, the connection between chemistry and biology is naturally shown during each topic of the course. For example, "Unsaturated compounds" topic leads to the discussion of beta-carotene structure and properties; amino compounds are illustrated with a problem about adrenaline, etc.

The way we see it, environmental themes are especially important for future scientists in the field of biology. On many topics of organic chemistry course, discussions with students are initiated. The question is how a particular discovery being studied has altered the life of the mankind, including the subtle and nontrivial consequences it caused, the ethics and ramifications associated therein. It is very important as the topics are related to industrial production, plastics and rubber processing, dyes, medicine, food additives, fossil fuels and petroleum products.

We believe that it is extremely important for future scientists to be able to make informed decisions, evaluating the risks and benefits on the

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basis of available information. For example, trans-fats in crisps and other fast-food and the biochemical mechanisms of their intake may lead to the development of cardiovascular diseases. .Armed with that knowledge, students will not buy another pack of crisps as thoughtless as before.

As chemistry is an experimental science it is impossible to teach it without practical work. We are lucky to have the opportunity to use the students' laboratories of MSU Chemical department. During the semester, students acquire practical skills of working with organic substances and carry out basic organic syntheses.

Our educational program for biology-focused groups includes a research type mandatory project. Students have opportunities to conduct simple investigations at school, and to work in research laboratories on actual scientific problems. Thus, our students have a chance to get an experience with modern scientific research, which is steadily introduced into the school program. While preparing their reports, students learn to present investigation results. It helps them to enter the world of scientific research even being pre-University student Also they have an opportunity to shift their research on high-level even during their freshman year, often achieving significant results [3].

## 3. Conclusions

Thus, teaching organic chemistry in the biology-focused student group at AECS MSU combines the advanced knowledge of organic chemistry, systematic preparation to carrying out bleeding-edge scientific research, and close work relations with active University researchers. The success of this approach stood the test of time, as most of our students are admitted to Moscow State and other high-profile universities, choosing to continue their research after graduation in modern biology, chemistry, pharmacology and medicine.

## 4. References

[1] M. V., Sitnikova V. V. Zagorsky “Specifics of online performance control in high school”, Ireland International Conference on Education (IICE-2016) Proceedings, 2016, pp. 182–183.

[2] Chemistry chair. AESC web-site: http://internat. msu.ru/en/chemistry-en/ (Access date: 12 April, 2017)

[3]. A.S. Sigeev, O.V. Koliasnikov, E. A. Mendeleeva, M.G.Sergeeva, N.I. Morozova “Project-based approach – step from school education to modern science”, London international Conference on Education (LICE-2015) Proceedings, London, 2015, pp. 159–160.

# Indigenizing College Programming: Challenges and Successes

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**Abstract**

*For decades, scholars and educators have been working toward improving education for Indigenous students. In spite of these efforts, Indigenous students in Canada remain behind in academic achievement at the post-secondary level when compared to non-Indigenous students [1]. In order to improve Indigenous student rates of retention and completion, Indigenous and non-Indigenous scholars have collaborated with educational and government organizations to develop provincial and national protocols for making post-secondary education a more accessible and inclusive environment for Indigenous students. These protocols are the Manitoba Collaborative Indigenous Education Blueprint and the Colleges and Institutes of Canada protocol [2]. However, while instructors of Indigenous students may recognize the need to make changes in order to improve success rates of their students, the transition from mainstream education to more Indigenized education may prove difficult. In this paper, I will describe the experiences I had as an Indigenous chair of an Indigenous education program area in a college in Canada, specifically, the challenges and successes I encountered in my attempts to Indigenize education at the post-secondary level. Some instructors who have taught the same curriculum in the same way may find Indigenizing education difficult because of the amount of change that may be involved. For example, in order to respect Indigenous student knowledge and perspectives, instructors may collaborate with students while developing curriculum and instructional strategies for the course, and some instructors may find sharing power in this way uncomfortable and may be reluctant to do so [3]. I found that some of our instructors appeared to be hesitant about involving students in curriculum development, although some of this hesitation may have been alleviated once they actually began collaborating with students. In addition to collaboration, some instructors may be uncomfortable with the idea of incorporating Indigenous ceremony or spirituality into their instruction, which would likely be a necessary component of an Indigenized curriculum [4], [5]. Also, according to Godlewska, Moore, and Bednasek [6], some non-Indigenous instructors may feel that they are unqualified to or not allowed to speak to some aspects of Indigenous education, such as spirituality and cultural practices which may become part of an Indigenized curriculum. As uncomfortable as some non-Indigenous instructors may be to speak about spirituality in the classroom, some Indigenous instructors may also be uncomfortable speaking about Indigenous spirituality, particularly if they are Christians [7]. Despite the legacy of residential schools, some Indigenous communities remain predominantly Christian [8], and this could complicate attempts to Indigenize education, which I found to be the case in our attempts to Indigenize education at our institution. Although there have been and continue to be barriers to Indigenizing education in Canada, much has been accomplished in terms of scholarship and changes to policy on the part of the government and academic institutions. Large changes such as adapting curriculum and teaching methods to incorporate Indigenous ways of knowing disrupt familiar systems and potentially the instructors who operate within those systems. In time, as more institutions adopt policies of education reform through Indigenization, the changes will become easier to accept and someday post-secondary education that is respectful of Indigenous culture and worldviews will become more common. When that happens, we might have achieved some degree of respect of Indigenous people and acknowledgement of the contributions we have made and continue to make to Canada.*

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## References

[1] Statistics Canada (2016). *The educational attainment of Aboriginal peoples in Canada*. Retrieved from https://www12.statcan.gc.ca/nhs-enm/2011/as-sa/99-012-x/99-012-x2011003_3-eng.cfm (Access date: 10 April, 2017)

[2] College Planning (2016). *Strategic priority: Indigenous achievement*. Retrieved from http://blogs.rrc.ca/strategyplanning/category/strategic-plan/ (Access date: 10 April, 2017)

[3] Justice, C., Rice, J., Roy, D., Hudspith, B., & Jenkins, H. (2009). *Inquiry-based learning in higher education: Administrators' perspectives on integrating inquiry pedagogy into the curriculum*. Retrieved from http://www.jstor.org.uml.idm.oclc.org/stable/pdf/25622157.pdf (Access date: 10 April, 2017)

[4] Fitznor, L. (2012). Indigenous scholars and writing through narratives and storying for healing and bridging. In L. Fitznor & J. Hendry (Eds.), *Anthropologists, Indigenous scholars and the research endeavour*, pp. 270-283. New York: Routledge.

[5] Shahjahan, R. (2004). *Reclaiming and reconnecting to our spirituality in the academy*. Retrieved from http://web.a.ebscohost.com.uml.idm.oclc.org/ehost/pdfviewer/pdfviewer?vid=2&sid=cb8f30d1-4429-43c6-86e6-39181ae13058%40sessionmgr4007&hid=4214 (Access date: 10 April, 2017)

[6] Godlewska, A., Moore, J, & Bednasek, C. D. (2010). *Cultivating ignorance of Aboriginal realities*. Retrieved from http://web.a.ebscohost.com.uml.idm.oclc.org/ehost/pdfviewer/pdfviewer?vid=2&sid=6c5bcbf7-ecef-4632-881f-39787adb76e3%40sessionmgr4007&hid=4214 (Access date: 10 April, 2017)

[7] Maxey, R. M. (1996). *Who can sit at the Lord's table? The experience of Indigenous peoples*. In J. Treat (Ed.), *Native and Christian: Indigenous voices on religious identity in the United States and Canada*, pp.38-50. New York: Routledge. Retrieved from https://books.google.ca/books?hl=en&lr=&id=htgrp2inYjMC&oi=fnd&pg=PP5&dq=christian+aboriginal+to+teach+aboriginal+spirituality&ots=VLVESNFkaB&sig=FUy9LSIVO6u_sEhhVxwTRKdAdw0#v=onepage&q=christian%20aboriginal%20to%20teach%20aboriginal%20spirituality&f=false (Access date: 10 April, 2017)

[8] CBC Radio. (2016). *Majority of Indigenous Canadians remain Christians despite residential schools*. Retrieved from http://www.cbc.ca/radio/thecurrent/the-current-for-april-1-2016-1.3516122/majority-of-indigenous-canadians-remain-christians-despite-residential-schools-.3516132 (Access date: 10 April, 2017)

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## Session 5: Curriculum, Research and Development

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Title: Does Online Course Success Depend on When You Take the Course?
(Authors: Nohjin Kee, Chris Perumalla)

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# Bilingual Education and Indigenous Children's Voice

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## Abstract

*Education plays a vital role in today's society and it is an important tool that can be used to heal and to bring the community together. The truly human society is a learning society where everyone is given the opportunity to learn from each other and to contribute to their community. Education in essence is a social and enriching process where interaction between the individual and other people and the environment are key. Nonetheless, many times the true meaning and the purpose of education has been forgotten. An example of this is the transitional bilingual education that has been implemented in areas inhabited by indigenous peoples in Mexico where indigenous children have been discriminated against and their linguistic and cultural rights have been violated. This has damaged their personality and behavior, for example, children have become shy, quiet and isolated in the classroom due to the education they receive and the way they are treated. Many indigenous children's voices have been taken away since they have been taught in a language they do not understand. They have been silenced since their human, linguistic and cultural rights have been violated. This situation motivated conducting a qualitative ethnographic research study to explore the elementary indigenous Tsotsil children's educational experiences in a school located in the Highlands of Chiapas in southeast Mexico. The aim was to analyze the social and academic consequences of using or not children's native language and culture in their learning process. That is, it was aimed to find to what extent indigenous Tsotsil children are affected when their native language and culture were or were not considered in their elementary education. Over the course of one semester, children were observed passively and actively and were also interviewed by the main researcher. Students' teachers were observed passively when teaching and were interviewed during the semester. Also, the school principal participated in this project. The findings give hope that education can contribute to the defense of indigenous children's cultural and linguistic rights since the results of this project show that it is possible to embrace, preserve and promote children's indigenous language and culture through additive bilingual education. Also, the students especially those who were about to finish their elementary studies showed that the lack of financial resources is not a limitation for bi/multilingualism to take place when hard-work and commitment exist. The same is applicable to the teachers who work at the focus school. They do their best to maintain and promote the indigenous language despite the factors that do not favor the implementation of bilingual education. It is important to recognize that these teachers "perform magic with the little resources they have", for example, with the few teaching materials they have. Also, they are instructors who care for their students, not only for the success of their academic performance at school, but also for their well-being as children. Teachers at the bilingual school have made significant contributions to the lives of their students and they have also ensured that they are given a voice it is common for extrovert indigenous children to become shy, silent and alienated in the school as the language they are taught in and spoken to is foreign to them. Fortunately, the indigenous children at the focus bilingual school do have a voice and their personality and behavior are positively affirmed as teachers maintain and promote the use of the native language and culture.*

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# Compulsory Short-term Study Abroad Programs for Japanese High School Students in Hawai'i: A Case Study

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## Abstract

*The majority of senior high schools in Japan include a short domestic or overseas school trip as part of their curricula. Kanto High School (a pseudonym), a coeducational private senior high school located in Eastern Japan, requires all of its students to participate in a short study abroad program at its satellite campus in the United States, Hawai'i Study Center (a pseudonym). This case study objectively documents the educational context, administration, and outcome of this program to serve as an exemplar for similar programs.*

## 1. Introduction

Short-term study abroad programs take many forms. In 2014, students from 1,199 Japanese high schools participated in 1,776 overseas study tours, or kenshuu ryokou [1]. The Hawai'i Study Center program is one of these and was established to provide Kanto High School students with an opportunity to study English conversation while experiencing cultural exchange. Overall improvement in their English speaking ability and willingness to communicate in English [2] [3] is the primary goal. The secondary goal is for program participants to become more independent and experience personal growth through being separated from both their parents and home country and being placed in an environment in which they must adapt and make their own decisions [4] [5].

Hawai'i Study Center was founded in 1989 and initially served as an intensive study center for students specializing in English at Kanto High School and at its affiliated junior college. At the time, the short-term study abroad programs were three weeks in length and consisted of six cohorts of around 35 students each every year. The content of the English as a Second Language (ESL) instructional component of the high school and junior college programs differed, but the programs were otherwise identical. The junior college program continued for 16 years and is now defunct. The high school program has been shortened and expanded to now include all Kanto High School second-year students for compulsory two-week intensive programs. Between 700-800 students, divided into 12 cohorts, have now been going to Hawai'i Study Center annually for the last 15 years.

## 2. Facilities and staffing

The three-acre Hawai'i Study Center campus is located in a residential area and consists of five purpose-built buildings within walking distance of its town's downtown area. The main building contains a business office, laundry room, multi-purpose room, and a dormitory. An adjacent building contains classrooms and offices for teachers and administrators. The two other buildings are used as dormitories for students and accompanying teachers. A separate open-air pavilion is used for large group activities and banquets.

Shared dormitory accommodation contains a communal living space furnished with a sofa, dining table and chairs, kitchenette, toilet, and shower. This area is connected to two separate bedrooms that contain either two or four beds, dressers, closets, desks, and chairs. Internet access is not available. Student dormitories are segregated by gender.

Hawai'i Study Center has full-time, seasonal, part-time, and outsourced employees. There are two full-time administrators who consist of the "Director," an academic who is the lead administrator and in charge of the overall program, and a "Supervisor," who is in charge of scheduling and organizing the afternoon and weekend activities, excursions, and lectures. The full-time office staff consists of a bookkeeper and a clerk. ESL teachers were originally dispatched from the University of Hawai'i system but are now hired directly on a seasonal basis when classes are in session. There are currently 14 on call and most have formal teaching qualifications and significant amounts of teaching experience. A single instructor teaches the same group of students for an entire session and the Director is the designated substitute teacher. An average of 11 Student Assistants are

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employed on a part-time hourly basis. They each work an average of 20 hours a week during a session.

## 3. Learner profile

The students who attend Hawai'i Study Center are from one of two tracks at the somewhat selective Kanto High School. The *futsuu* course has a university preparatory curriculum and the *shougyo* course prioritizes applied business skills and knowledge for employability immediately after graduation. Approximately 70% of Kanto High School students have never been overseas before.

The English language abilities and motivation levels of the two groups differ. The *futsuu* students, which make up the majority, tend to be more proficient English users and have higher motivation levels than *shougyo* students. *Futsuu* students go to Hawai'i Study Center from the beginning of the academic school year and *shougyo* students attend at the end. The content of the short-term study abroad programs does not change, but individual ESL teachers are allowed to make any necessary adjustments to the pace of instruction in their classes.

## 4. Schedule

Hawai'i Study Center has a two-week program. On weekdays, ESL classes are held in the morning, and afternoons are used for activities, excursions, and lectures. Saturdays have all-day field trips and no activities are scheduled on Sundays. Modifications to this schedule need to be approved by Kanto High School beforehand.

A typical Kanto High School cohort takes an overnight flight from Japan and arrives in Hawai'i on a weekday morning. The group is greeted at the airport by Hawai'i Study Center staff. Everyone is then bused to the campus, where they have an orientation before eating lunch and settling in to their surroundings.

The general orientation session, which begins immediately after arriving at Hawai'i Study Center, is purposely brief due to student fatigue. The first part is conducted in both English and Japanese and begins with an introduction of the Hawai'i Study Center administrators and office staff. Steadfast rules including the curfew (5:30 PM in winter, 6:00 PM in summer), attendance at daily 8:00 AM and 8:00 PM meetings, and the "lights out" policy at 10:00 PM are announced at this time. After a safety briefing, instructions on such things as how to store and retrieve valuables from the front office is given. Dormitory assignments are then announced. One member from each room is a designated resident assistant and is led to a room by office staff to become familiarized with the operation of the appliances and bathroom fixtures. This student is responsible for later demonstrating how to use these to his or her roommates. At the end of the orientation, students are told that an "English Only" policy is in effect–Japanese cannot be spoken in ESL classrooms and when interacting with any Hawai'i Study Center staff except in emergencies. Lunch boxes are then distributed, which students take with them to their rooms. Later, the entire cohort walks to a large supermarket, where they begin purchasing the groceries and daily necessities they will need during their stay.

A welcome dinner is held on the evening of the first day and is emceed by the Director. Students sit together in previously assigned groups to meet their ESL teacher for the first time. Dinner consists of a catered buffet featuring local Hawaiian and mainstream American food.

ESL classes begin on the morning of the second day. They are held from 8:30 AM to 12:00 PM with scheduled 10-minute intermittent breaks at 9:50 AM and 10:50 AM. In the afternoon, a fire drill is held before everyone boards a bus for a city tour with a professional tour guide.

From the third day, weekday afternoons consist of a rotation of activities, excursions, and lectures held between 1:00 PM to 4:30 PM. Activities are held on campus and consist of a traditional Hawaiian hula dance class conducted by a well-known *kumu hula*, a dance-based group fitness class led by a physical education teacher, and a "Talk Story," which is a relaxed free-conversation activity (see Student Assistants below). Excursions are short trips by van to local tourist attractions, a museum, a farmer's market, a chocolate making and tasting class, and to a restaurant with their ESL teacher. The hour-long academic lectures are on geology and oceanography, which are related to the Saturday field trips the students take part in. All activities, excursions, and lectures are in English; however, the students are allowed to speak in Japanese with each other during these events and during field trips.

There are two all-day field trips on Saturdays. One trip is an educational tour to a national park. A side trip is made to a coffee and macadamia nut farm. The other trip is to a popular beach, followed by stops to a high-end shopping center and a well-regarded bakery.

Students are allowed to leave campus in groups when they have no scheduled activities. The immediate area is explored on foot and longer distances are often traversed by taxi. Students spend the majority of their off-campus downtime shopping.

The schedule for the last two days consists of a test, room cleanup, a farewell dinner, and departure from Hawai'i Study Center. An achievement test is given in the final ESL class in the form of individual Oral Proficiency Interviews. Each ESL teacher is in charge of assessing how much their students improved over the duration of the program. A letter grade is given, but it does not become a part of the

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student's permanent academic record. The final afternoon is reserved for students to pack their belongings and clean their dormitory rooms. A program satisfaction survey is completed at this time. In the evening, there is a buffet dinner featuring a barbecue prepared by the student assistants. Each class performs a short skit or song, and speeches are made by the accompanying teachers, ESL teachers, and Director. Certificates of completion are distributed by the ESL teachers to their students at this time. The cohort leaves Hawai'i Study Center after their morning meeting the next day.

## 5. Logistics

Careful planning is necessary to accommodate the large groups of students. One cohort, which averages 65 students and consists of two Japanese *kumi*, or homerooms, arrives each month. The students have previously been randomly assigned by Kanto High School into *han*, or subgroups of 10-12 students, for the short-term study abroad program and each is given a letter name. The *han* unit stays together for ESL classes and afternoon activities, excursions, and lectures. A *han* is only separated for dormitory assignments, which are determined by Kanto High School separately.

Hawai'i Study Center owns four 12-passenger vans that are each capable of transporting a *han* to an afternoon excursion. Due to the number of vans and the number of *han*, and in an attempt to keep the number of participants low, different *han* have different activities, excursions, and lectures on different days. However, every event will be experienced by each *han* once during the two-week period. Large school buses are chartered for Saturday field trips, with four or five *han* going on one or the other on alternating weekends. These buses are also used for taking students to and from the airport.

Students are responsible for many of their own meals. Hawai'i Study Center provides students with buffet dinners on the first and second to last days, as well as lunch, which is delivered from local vendors Monday through Saturday. Otherwise, students need to shop for and prepare their own food. In addition to the supermarket, a fast-food restaurant is also located nearby.

## 6. Syllabus and classroom materials

Classes at Hawai'i Study Center are not directly integrated with classes at Kanto High School. ESL teachers are informed of the student needs when hired and are given a considerable amount of autonomy to teach as they see fit. The Director is responsible for screening all syllabi and materials. Certain tasks, such as self-introductions and learning how to write a postcard, are requested by Kanto High School. Teachers are encouraged to collaborate with each other and more than half of all lesson plans are shared.

Instructors submit their classroom materials to the Supervisor a week before a cohort arrives for copies to be made. The textbooks are printed in black and white on single-sided US letter-sized paper and bound in three-ring binders with pockets on the inside covers. Multiple images and pictures appear on every page to support text. No pre-recorded listening materials are provided to students. Teachers are allowed to use audiovisual materials and slide show presentation software in class.

English classes at Hawai'i Study Center follow a notional-functional approach and the course materials reflect this. The themes are purposely connected to the afternoon and weekend activities and excursions.

## 7. Student assistants

Hawai'i Study Center employs 11 native-speaker "Student Helpers" who serve as near-peer role models [6] and perform a variety of roles in the afternoons and on weekends. One of their responsibilities is to chauffeur groups of up to 12 students in passenger vans to and from their afternoon excursions. The Student Helper is responsible for their safety and accompanies the group for the duration of each of these outings. Another duty is as a conversational partner. They are required to speak to each student in a cohort at least once and are encouraged to chat as much and as freely as possible in English, which provides meaningful speaking and listening opportunities that students may not otherwise encounter [7]. A third role is to act as a cultural informant [8]. Through speaking with the Student Helpers, Kanto High School students can have ethnographic questions answered in a non-academic setting.

Contact with the Student Helpers is a key component of the English curriculum. The overwhelming majority of out-of-class socialization by students with non-Japanese during the program is with them. Certain activities, such as "Talk Story," could not be conducted without the presence of Student Helpers. "Talk Story" is a small group-based conversation activity where four or five students are matched with Student Helpers who lead group discussions on a variety of everyday topics. Teachers sometimes assign homework tasks that require their students to ask questions to Student Helpers.

Student Helpers tend to be male university students and positions are found through word of mouth. Most apply for these positions because they prefer to work in school settings and are interested in Japan. They are subject to the English-Only policy and outside contact with the students via social media during the program is prohibited. Student helpers are required to reapply for their positions

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twice a year and are evaluated by both the Director and Supervisor.

## 8. Chaperones

A professional tour conductor is responsible for the welfare of the students when traveling to and from Hawai'i Study Center. This escort is an employee dispatched from the travel agency that Kanto High School contracts to make travel arrangements. He or she meets each cohort at Narita International Airport and travels with them to Hawai'i Study Center before immediately returning to Japan. The tour conductor will return at the conclusion of the program to take the group back. Pre-departure orientations in Japan with students and parents to discuss passports, travel procedures, insurance, and currency exchange are also coordinated through this travel agent.

Three "Accompanying Teachers" are sent from Kanto High School with each group. These teachers do not necessarily teach English nor do they need to be the homeroom teachers of the students in the cohort. To ensure fairness, there is an established rotation among all full-time teachers at Kanto High School for this duty. Accompanying Teachers do not have any pedagogic duties at Hawai'i Study Center and are not required to audit the ESL classes. However, they do go along with most student groups on afternoon excursions and weekend field trips, when an ESL teacher is not present. The main concerns of the Accompanying Teachers are of student discipline and safety. They are also in charge of enforcing the curfew, holding an evening meeting, conducting a nightly head count, and filing daily status reports to Kanto High School. Student interaction with Accompanying Teachers is not subject to the Hawai'i Study Center's English-Only policy.

## 9. Conclusion

This case study is a comprehensive documentation of an ongoing short-term study abroad program for Japanese high school students in the United States. Its purpose is to provide a greater understanding of Japanese educational sojourns abroad. While no attempt is being made to independently ascertain the degree to which it accomplishes its stated goals, Hawai'i Study Center does administer its own anonymous satisfaction questionnaire in Japanese on at the end of the program and its results consistently show that the overwhelming majority of the participants evaluate the program positively.

## 10. Acknowledgement

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## 11. References

[1] Educational Tour Institute, Heisei 26 nendo (2014) zenkoku koushiritsu koutougakkou kaigaishugakuryokou kaigaikenshuu (shugakuryokougai) jisshijoukyouchousa houkoku [A report on the current state of school trips and study trips abroad in Japanese private and public high schools in the academic year of 2014], Retrieved from <http://shugakuryoko.com/chosa/kaigai/2014-01-hyoushi.pdf> (Access Date: 01 December, 2016)

[2] M. Watanabe, "Willingness to communicate and Japanese high school English learners." *JALT Journal 35(2)*, JALT, 2013, Tokyo Japan, pp. 153-172.

[3] T. Yashima, L. Zenuk-Nishide, and K. Shimizu, "The influences of attitudes and affect on willingness to communicate and second language communication." *Language Learning 54(1)*, Wiley-Blackwell, 2004, Michigan USA, pp. 119-152.

[4] G. Gmelch, "Crossing cultures: Student travel and personal development", *International Journal of Intecultural Relations 21(4)*, Elsevier, 1997, pp. 475-490.

[5] Laubscher, M. R., *Encounters with difference: Student perceptions of the role of out-of-class experiences in educational abroad*. Greenwood Press, Westport USA, 1994.

[6] T. Murphey, "Identity and beliefs in language learning." *The Language Teacher 19(4)*, JALT, 1995, Tokyo Japan, pp. 34-36.

[7] K. Tanaka, "Japanese students' contact with English outside the classroom during study abroad." *New Zealand Studies in Applied Linguistics 13(1)*, ALANZ, 2007, Auckland New Zealand, pp. 36-54.

[8] Spradley, J. P., *Culture and cognition: Rules, maps, and plans*. Chandler, San Francisco USA, 1972.

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# The Review Ontario and Turkey Mathematics Curriculums from Financial Literacy Perspective

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## Abstract

*Financial literacy has been popular in the global world, is a new field in mathematics education. It rises in education and is carried out in PISA since 2012. The study aims to review mathematics curriculums of Ontario and Turkey from financial literacy perspective. In these curriculums, it is analysed whether or not financial knowledge and skills are included in the mathematical contents. Findings reveal that the curriculum of Ontario has financial literacy knowledge, skills, and behaviours shown in real situations while the curriculum of Turkey includes related financial concepts such as money, shopping and percentage without touching the financial literacy theme. Mathematical literacy and financial literacy have a large set of intersections. So financial literacy should be further studied in mathematics education. Also, mathematics curriculums should be handled focusing on real life situations within the frameworks of them.*

## 1. Introduction

Mathematics is a field that aims to gain mathematical knowledge and skills needed in real life, in other words, to make students mathematical literacy. According to National Council of Teachers of Mathematics (NCTM), mathematical literacy (ML) or "numeracy" is a social need that required quantitative understandings [6]. Simply, ML that has some components such as conceptual understanding, reasoning, problem-solving, and representing is the transfer of mathematical knowledge and skills to real life [1,8]. ML is forceful on maths curriculums over the world. Also, ML is one of the defined fundamental domains in Programme for International Student Assessment (PISA). PISA tests analyse real life skills of students rather than expectations of curriculums of countries. Therefore PISA is a leading reference for educational policies and curriculums of countries [7].

## 2. Financial Literacy

Financial literacy (FL) is to have knowledge about financial concepts, to convert this knowledge to skills and behaviours, and to own confident and motivation for this [7]. FL is a phenomenon that exposes financial responsibility and freedom needed from early ages [2]. So FL should be included in formal education. FL that increasingly popular in the global world is one of the defined domains in PISA since 2012. Also, many countries such as Canada, US, Australia which consider FL have performed the integration of FL into their curriculums. Ontario declares their vision about FL clearly and strongly in their curriculums and the official documents. Ontario works on the integration of financial literacy in all curriculums including mathematics since 2009 [4].

ML and FL that have a large set of intersections have common processes such as reasoning, manipulating and estimating, problem-solving and modelling. OECD refers to ML as a prerequisite to being financial literate [7]. Withal the results of PISA which was in 2012 indicate positive correlation powerfully between achievements of ML and FL *(r: 0.83)* [7]. Therefore it is significant to analyse how intense the interactions in curriculums.

## 3. The Aim of the Study

The study aims to review the mathematics curriculums of Ontario and Turkey from financial literacy perspective. It is worthwhile to review the expected strong relationships between FL and ML in curricula.

## 4. Methodology

These curriculums are analysed according to elements of FL and relationships between ML and FL revealed in literature. It is analysed which financial knowledge and skills are included in the mathematical contents defined in PISA in the maths curriculums [7].

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## 5. Findings

In these curriculums at the *elementary level*, the introduction of banknotes and coins, simple operations, basic proportional reasoning, and using of percentage are seen in both of them. Ontario aims to teach numbers by money while the concept of percentile is limited in the contexts of discounts and raising in Turkey. In Ontario, there is a demand to establish equations and to model on real life situations about finance. Also, Ontario focuses on converting metric units of measure. But in Turkey, there is not any mark on these concepts. Both of them use various tools to analyse data. But in Ontario, it is aimed to earn habit of the investigation and interpreting correctly.

In these curriculums of *secondary level*, Turkey just focuses on calculating while Ontario generally cares to select the best one of the options in financial situations and modelling and understanding mathematical representations rather than calculating. There is an effort to integrate financial knowledge and skills to all mathematical concepts such as the functions, the series, and even the derivatives. Ontario focuses on interpreting data on the analysis of one and two variable data and using probability in a problem-solving. Further, includes tools and realities of the financial world in terms of local and global and the correct interpretation of data about the financial landscape, and the identification of indices such as Standard & Poor's are integrated into the curricula. In Turkey, there is no any example or any mention in these parts.

In both countries, there are other programs used to prepare students who don't consider university for their life. In these programs, there are similar heads, such as travel costs, shopping, the taxes and bills. Though this is a simplified program, it has more financial knowledge and skills than the general curriculum in Turkey. But the purposes related to FL are not defined clearly in the program as well.

## 6. Discussion

According to the analysing of these curriculums, in Ontario FL is considered as one of the most important basics of real life and the curriculum makes students feel that. Mathematics education and financial literacy education support each other. Financial contexts are used intensely in the curriculum, conceptual relations and reasoning are asked from students [5]. Also, there are some improving skills over the years such as the construction of equations, interpretation the interest, and selection the best choice. On the contrary, FL is not stated in the aims of the curriculum of Turkey. Financial knowledge and skills are not sufficient, even fundamental frames such as the interest and investment were not considered [3].

The curriculum of Ontario provides that students can reflect their financial knowledge and skills on financial situations in real life. This is also to be a financial literate. PISA involves similar instances, questions and heads as well. From this point of view, the curriculum of Ontario has harmony with aims and contents of PISA and it can be said that PISA is accepted as a reference for some countries' curricula.
The curriculum executes since 2011 has improved over the years in Ontario and there are many official and private initiatives supported by the government.

But in Turkey, there is no conscious about financial literacy education in terms of the curriculums.

## 7. Conclusions

ML and FL have a large set of intersections. So FL should be more worked in mathematics education and common models that deal with both of them are need. Also, it will be useful that mathematics curriculums should be handled focusing on real life situations within the framework of ML & FL. Similarly, the interactions between ML & FL should be researched in the framework of PISA. It is considered that the concept of FL risen in the global world will be more popular in future with PISA and other effects.

## 8. References

[1] J. Kilpatrick, "Understanding Mathematical Literacy: The Contribution of Research" *Educational Studies in Mathematics, 47*.1, 2001, pp. 101-116.

[2] A. Lusardi, "Numeracy, Financial Literacy and Financial Decision-Making", *National Bureau of Economic Research,* 2012.

[3] Milli Eğitim Bakanlığı. "Ortaöğretim Matematik Dersi Öğretim Programı", *Devlet Kitapları Müdürlüğü Basım Evi*, Ankara, 2013.

[4] Ministry of Education Ontario. "A sound İnvestment Financial Literacy Education in Ontario Schools", *Ministry of Education Ontario*, 2010.

[5] Ministry of Education Ontario. "Financial Literacy Scope and Sequence of Expectations. The Ontario Curriculums", *Ministry of Education Ontario,* 2011.

[6] National Council of Teachers of Mathematics. "Curriculum and Evaluation Standards for School Mathematics", *Reston,* VA. 1989.

[7] Organization Economic Cooperation Development, "Financial Literacy Framework, PISA 2012 Assessment and Analytical Framework: Mathematics, Reading, Science, Problem Solving and Financial Literacy", *OECD Publishing,* Paris, 2016.

[8] D.K. Pugalee, "Constructing A Model of Mathematical Literacy", *The Clearing House* 73.1, 1999. pp. 19-22.

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# Does Online Course Success Depend on When You Take the Course?

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## Abstract

*The department of Physiology at University of Toronto has developed an online version of PSL200, a basic human physiology course. Our online human physiology course was created to give students more flexibility in terms of time and location, to allow self-directed learning within a semi-structured frame-work, and to give opportunity to many non-University of Toronto students from across Canada and indeed any part of the world to complete the course. We've been pleasantly surprised by the overwhelmingly positive feedback for the course so far, and also by the excellent standards that students have maintained in their coursework and exams. It is our experience that the grades and learning outcomes for students in Physiology SCS2159 are equivalent to or better than those of students who physically attend classes here on campus. We have demonstrated in past publications that the students' grades from the online physiology course did not significantly differ from that of the in-class PSL200 basic human physiology course. Our students are composed of those who require a credit-equivalent course in Human Physiology as a prerequisite for entrance into Health Science professional programs (including nursing, dentistry, speech and language pathology, occupational and physical therapy, etc...) and Individuals who simply have an interest in understanding how the body works. Our online physiology course is offered 3 times a year as Fall, Winter and Summer sessions. The decision to take the course in either the Fall, Winter or Summer session depends on many factors including deadlines for health science professional programs such as nursing, financial restrictions, time restrictions etc…In this paper we have analyzed whether taking the course in the Fall, Winter or Summer session had any impact on students' grades. Our results demonstrate that there were no significant differences in: term grade (5 online quizzes), final exam (a 3 hour in-person cumulative written exam) and the final grade (45% from online quizzes, 5% from participation and 50% from the final exam) amongst all sessions. Our results suggest that there are no significant differences in terms of student success amongst all 3 sessions.*

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## Session 6: Global Issues In Education and Research

Title: Exploring Quebec's Ethics and Religious Culture Program
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Title: The Impact of Teachers' Commitment on Students' Desire for Knowledge. Outcomes of an On-Going Research Project of School Dropouts in Luxembourg
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Title: The Nurse Academic: The role of institutional cultures in the formation of Teaching Identities at the School of Nursing, University of Auckland
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Title: Sexual Victimization on Campus: Implications for Women's Education and Health
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# Exploring Quebec's Ethics and Religious Culture Program

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## Abstract

*Contemporary theories of liberal democratic education hold that public schools are at once cultural microcosms of their surrounding societies as well as places where young people should be educated to develop the knowledge, skills, and dispositions needed to actively and continuously reform and improve those societies. This democratic dilemma – calling on schools to both reflect and reconstruct the broader societies in which they are located – is especially salient for pluralistic societies such as the United States and Canada, which are enriched yet divided by deep cultural and religious differences.*

*In September 2008, all elementary and secondary school students from the public and private sectors in the Canadian province of Quebec started receiving the mandatory instruction through the new, approved by the Minister of Education, Recreation and Sports, Ethics and Religious Culture (ERC) Program. The program is the culmination of a long process by which Quebec schools shifted from religious to secular instruction and marks an important turning point in the history of the province. This new program, reflecting the preference of the majority of Quebeckers, replaced the Catholic Religious and Moral Instruction Program, the Protestant Moral and Religious Education Program, and the Moral Education Program and now enables all students in the province to follow an identical course of study.*

*The paper examines the history behind the ERC Program development and its philosophical foundations, highlights the program's unique nature and its salient characteristics, analyzes the program's content and the main competencies that it aims to develop, as well as probes the controversy that the program continues to generate from a wide spectrum of Quebec's population. The paper also draws comparisons and suggests implications for the United States, as public schools in both counties strive to promote a common civic identity among culturally and religiously diverse young citizens.*

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# The Impact of Teachers' Commitment on Students' Desire for Knowledge: Outcomes of an Ongoing Research Project on School Dropouts in Luxembourg

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## Abstract

*The essential mission of school is to transform the one who doesn't know into the one who knows. Taken by international evaluation standards, school is expected to produce academic performance. It is inclined to tolerate very few deviations. In this sense, the demand for help in schools does not come from the student himself (who is the one suffering), but from the disturbance he causes to the parents and to the school [1]. However, it is a matter of opening the gateway to knowledge for the student – thus he can realize that he is not alone in asking the existential questions about life, death and self. It is about creating a bond through which he will learn what makes people different and unique [2]. The school must be this place where knowledge is articulated and conveyed by a body of teachers, inscribed in subjective link and not the anonymous one of the Web [2]. The pedagogical act of a teacher is conditioned by his subjectivity, his unconscious, his desire to transmit knowledge, but also by the impact of institutional discourses.*

*With this paper, we would like to point out that creating a new school framework is necessary but rarely sufficient. Our society, focused on knowledge, constantly brings new recommendations. Policies and pedagogical paradigms change in relation to the ideological and economic context. New frameworks come up in the scholar system regarding the increasing school failure, school dropout rates, and so on. Thinking about their adjustment and their sustainability is essential to face an increasingly heterogeneous school. We would like to question the impact of the institutional context on how teachers build their professional identity and therefrom their interactions with pupils and how those interactions interfere with students' commitment to school's success. We conducted three narrative interviews with i) teachers from a high school for young adults, and ii) students from the same school, which gives us a double point of view on the institutional framework. Based on a psychoanalytic approach, our interest is mainly in interviewee's discourse by identifying signifiers [3], which allow us to understand links, unconscious conflicts, desire, inhibitions, beyond the visible.*

*Preliminary results show that professional engagement of teachers goes beyond statutory identity because of its particular relationship to the unconscious. Teachers establish a personalized relationship with students, thus demonstrating a systematic adjustment of their professional position. The commitment to the student's academic success is therefore strong, due in part to tutoring and a small number of students in the classroom. This is a two-way approach: on the one hand teachers receive feedback from their students and are more likely to question their practice; on the other, the students feel supported both by the teachers and by the institution that authorizes the teachers to get more involved; the question of the third party is present. This type of institutional framework favors the relationship between teacher and pupil, under the condition that the institution supports and encourages it. The relation established between student and teacher has a significant impact on the student's way of approaching school and knowledge in particular. Students are more likely to pursue their schooling when they feel comfortable and supported by their teachers due to the singular bond encouraged by the institutional framework. The teacher is thus both an expert in his subject, an educator and a reference figure, whose work consists of connecting with pupils.*

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## References

[1] Foucher, Thierry (2008). « Psychanalyse et psychologie scolaire », Le Journal des psychologues 8/2008 (n° 261), p. 59-62

[2] Lacadé, Philippe (2013). La vraie vie à l'école, Editions Michèles

[3] Lacan, Jacques (1975) Le Séminaire, Livre III, Les psychoses. (1955-1956) Paris, Le Seuil

# The Nurse Academic: The Role of Institutional Cultures in the Formation of Teaching Identities at the School of Nursing, University of Auckland

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## Abstract

*This paper discusses proposed research investigating teaching identities of academic nurses at the Faculty of Medical and Health Sciences (FMHS), University of Auckland. Both in New Zealand and internationally, the concept of an "academic nurse" is relatively new: With the creation of a School of Nursing at the University of Auckland in 1999, many nurses with advanced nursing skills (as well as extensive teaching experience) were inducted into a new work environment where they were expected to engage in a new form of academic work – research. Despite the well-documented trend to prioritise research-intensive values within research driven universities [4], the School has a reputation for fostering scholarly teaching and innovation with the FMHS. This project will seek to investigate the origins and outcomes of these teaching and research behaviours and used them as a mechanism to explore the role of institutional cultures in academic identity formation, particularly teaching identities.*

*In the context of this study, Basil Bernstein's work [1] will be used to explore the role of the disciplinary holon (School, in this case) in shaping nursing academic identities. In terms of the formation and reproduction of identity, Bernstein offers a robust framework for analysing the role of academic identities, particularly the relationship between disciplinary boundaries and the creation of stable and strong identities. Disciplines such as nursing are classified by Bernstein as regions and, he theorizes, are more insulated from external interference and contamination and in turn leads to formation and reproduction of strong occupational identities.*

*Considering the complex interplay in this research between the academic, as subject, and subsystem, a case study method [5] will be employed. At the centre of these cases will be academic teaching staff in the School of Nursing that meet the criteria for scholarly teaching proposed by Richlin [3]: 'those who consult the literature, select and apply appropriate information to guide teaching-learning experiences, conduct systematic observations, analyse the outcomes, and obtain peer evaluation of their classroom performance' (p. 59).*

*Research questions are:*

*• What are the experiences of academic staff around teaching work within the School of Nursing?*

*• What is the relationship between disciplinary cultures and the formation of what Basil Bernstein [1] terms "strong' and 'weak' teaching identities?*

*• What contextual factors contribute and inhibit engagement with scholarly teaching practices?*

*• What impact do specific institutional configurations have on how academics (with teaching responsibilities) engage in scholarly teaching practices?*

*This qualitative study will include informant interviews known for their scholarly teaching (n=10). In line with traditional data collections methods for the case study method, we will assemble each of our cases based on the following collection methods: Semi-structured interviews with staff, peer observations of teaching, and textual analysis of policies and procedures around teaching and learning. These will be further contextualized by semi-structured*

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*interviews with a broader group of staff including those in positions of leadership. Cases will first be considered in isolation, and then subject to cross case analysis to locate common themes and conceptual similarities [2].*

*The overarching goal of this research is to better understand the characteristics of institutional cultures (particularly subsystems such as schools/ departments) that foster and inhibit innovative teaching practices and, ultimately, high quality teaching and learning environments in higher education settings.*

## References

[1] Bernstein, B. (2000) Pedagogy, symbolic control and identity: theory, research and critique (rev edition), Lanham, Rowman and Littlefield.

[2] Merriam, S. B. (1998). Qualitative research and case study applications in education. San Francisco, Jossey-Bass. pp. 3-25.

[3] Richlin, L (2001). Scholarly Teaching and the Scholarship of Teaching. New Directions for Teaching and Learning (86), pp. 57-68.

[4] Sorcinelli, M. D. (2002) New conceptions of scholarship for a new generation of faculty members, New Directions for Teaching and Learning, (90), pp.41-48.

[5] Yin, R. K. (2003). Case study research: Design and methods (3rd ed.). Thousand Oaks: Sage.

# Sexual Victimization on Campus: Implications for Women's Education and Health

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## Abstract

*Sexual victimization is a continuing reality in the lives of many women. Incidents of sexually coercive behaviour are seen across the lifespan; however, youth and especially females ages 15 to 24 are disproportionately represented as victims of this behaviour. On university campuses around the globe where there are large concentrations of young women, sexual coercion remains a significant problem. In Canada, studies indicate that over 30% of women surveyed on university campuses report experiencing some form of sexual coercion during their undergraduate years. While the negative effects of sexual coercion on young women's psychological and physical health are well recognized, very little research has focused on the impact of these behaviours on the education of women students, particularly for women from diverse cultural backgrounds. In this research in progress, we discuss data from campus-based reports of sexual assault and other forms of sexual victimization. Research addressing the effects of sexually victimizing behaviours on the educational experiences of women undergraduates on Canadian university campuses is presented. Our study to date demonstrates that students reporting various forms of sexual victimization are impacted negatively in both their academic performance and their health by these experiences. Participants stated that they had difficulty focusing on their work, received lower grades and requested accommodations in order to complete course assignments or tests. Students spoke of decreased academic and social engagement on campus and beyond as well as changes in their attitudes towards their education. Our preliminary results confirm the importance of addressing the impact of sexual victimization on the education and health of university students.*

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## Session 7: Pedagogy

Title: Random Inequity in Mathematics Education: An Insurmountable Problem?
(Author: Richard O'Donovan)

Title: Internship as a Key Option To Alleviate Educators' Workload
(Author: Deon van Tonder)

Title: An Innovative Pedagogical Tool for Robotics Engineering Studies
(Authors: Yolanda Bolea, Antoni Grau, Alberto Sanfeliu)

Title: Challenges in Math and Computer Science Undergraduate Education in Pakistan
(Authors: Umair Azfar Khan, Yousuf Kerai)

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# Random Inequity in Mathematics Education: an Insurmountable Problem?

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## Abstract

*The issue of inequality within mathematics education has been an important area of research for many decades, however the focus has usually centred on identifiable sub-groups of the community based on factors such as gender, ethnicity, and location. Analysis of data collected as part of a multi-year professional development program for mathematics teachers provides potential evidence for the existence of another, more general, form of mathematics education inequity.*

*The objective of this paper is to develop the concept of random inequity, to estimate its prevalence, and its potential impact on school mathematics.*

*Survey data from 92 teachers participating in a professional development program provide an initial empirical basis for the concept wherein two broad categories of teachers are identified: optimal and sub-optimal mathematics teachers. Sub-optimal teacher categorisation was based on two criteria: reports of teachers lacking confidence teaching mathematics and also lacking mathematical content knowledge; or responses to survey items that demonstrated attitudes toward mathematics students that might be described as unsympathetic. The optimal category consisted of teachers who reported being confident teaching mathematics, as having good mathematical content knowledge, and whose responses aligned with being sympathetically disposed toward their students.*

*Given the centrality of teacher quality in current debates surrounding student mathematics performance, it is hypothesised that students of sub-optimal teachers could be said to be disadvantaged relative to their peers who have confident, knowledgeable, and sympathetic mathematics teachers. For instance, sub-optimal teachers lacking confidence and content knowledge may provide inadequate explanations of mathematics concepts, while unsympathetic teachers may provide good mathematical explanations but in a way that alienates their students. Students of the sub-optimal teacher might be said to have had an unhelpful year of mathematics.*

*Potential implications for the effect of unhelpful years are considered by positing scenarios which might result in more permanent disadvantage. For instance, while it seems reasonable to expect any misunderstandings or mislearnings arising from a single unhelpful year to be corrected in subsequent years by more confident, knowledgeable, and sympathetic teachers, there remains the possibility that some of these students could experience another unhelpful year the following year, and perhaps even in the year after that. Given the largely sequential nature of the mathematics curriculum, recovery from having a series of unhelpful mathematics years might prove difficult for many students, and such experiences may well result in a permanent loss of confidence and mathematical disengagement.*

*The discussion includes a preliminary analysis of the different scenarios and suggests that if more than 35% of mathematics teachers are in reality sub-optimal, then the majority of students could be randomly disadvantaged – which could prove to be an insurmountable problem for mathematics education. Ameliorating factors are also considered, along with possible future research avenues that could help establish the significance, or otherwise, of random inequity.*

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# Internship as a Key Option to Alleviate Educators' Workload

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## Abstract

*The crucial role of educators is a daunting challenge as it encapsulates fostering cognitive well-being among learners. Together with this challenge, educators experience stress that emanates from an ever increasing workload. The Relieve Educators Administrative Demands (READ) model focuses on internship-held benefits for alleviating educators' workload. This paper will focus on a proposed model (Relieve Educators Administrative Demands: READ), where student educators complete their studies and start with an internship before registering with the South African Council of Educators (SACE), during which they perform administrative activities on behalf of in-service educators. The present study reports on the initial findings of an explanatory mixed method pilot study regarding the present workload of a heterogeneous group of secondary school educators (n = 5) at a High School in South Africa, Vereeniging. Furthermore, the role of internship as a possible solution to alleviate educators' workload to enable them to focus on one of their core tasks, namely teaching thinking effectively to learners, is elucidated. Questionnaire data determined the educators' perceptions of their present workload and the impact thereof on their personal and professional well-being. Furthermore, interview data will be explored to elaborate on the influence of an internship in terms of alleviating workload. The findings of the research revealed that educators' workload in the past two years increased tremendously and affects their personal and professional well-being negatively. Moreover, educators appear not to manage their workload effectively and the support of an intern can prepare the way for focused attention being paid to the budding, blooming and reaping the fruits of the purposeful teaching of thinking.*

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# An Innovative Pedagogical Tool for Robotics Engineering Studies

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## Abstract

*At the Engineering School of Barcelona (ETSEIB-UPC) a multimedia pedagogical tool has been developed in order to training concepts and ecojustice, environmentalism and sustainability to the students in Technical degrees, specifically in Robotics Engineering. This didactical tool consists in a serial of multimedia world maps that describes the world situation in a wide range of different trends such as the nuclear energy, the fossil fuels, the electronic components of the machines, the atomic weapons, etc. The developed pedagogical instrument uses a slide presentation format in order to integrate the relevant information of different economical-environmental-social themes related with actual society. In this paper one of the multimedia maps is explained and discussed: the nuclear energy map. This pedagogical resource boosts the reflection in our students about several aspects of social interest in a sustainable overview and students are able to understand the role of Robotics in many and relevant applications.*

## 1. Introduction

Nowadays there are a large number of people worldwide being driven into an economic crisis. The entire world network of governmental and supra-governmental summits are taking good note of it, and have sprung into action with the financial measures we all know about through the media coverage the issue has attracted. However, there are two other critical issues in the world today, namely the social and environmental degradation, which are not receiving the same political and media attention. As a consequence of this, social awareness of their impact on our lives is scarce. It is only in what is known as the alternative summits, such as the 2012 Thematic Social Forum [1] [2] in Porto Alegre, removed from decision-making scenarios, which these issues are brought to the fore.

What do we mean by social and environmental degradation? These terms require some clarification. If we try and describe what they mean, [3] [4] lists the following phenomena as being a consequence of such social and environmental problems these days: climate change, peak oil, deforestation, the destruction of many ecosystems in the world, poverty, wars, human rights reduction and social inequality. Literature abounds which has identified them as being equally or even more important than the current economic crisis

In relation to social awareness and responsibility, we understand that Higher Education institutions (HE), as the rest of the educational system, have a key role to play in bringing attention to such social and environmental crises/issues and their consequences.

We would like to advocate their engagement in trying to bring them to the attention of students and staff; something they can do in their two main functions, namely teaching and research. More specifically, given that HE institutions stand as a bridge between the educational and the professional world, this should stand as one of their main priorities or, in fact, goals: that when students start with their professional careers and need to make decisions concerning social and environmental issues, they adopt the adequate decisions based on well-founded social criteria.

That is, to integrate the "Sustainability and Social Commitment" competence in different subjects in scientific and technological degrees. In fact, the present social, economic and environmental crisis is a good opportunity to renew the didactical models and the pedagogical teams. It is a matter of fact that crisis has a presence in natural sciences, in knowledge building, in the modernity, in the world phenomena. Complexity reveals a trend to the holistic thinking that "the world is complex" and "total is total". This thought makes necessary the tendency to the disciplines dissolution and a solid evolution of knowledge that allows facing new challenges and problems. Applying the above to the didactical models, the complex thinking swaps objectives for competences, knowledge transmission for knowledge socio-building, vertical management for horizontal management, individual act for cooperative act. Critical thinking is that mode of thinking - about any subject, content, or problem - in which the thinker improves the quality of his or her thinking by skillfully taking charge of the structures inherent in thinking and imposing intellectual standards upon them. Therefore, analyzing economic, social and environmental models is also a growing need nowadays.

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In order to achieve the above competence, firstly, those topics should have to be included as an integral part of their curricula and, secondly, to afford themselves of adequate pedagogical tools to develop the topic. It is to this question that this paper seeks to contribute.

Hence, the objective of this paper is to present in detail an innovative didactic tool to bridge the existing gap in the area of curriculum design and pedagogical innovation when dealing with environmental and social issues in technical universities. This tool is conceived to allow the lecturer in the classroom to explain his/her regular subject with new didactical models that incorporate the complexity and the critical thinking. The fundamental challenge is to move towards a new educational model that without being dogmatic it does not fall in the relativism; a model that without resigning to the search of responses it does never resign to the competence to question; a model that enables to think integrating emotion and indeterminism [5].

The idea of devoting time and effort to this objective has been one of the goals of a larger project entitled "Sustainability, Technology and Excellence Program" (STEP) [6], developed at the Technical University in Catalonia (UPC). The project seeks to cover the compulsory cross-sectional competences in the curriculum in the area of the environmental and social impact of technology. It focuses precisely on most of the issues mentioned above. One of the lines to which this paper makes a contribution is "inequality North-South and dependency between these two worlds".

## 2. A Novel Pedagogical Tool

The pedagogical tool that we present in this paper consists of a series of interactive world maps. By interactive world maps we mean maps whose content keeps changing while the map remains still. Such moving effect is achieved by superposing several maps one onto the other and allowing them to show the changing image. The technical sophistication needed to achieve such effect is readily available to the public and does not require a high level of computer literacy, as an average office presentation application and an image manipulation program (i.e. GIMP) should allow it.

At this point we may wish to address the question: Why the use of maps? It is easy to see why we felt the need of such a kind of pedagogical tool if we consider the content which they are designed to represent. The maps allow us to analyze and present visually "inequality between North-South", at the same time as the dependency of North countries from the South countries. The following example should serve as an illustration of it: Nigeria possesses uranium mines, France needs uranium but has no mines and it obtains the economic benefits of extracting uranium in Nigeria and shipping it out to France where it is used to produce electricity. It is clear that we are dealing with fluxes and movements of goods across the world. The visual movement that our maps allow is crucial when trying to portray such dealings related to the extraction, consumption and production of goods across countries.

It is true that the available facts related to such topics can be found in books, articles or reports, they are indeed accessible to the general public. However, it must be said that the information found in those sources is scarcely reader-friendly. We believe that our maps are an efficient tool to overcome such a disadvantage. Consequently, these maps constitute an innovative way of acknowledging North-South inequality in a readily straightforward and clear manner, as a complementary didactic material for academic purposes.

Regarding their use, we have identified four main uses that maps may have. In the first place, didactic maps can present students with the background knowledge of topics dealt in the curriculum. Scientific/technical degrees/subjects rarely offer general information when covering specific topics. Consequently, students end up without a global image of what they are studying. For example, when analyzing chemical reactions, the information concerning where minerals come from.is generally missing. In the second place, didactic maps can also be a tool strictly for learning technical/scientific concepts. In scientific/technical degrees/subjects students rarely have many opportunities for developing critical thinking towards environmental and social issues. In our case, we have used them in math subjects. We may create exercises which should model the information contained in the maps mathematically; for example, in the case of differential equations they might be instrumental in calculating life expectancy of petrol resources in a particular country. In the third place, didactic maps can also be a tool for offering additional material to a specific topic to make the lesson/laboratory less dense as far as the mathematical operations and concepts. In fact, they can be used to give students a well-deserved break in abstract thinking!! Finally, maps can also be used at prior educational levels, primary and secondary, to generate discussion, because it is not complicated to understand and interpret the maps, due to the fact that the information contained in them is visual and graphical.

Nowadays, with the commitment of university community and in a wider sense the scientific and engineering community, education in engineering should have an integrate approach about skills, attitudes, abilities and values; it should embed

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disciplines in the social sciences and humanities; it should promote the multidisciplinary team working; it should stimulate a systemic thinking and an holistic approach; it should aware about the challenges posed by globalization [7]. In this sense, in this work the presented tool uses a slide presentation format in order to integrate and to treat the existing information on a topic of social interest in a scientific and technical subjects in the university through series of interactive maps which describe the cycle and interactions among this theme and different aspects of the remainder world (such as, economy, society, etc.) in order to train in the complexity and the critical thinking [8]. The idea is that the lecturer will work in the lecture room using a pedagogical 'scientific model'. The Gilbert's definition of 'model' [9] is of interest: "A model is a simplified representation of a phenomenon, focusing attention on specific aspects. The model is used to provide explanations as an answer to a question". In 2000 the OECD has already defined what science learning at school should compromise: "Developing pupils' capacity to use scientific knowledge to identify questions and obtain conclusions based on facts, in order to make decisions about the natural world and the changes in it caused by human activity". In order to achieve this, pupils must be helped to develop their ideas about facts, objects and phenomena in their surroundings, to bring them closer to scientific ideas, or scientific explanatory models [10]. This methodology can be used in the higher education also. The diagram in Figure 1 shows the aspects that we believe are fundamental in the modeling process at University.

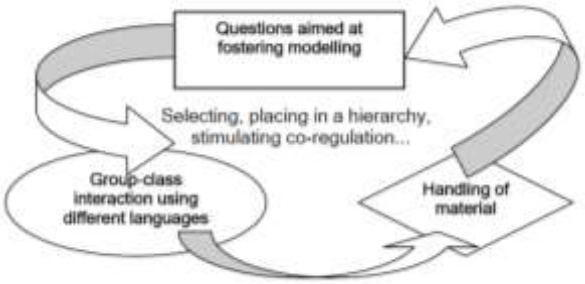


Figure 1. Three fundamental aspects in the process

To better understand the process, the next illustrative example is taken: the living being model, see Figure 2. What does it mean the living being model? In [11], it is described as "…studying living beings from a systematic perspective that identifies them as open and complex systems They are open in the sense that in order to be, they are continually exchanging material, energy and information with their surrounding environment, and complex because they are made up of many interrelated elements, the whole of which is not the sum of its parts". It is this complexity of views provided by a living being school model such as authors enable ideas to develop throughout schooling.

In this work, authors will focus in the handling material to carry out the modeling process at higher education. The proposed didactical material is the multimedia maps cited previously. The elaborated maps treat about different specific thematic such as: nuclear energy, oil, weapons and their production and trafficking, international conflicts, anti-personnel landmines, aerial traffic, tourism, electronic consumption, health, etc.

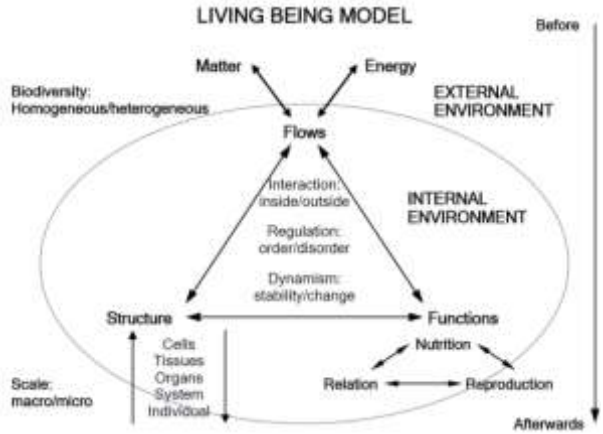


Figure 2. The living being model, [11]

In the particular example of nuclear energy (the example of interest of this paper), these maps make easier for the reader to get an idea of where uranium comes from, where it is mostly used for energy purposes or where it is used for nuclear arms, among other purposes. At the same time, we have tried to make them entertaining to consult by introducing as much visual animation as possible. They also offer the opportunity to analyze the uranium cycle from different knowledge fields: economy, political science and environmental science. Therefore, taking into account the relationships without skipping the entities, every entity is part of a whole. And furthermore, this analysis considers the economic, productive and consumption model as well as the local, regional, national and worldwide use of natural resources identifying and analyzing the social connections that exist between the North and South countries., the geographical interdependence, the local and global development challenges, the entity and diversity problems in the multicultural contexts.

Those didactic materials will be useful to the lecturer to systemically and critically analyze the worldwide situation.

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## 3. The Nuclear Fuel Cycle Map: A Practical Example

In this section the didactic maps developed at our university are presented in detail. For that purpose we use the nuclear fuel cycle series of maps. This particular map shows the cycle, or stages, of an energy resource strongly linked to nuclear engineering: uranium. Nuclear energy is generally presented to the public as an important power source for the future. However, there are opposing opinions concerning to this idea and to whether we should rely on nuclear energy. Its economic viability and its security are two of the main controversial aspects of nuclear energy [12] [13] [14]. Indeed, ever since the beginning of the nineteenth century the political debate and social protest around nuclear energy has been recurrent [15] [16], having gone further beyond the scientific circles and managed to influence many peoples' position regarding nuclear energy. It has reached the point where in countries such as Germany, social pressure is making politicians change their energy plans and getting rid of nuclear electricity generation plants. The main and most painful, recent evidence of how nuclear energy can affect many peoples' lives is the recent nuclear disaster in Fukushima, which the media has covered quite well. Taking all of this into consideration, an interactive map about the uranium cycle offers a very good opportunity for students to access this controversial of information, and develops their own criteria around this energy source. Ultimately, it will make it possible for them when in their professional careers as part of the general public to better understand the nuclear issue.

In practical terms, the nuclear fuel cycle series of maps is a slide presentation which has a map for each important stage or process of the cycle of uranium which is within human hands. Information published by the International Atomic Energy Agency (IAEA) and the World Nuclear Association (WNA) has been used to design and construct them. More specifically, we have mainly included the facts available in the database of the World Nuclear Energy's official web site and [17].

More than ever, nuclear energy is at the center of political debate and environmental discussions. These try to address the question of how to provide electricity for the world's needs and how to avoid damaging the planet's climate because of it. Within such circles, there is a growing feeling that contributions are needed from all fields of expertise, in fact, from society at large. The objective of this paper is to present an instrument which we believe can help in this respect, by making the existing information clearer and more attractive. The idea is to show the potential hazard of using nuclear energy with qualitative data and example and to promote the use of renewable energies.

When looking into the existing information related to the political and environmental debate around nuclear energy one finds a considerable number of official reports. They are mostly issued by agencies, such as, the IAEA (International Atomic Energy Agency), the World Nuclear Energy and the organization "WISE" (with wise-uranium as one of its projects), among others. Besides, readers can also find published literature on this matter: books, journals... However, as is obvious when reading the previous list of sources, it is not easy for the general public to access them: the information is not presented in a reader-friendly way, it is not attractive. An additional fact to be taken into account is that it is only within the agencies mentioned that there is a database large enough so that it allows us to obtain the general picture on this issue at once. In sum, although it is not difficult for anyone interested in nuclear energy to access crucial information on the matter, it is however difficult to both gain a general picture of the mechanisms determining the cycle of nuclear energy worldwide, and follow the details of it all.

Such a situation does not help to involve other parts of society in the debate. A solution to it may be to invest time and energy in analyzing the existing information and making it readily available. This is what the authors seek to achieve, in order to fill the gap between very exclusive information and the general public.

Concerning the actual content of the maps, the key points to be represented in the nuclear fuel cycle contained in them include: the uranium reserves around the world, where uranium is extracted, where the economic benefits obtained in this process go to, where nuclear energy is mostly used and, in this particular case where a nuclear weapons are located. Other than this last one, the previous items are the type of information which would similarly appear in maps related to other energy resources. Furthermore, on the basis of the maps and the reliability of the information and figures used, students can come up with their own conclusions on this matter, such as "the degree of exploitation that countries suffer regarding their uranium reserves".

A first visual representation of four maps partly showing this information is presented in Figure 3, as an illustration of the mechanics of this instrument.

In Figure 3, authors intend to illustrate how the maps are used when trying to represent a type of flux, in this case the flux of wealth related to the extraction of uranium, in a visual display of information, and the effect they gain by being interactive.

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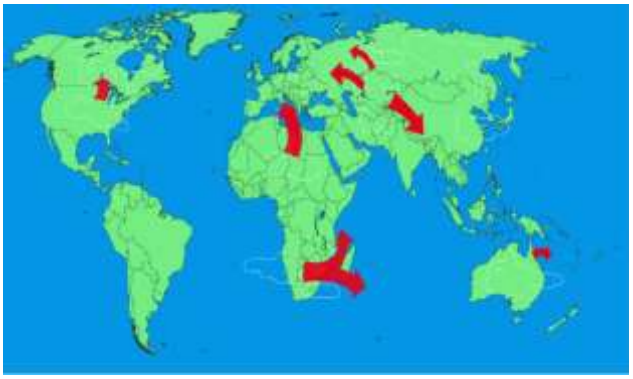

Figure 3. Interactive map model

Together with this map, other maps are prepared in order to represent the amount of uranium extracted, where wealth resulting from the extraction of uranium is to be transferred from the country where it was extracted to a receiving country; the direction of the flux, and the actual size of the accumulated wealth. It must be made clear that it is not the uranium itself which travels, but rather the wealth obtained in the operation.

When the maps are shown in a superposed dynamic combination which the PowerPoint allows us to do, it is possible to visualize the movement of the wealth world-wide as a result of the extraction of uranium. By the use of these simple and casual images the students have the opportunity to understand the idea conveyed above in a straightforward manner.


Figure 4. List of countries by exploitation ratio

On the basis of the mechanics just presented, our project is investing in the use of these maps as teaching material. Our goal is to develop a bank of maps related to different issues and topics. Furthermore we are studying how to incorporate them in subjects that deal with differential equations. For this purpose, we are looking to model a range of mathematical fluxes such as the one presented in Figure 3.

This second stage would represent an important achievement, and the goal of incorporating the tool presented in this paper into technical degrees would begin to take shape.

## 4. Discussion and Assessment

Having presented how The Nuclear Fuel Cycle Didactic Map works, and the mechanics of using it, this section includes an interpretation of the information that the didactic maps offer. It should be noted that the interpretation given here focuses on those aspects related to environmental and social issues.

In the first place, there are relevant facts to be noted when analyzing to what extent countries are exploited in relation to their uranium reserves. The perception is that those countries that are most exploited are not industrialized countries (or countries from the North).

Effectively, when doing the division of (tons of uranium produced)/(known recoverable resources), the countries which have the highest ratio are Southern countries (see Figure 4.)

Figure 5. World Nuclear Power Reactors and Uranium Requirements (2013)

In the second place, when comparing the figures related to mining and those related to the benefits from mining, it is noticeable that there are countries that do not obtain the benefit they should, when compared to what is extracted in them (see Figure 3). This is particularly so in the cases of the African countries. On the other hand, some countries benefit from uranium mining without having mines in their countries. France and England are cases in point. It is important to mention though, that this is not the general rule. As can be also in Figure 3, Kazakhstan and Uzbekistan, which are considered Southern countries, keep the wealth they produce. However, it has to be said that the wealth accumulated in a country is not necessarily the same as the benefits accumulated by that country. Indeed, there may be foreign investors who benefit from the wealth obtained through the company shares.

A third interesting observation which can make when studying the uranium map relates to the amount

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of uranium the countries need and use of uranium to generate electric power.

In this respect, none of the Southern countries produce electricity from nuclear energy, whereas all the countries that need uranium are Northern countries. One can conclude that there is a large dependency of this mineral on the Southern countries, on the part of both the Northern countries on the one hand, and the so-called emerging economies on the other hand. In Figure 5 the numbers indicate the tons of uranium needed by different countries.

The students in Robotics Engineering, after the reflection in front of this study, realize about the worldwide energetic reality and the need to tackle this reality through the Robotics field.

For most industries in which robots have been or are expected to be applied in significant numbers, such as auto- mobile production, metalworking, and machinery manufacture, the incentives to robotize relate directly to preserving or recapturing competitive advantage through lowered unit costs of production and improved product quality. But for some industries, the attraction of robots is their potential to work in hazardous environments, thereby reducing the human risks associated with the work. The electric utility industry is one such industry. Although utilities are not viewed by most industrial robot manufacturers as a significant potential market, special-application robots are under development for performing inspection and maintenance tasks inside nuclear power plants, where radiation levels, heat, and humidity either rule out the presence of human workers or severely limit their ability to work. For many of these tasks in a nuclear plant, robots would be a welcome addition to the workforce, freeing humans from some of the more onerous and discomforting jobs and, possibly, permitting certain tasks to be performed while a plant remains on-line, thus avoiding costly plant downtime for inspection or maintenance. The use of remotely operated and robot-like equipment to protect nuclear workers in high-radiation areas is not new. In many industrial applications of robots, the objective is to replace human workers with machines that are more productive, efficient, and accurate. But for nuclear applications, the objective is not so much to replace workers as it is to extend their presence—for example, to project their reach into areas of a nuclear plant where the thermal or radiation environment prohibits or limits a human presence [18].

There are no explicit questions about Sustainability in the robotics subject exam because the real objective is to integrate it within the theoretical topics of each subject. Therefore, the Sustainability and Social Commitment competence is implicitly assessed with the regular exams. Anyway, a questionnaire is given to each student to know his/her opinion about the integration of this competence in the regular subject and the answers are very positive which encourages lecturers to keep on the competence and improving the contents.

## 5. Conclusion

In this paper authors presented an innovative pedagogical tool which offers new integrative materials to classrooms in technical/scientific degrees, such as Robotics Engineering. Why are they integrative? The maps allow us to focus on a topic and cover it comprehensively with the consequence that the information gathered in such a manner becomes revealing. One manages to capture at a glance the different angles and sides of the same topic and this is a key element to understand social and environmental issues as a part of many things that are involved in the technical/scientific field. But above all, the advantage of using an interactive map is that whatever one wants to represent is made clear to whoever uses them. In fact, the elaborated pedagogical material has been developed in order that lecturer have such a material to cover the compulsory transversal competence of "Sustainability and Social Commitment" in different technological and scientific degrees, from the complexity and critical thinking.

## 6. Acknowledgments

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## 7. References

[1] United Nations, Sustainable development goals, http:// www.un.org/sustainabledevelopment/, (Access date: 10 April, 2017)

[2] World Education Forum, last accessed April 10th, 2017, http://www.forummundialeducacao.org/ (Access date: 10 April, 2017)

[3] Biel, R., "The Interplay between Social and Environmental Degradation in the Development of the International Political Economy", *Journal of World-Systems Research*, XII, 2006, pp.109-147.

[4] Jike, V.T., "Environmental degradation, social disequilibrium, and the dilemma of sustainable development in the Niger-Delta of Nigeria, *Journal of Black Studies*, Vol.34, no.5, 2004, pp.686-701.

[5] Bonil, J., and Pujol, R.M., "The paradigm of complexity. A new way of approaching scientific education in the community", *Culture della Sostenibilità*, anno II, no.3, 2008, pp.11-28.

  ISBN 978-1-908320-77-3 

[6] Technical University of Catalonia, Step Program, http:// www.upc.edu/sostenible2015/step, (Access date: 10 April, 2017)

[7] Mulder, K.F., Segalàs, J., Ferrer-Balas, D., "How to educate engineers for/in sustainable development: Ten years of discussion, remaining challenges", *International Journal of Sustainability in Higher Education*, Vol.13, no.3, 2012, pp.211-218.

[8] Bonil, J., Sanmarti, N., Tomas, C. and Pujol, R.M., "Un nuevo marco para dar respuesta a las dinámicas sociales: el paradigma de la complejidad", *Investigación en la escuela*, Vol.53, 2004, pp.5-19, (in Spanish).

[9] Gilbert, J. K., and Boulter, C. J., "Learning science through models and modelling", *The international handbook of science education* (pp.53–66). Dordrecht: Kluwer, B. Frazer & K. Tobin (Eds.), 1998.

[10] Carbó, V., Pigrau, T. and tarín, R.M., "The role of thinking, experimenting and Communicating in the Science Lab", *eLearning Papers*, Vol.20, July 2010, ISSN 1887-1542.

[11] Pujol, R.M., *Didáctica de las ciencias en la educación primaria*, Madrid, Síntesis Educación, 2003, (in Spanish).

[12] Xin Jin, Ray, A., Edwards, R.M., "Integrated Robust and Resilient Control of Nuclear Power Plants for Operational Safety and High Performance", *IEEE Transactions on Nuclear Science*, Vol.57, no.2, Part:2, 2010, pp.807 – 817.

[13] Massachusetts Institute of Technology, *The Future of Nuclear Power: an Interdisciplinary Study* , 2003, Available at: http://web.mit.edu/nuclearpower/, (Access date: 10 April, 2017)

[14] Shropshire, D., "Economic viability of small to medium-sized reactors deployed in future European energy markets", *Progress in Nuclear Energy*, Vol.53, no.4, May 2011, pp.299–307.

[15] Etzkowitz, H., "Solar versus nuclear energy: autonomous or dependent technology?", *Social Problems*, Vol.31, no.4, April 1984, pp.417-434.

[16] Marshall, A., "Questioning the Motivations for International Repositories for Nuclear Waste", *Global Environmental Politics*, Vol.5, no.2, May 2005, pp.1-9, Massachusetts Institute of Technology.

[17] Uranium 2007: Resources, Production and Demand, OECD NEA No. 6345, 2008. (Red Book).

[18] More, Taylor, Robots for Nuclear Plants, IAEA Bulletin, 1985.

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# Challenges in Math and Computer Science Undergraduate Education in Pakistan

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## Abstract

*There are two main systems of higher secondary education in Pakistan which are the Higher Secondary Certificate (HSC) and the General Certificate of Education (GCE) A Level, as followed in England. The emphasis of schools employing these two systems is about scoring better grades rather than developing an enduring understanding of the core concepts. The students who go through these systems and enter the university have to adopt a drastically different mode of learning before they are trained enough to start their undergraduate education. We as educators emphasize on learning the foundations of any concept before moving on to further applications of content. In order to do so we have encountered various challenges and have applied different techniques to enhance learning. We have received encouraging response from the students that is a good indication that our efforts are producing favorable results. With this paper, we share our experiences and approach to overcome these challenges and provide the students with a better learning experience during their undergraduate studies.*

## 1. Introduction

Habib University, ever since its inception in 2014, remains in the forefront of Liberal Arts and Sciences Education in Pakistan. It offers a transformative learning experience and aims to redefine higher education in the country by applying innovative techniques in pedagogy. One of the greatest hindrances in achieving this goal has been the learning habits that students bring with them; centered primarily on scoring well in their high school examinations. Almost all the public and private sector universities now hold their own selection examinations and it is assumed that if a student performs well in high school, s/he will be able to score well in the university selection test as well. Hence, there is a great demand on students to learn the necessary skills to be able to perform well in the high school examinations. At the same time, they are tutored to gain the necessary skills which help them approach the various examinations that are held by these universities. In doing so, the main purpose of actual learning is lost which should be covered by the higher secondary education. Habib University's Talent Outreach, Promotion and Support Program (HU TOPS), however, provides an opportunity to talented students to be inducted purely on the basis of their score in the higher secondary education programs. Students who are enrolled in Pakistan's Board of Intermediate Education (BIE) or Federal Board (FB), or Aga Khan University Examination Board (AKUEB) are given an opportunity to pursue a fully funded four-year undergraduate program at Habib University based on their academic talent and performance.

With our experiences, we have found that mostly the students that do clear the examinations and enter the university are lacking the underlying concepts when it comes to science, mathematics and even logical reasoning. Students have to go through a few weeks of an unlearning phase where habits that were acquired over the years are suppressed and special emphasis is placed on conceptual learning. This brings with it its own challenges which we will discuss in this paper and provide the methods that we found to be effective in helping the students overcome their deficiencies.

## 2. Status of education

In Pakistan, like many other countries, when a student enters undergrad studies, s/he has about 12 years of education. During the undergrad studies the student completes 16 years of education and graduates as a Bachelors in his/her field. However, there is a very small number of students who actually reach the level of Higher Secondary Education. Not having enough schools, poor basic education and poverty are a few main reasons that cause the students to not pursue any further education. At the same time, the female students are not encouraged to study due to archaic social and traditional reasons.

Only 1.98% [2] of all the educational institutes in Pakistan cater for the needs of students in Higher Secondary Level. Out of these students not everyone ends up in universities. Generally all universities require the students to score at least 60% in their higher secondary education to be eligible for the university selection examinations.

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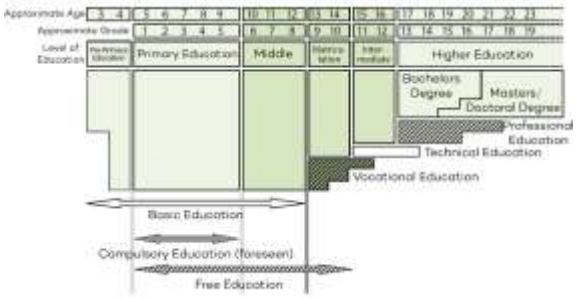


Figure 1. Education Structure: Approximate Starting Age and Duration [1]

Private sector universities are quite expensive and with a dearth of public sector universities, only a few students manage to get enrolled in a university to pursue their undergraduate studies. There are, however, many scholarships available for excelling students which gives them the opportunity to pursue an undergraduate degree. Even with this selection procedure, not all students are ready or prepared to start their undergraduate studies.

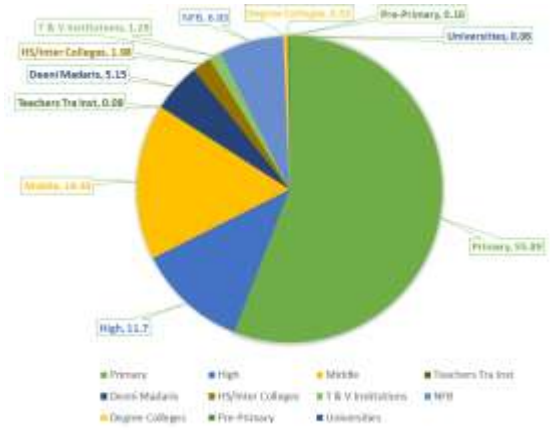


Figure 2. Distribution of Institutions by Level of Education, Pakistan, 2013-14 [2]

The level of the students changes drastically depending on their economic class or the region from which they belong. Bringing them all to the same level and making sure that everyone learns at the same pace is an extremely difficult task.

## 3. Challenges in learning

Pakistan has a plethora of public and private sector schools that provide the necessary education to students for the first 12 years of their school life. Even though the education acquired in these schools should be enough to prepare the students for university selection examinations, mostly the parents find it necessary to let their children go through a series of private tuitions. The aim of these tuitions is to provide the students with the necessary skills to approach the examination questions rather than understanding the underlying concepts. This is very much analogous to rote learning and kills the inherent creativity and critical-thinking skills of the students.

We have also seen that the aim of the students is to arrive at the correct solution through methods learned and formulae memorized. The reasons behind why a methodology is used or why a formula is applied are lost to them. In their minds they assume that following a series of steps mechanically is the best exhibition of their capabilities. We even had instances where students rote learnt entire computer programs to pass an exam. Such an instance was extremely alarming for us and we had to change our teaching methodology to help the students understand the concepts behind programming.

At Habib University, the emphasis is always to enable students to have a basic understanding on top of which they can build and extend their knowledge by going through books and online content. Students however have a totally different take on the subject material; they will only read their course books if chapters have been marked by the instructor and will only review handouts given in class. Mostly students show no initiative in learning on their own or finding content online. We have realized that properly using the search engines and arriving at the desired information is a skill which most students lack. Students shy away from reading and most of all want someone else to help them solve assignment problems for them. They do this with the intention to learn how a particular problem was solved rather than using their own capacity to come up with a solution. A few students have also said that they can only arrive at a solution if someone sits with them and acts as an observer, stepping in when they get stuck. This indicated to us that we need to have more emphasis towards a flipped classroom environment and at the same time help the students become more independent.

## 4. Enhancing learning

The problems mentioned above puts the instructor in a very precarious position. On one hand, the course content needs to be covered during the semester but then there is no point in pushing forward with the course content if most of the class does not have the necessary understanding of the foundations. The decision was taken to concentrate on helping the students build their foundations for math and logical reasoning before moving forward in courses that had to do with Calculus and Computer Science.

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### 4.1. Learning in Computer Science

Most of the students who come to Habib University have no idea about computer programming and logical reasoning. In the beginning, a programming console for the students can become extremely overwhelming and it can result in having them reject programming entirely. Many students especially from the humanities department, do not see the need to learn programming and thus show no interest in it. It becomes difficult to teach such students as they have already built up some resistance towards any sort of programming. We have introduced Python as the starting language as it is easy to learn and does not appear to be daunting to the students with its syntax. It gets more work done with a few lines of code and gives a lot of power to the programmer. We had hoped that this will make programming easier to get into but there were many issues that cropped up as we started teaching. We will go through these issues one by one to highlight the problems at hand and to explain the methodology we used to solve them.

**4.1.1. Logical reasoning.** Students fail to understand the usage of basic mathematical concepts in formulating logic. Helping them understand basic conditional statement and loops can take some time. The best way we found to explain this was to take them through the code line by line and asking them, repeatedly, what each line of code meant. This helps them formulate the picture in their heads and helps them understand the code and its flow. Flow charts have been helpful as well as it shows them the flow of the program graphically and they are better able to visualize it.

**4.1.2. Debugging.** Mostly students write the entire program and then start to debug it. They do not test the program while they code to check whether their code is actually working. We have seen a large number of students who are stuck in their own code because they cannot make sense of why a certain error is occurring. In their minds, they have created the right code therefore, the error is a complete mystery to them. We had to teach them to check their program repeatedly and most importantly break a big problem into smaller chunks; solve the chunk and then move forward.

Initially, students do debugging manually and soon move to print statements. We have also seen that they find the print statements to be extremely useful for debugging and it became hard to teach them how to use a debugging tool offered by the Integrated Development Environment (IDE) for any programming language. We found it odd that even though we showed them clear advantages of using a debugging tool, they were still reluctant in using it. Many a times we had to stop helping them in fixing their code and asked them to use the said tool to find the fault in their code themselves. This again shows the reluctance of students to adapt new techniques when the old one seems to get the job done.

**4.1.3. Self learning.** We found the students to be most reluctant in learning by themselves. This included reading books, tutorials or doing exercises. The concept of going through the reading material, understanding it and following proper instructions is an extremely difficult task for them. We have to keep in mind that most of the students are so used to getting work done for them that they were dependent on the instructors for the steps towards a solution.

Students always look for handouts and presentation slides which can give them an overall summary of the topics in question. Since many of the compiler errors are not given in the books, the students have a hard time understanding the errors and searching solutions online using search engines like Google. We normally need to go through a few tutorials teaching them how to conduct a Google search and to find appropriate information in books and on websites. We have to clarify, repeatedly, that a university is not a tuition center and should not be considered as such. They need to develop problem solving skills and gain the habit of searching appropriate information on their own.

**4.1.4. Communication gap.** Through our experiences, we realized that there is a certain amount of communication gap between teachers and students. Students find it hard to approach teachers with their questions and in doing so do not learn the important concepts in time. Their inability to communicate with the teacher leaves them with the option of asking their peers for help. Habib University has made a special coaching centre known as Ehsas Centre which employs student tutors to help struggling students. The student tutors are selected through interviews that gauge whether they can provide the necessary help to the struggling students. Some research assistants, and even the course instructors, spend some hours in the Ehsas Centre to provide help to students. Since the students are normally engaged on individual basis, they do not feel the pressure of being singled out during the class. This has been slightly beneficial for the students but we still believe that there should be a better way to approach this problem.

Another method that has been used is that the students are given some tasks to be done in class while the instructor goes around checking their progress. This way the instructor gets to see the students' progress in real-time and gets a good idea about the nature of the problems faced by the students. As a result, the instructor gets to engage the students and this helps in reducing the reluctance of

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the student in approaching the teacher with their problems.

## 4.2. Learning in Mathematics

For a population of students that are largely predisposed to rote learning and memorization of formulae, the mathematical competency of students entering University level education generally lacks the necessary critical thinking skills required to tackle higher mathematics. Although the problem of understanding math through appropriate contexts is one that is experienced by students in many countries, yet in Pakistan the problem is further exacerbated by a lack of context and critical thinking in all the other subjects taught at the high school level as well.

**4.2.1. Determining Competencies.** All the incoming freshman students that are enrolled in the School of Science and Engineering are required to take Calculus as the first step in the many Math courses that are a requirement for their Engineering and Computer Science majors. However, given the level of readiness to actively engage and understand the concepts of Calculus (many of which are already introduced to them without much contextual development in high school), students need some remedial help in understanding and analyzing the world of Relations and Functions as a modelling tool. Very few students have looked at function behavior graphically or even numerically and have usually been exposed to formulae that generate some properties (roots, intercepts etc.) of rudimentary functions only symbolically. Most students don't manage to correlate tables and graphs with symbolic expressions and therefore, have very little understanding of local and global behavior of the various kinds of functions. Very few have reflected on the differences between constant and varying rates of change, a fundamental component of the Calculus course.

One of the solutions adopted was the creation of a diagnostic test whereby incoming freshmen could be sorted into students that had the necessary prerequisite understanding to enter Calculus or students that qualified for taking a Pre-Calculus course in the first semester. The diagnostic test assessed basic algebraic and geometric understandings and also determined the extent to which students understood the world of Functions. They were tested on their ability to extend an understanding to a new context, paying equal attention to graphical, numerical and symbolic representations of concepts.

The results of the assessment showed that around 60% of the incoming freshman for the School of Science and Engineering qualified for Calculus, some barely making it through, and the remaining 40% were required to take Pre-Calculus in the first semester. For these students to be able to stay in tandem with their cohort for courses that were offered during the sophomore year, a summer Calculus II course was offered to ensure that everyone had met the prerequisites for courses offered the next year.

**4.2.2. Strategies in the classroom.** In the long run, Pre-Calculus was not a stand-alone solution, given that critical thinking skills and fostering creativity were some of the main constituents that we sought to engender in our students across the board. A relational pedagogy [3] in which communication, collaboration and reflection [4] were at the heart of the learning experience had to be adopted. Students were arranged in groups of four or five (the tables were always arranged as such) and were seldom led into the fundamental arguments for a topic via lecture. Instead, they were provided with worksheets that guided them through compelling questions that were meant to be discussed amongst each other before penning proposed answers to them. This allowed for students to have a stake in the material being developed rather than silently accepting content being expounded from a lecture podium or the whiteboard. In this way, we were able to act as facilitators going from one group to another and helping to clarify things that may have remained a unanimous problem for a particular group or to help assist individuals that may have still been struggling with concepts. These strategies were not limited to the Pre-Calculus classroom only but were also employed in the Calculus classroom.

In addition, historical context was often used to allow students to understand the origins of certain concepts, making the subject more accessible and interesting. For example, the unit of Trigonometry was covered in a way where ancient and medieval astronomy was introduced as the basis for making trigonometric tables. Students were then given the opportunity to use their geometric understandings to find sines and cosines of easier angles on their own, thereby investing in a process that was in their direct experience. "*The adult mind is so familiar with the notion of logically ordered facts that it does not recognize – it cannot realize – the amount of separating and reformulating which the facts of direct experience have to undergo before they can appear as a "study," or branch of learning. ….The studies as classified are the product, in a word, of the science of the ages, not of the experience of the child.*" [5]

**4.2.3. Diverse assessments.** To allow for diverse learners to be assessed in ways that catered to various "facets of understanding" [6] there were a variety of assessment tools used for measuring student learning. Homework assignments were

graded purely on the degree of attempt for particular questions and more for completeness than for correctness. This took away some of the anxieties associated with incorrect solutions, which usually prevents further learning and understanding. Before more substantial assessments of entire units, there was always a quiz that was usually a quick assessment of where students were with their concepts, allowing for the instructor and the student to know what needs to be addressed before the big test ahead. In these formal assessments, students were also asked to explain their thinking at times, to ensure that purely mechanical solution schemes were not being memorized without the rationale that supports those methods.

Students were also given term projects that were to be done in groups where there was a component of research, pattern recognition and generalizations based on those patterns, and an extension of topics learned in the core syllabus. Topics ranged from historical perspectives, such as expounding on Newton's ingenuity with the Binomial Theorem, to applications of Calculus, such as explaining and justifying the process of determining a Least Squares line for certain non-linear data. Through these projects students got the opportunity to share their understanding of content and take ownership of various components in the process of piecing together a final presentation of the projects in front of their peers.

## 5. Observations

The strategies employed with the freshmen and sophomores helped to significantly improve student engagement and understanding as it managed to fill the gaps in their previous education. We believe that such initiatives increase student focus and help them develop the necessary skills to perform well in the university environment.

We have also observed that the traditional methods of teaching in the university have inherent problems as they do not enable the students to become self-directed, which is extremely important for undergraduate and higher studies. We believe that the amount of active and project based learning should be encouraged wherever possible in order to give the students a hands-on experience and to understand the utility of their education. Engaging the students on a personal level helped immensely as it gave the students an opportunity to apply their knowledge under supervision and reduced their reluctance in communicating with their instructors. Active learning gives them a sense of ownership as students get emotionally invested in their effort and are eager to learn more, something that we do not generally see in the traditional teaching methodologies.

## 6. Conclusion

Habib University has brought a transformative Liberal Arts and Science education experience to Pakistan. In our pursuit to be at the forefront of educational reform in Pakistan, we looked into the problems that might hinder us in achieving this goal. We focused on the state of understanding and knowledge of the students that were inducted in the university in the past two years and tried to identify and fill the deficiencies that we encountered through pedagogy.

A combination of flipped classroom, student engagement dialogues, and project-based learning proved useful in improving the learning process and gave timely feedback to the instructors. We recommend that the instructors be given enough flexibility to apply these techniques in their courses to improve the overall educational experience.

## 7. References

[1] D. Lynd, The Education System in Pakistan: Assessment of the National Education Census, Published by UNESCO Islamabad, Pakistan, 2007.

[2] A. B. Malik, N. Amin, Y. Irfan, M. B. Kakli, Z. F. Piracha and M. A. Zia, Pakistan Education Statistics, National Education Management Information System, Academy of Educational Planning and Management, Ministry of Federal Education and Professional Training, Islamabad, Pakistan, March 2015.

[3] Charles Bingham and Alexander M. Sidorkin (editors), No Education Without Relation, Peter Lang Publishing Inc., New York, 2004.

[4] James Hiebert…[et al.], Making Sense: Teaching and Learning Mathematics with Understanding, Heinmann, 1997.

[5] John Dewey, The School and Society and The Child and The Curriculum, The University of Chicago Press 1902.

[6] Grant Wiggins and Jay McTighe, Understanding by Design, Expanded 2nd Edition, Pearson Education, Inc., New Jersey 2006.

## Session 8: Curriculum, Research and Development

Title: Evaluation of Research Approaches in a Bachelor Program
(Author: Thomas Stehling)

Title: Playful Family Science: Learning Science One Exploration at a Time
(Authors: Shelley Goldman, Megan Luce, Soren Rosier)

Title: Early Childhood Mental Health in the Classroom
(Author: James Geidner)

Title: Disadvantaged Students' Multiple Goals for Learning Mathematics: Implications for Sustaining Motivation to Take Advanced Mathematics
(Author: Clarence Ng)

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# Evaluation of Research Approaches in a Bachelor Program

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## Abstract

*In the Bachelor degree program Information Technology at the South Westphalia University of Applied Sciences a research approach was chosen for the training in software engineering. The basic idea was to investigate the efficiency of process models for software production. To this end, third-semester students studying in cooperation with Siemens and with project experience were divided into three development teams with the aim of carrying out the same software project according to different approaches. Each of these groups was assigned another student as a fictitious client, who was to be included according to the requirements of the approach model.*

*The project was evaluated on the efficiency of software development and the fulfillment of the customer's wishes so that comparative statements can be made about the efficiency of the approaches. On the other hand, the learning behavior and the students' success in the field of software engineering were investigated, taking into account the research approach in the Bachelor program.*

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# Playful Family Science: Learning Science One Exploration at a Time

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## Abstract

*We are interested in providing supports for families as science learning environments. We developed a mobile app for families, Playful Science, to support science engagement at home or on the go. The app provides activity and conversation starters by pointing families to observe phenomena in their homes or in the world around them. It consists of exploration "cards" with challenges that encourage observations, conversations, and sense making. Our research aims to understand the ways the app does or does not support children accomplishing science sense making and reasoning. We ask, "How do these digital resources for exploration activities function in family activity"? We report on a first round of research and development with families, describing the features of families' science discussions and how the app facilitates and/or constrains them.*

*The explorations in the app are meant to be open-ended, to prompt collaborative exploration, and to focus on sense making rather than the seeking of correct answers. Each activity is introduced with a colorful, intriguing photo. Suggestions for things to notice, do, and discuss follow. This an example activity that can be done with plants:*

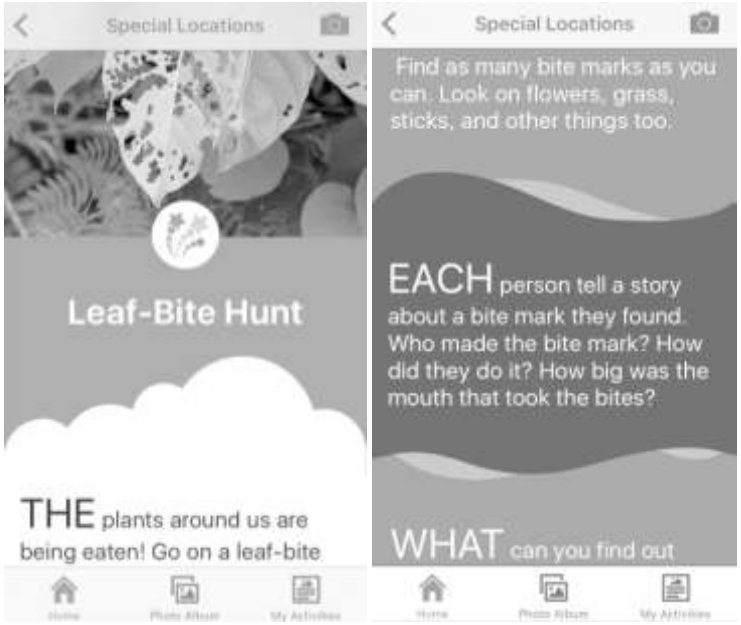


*Figure 1. Playful Science App Leaf-Bite Hunt*

*The focus of activity is on sensemaking about natural phenomena (eaten leaves) through the activity of searching for bite marks on leaves, and storytelling to create a plausible mechanistic account of the observed phenomena. This activity is open-ended (how many leaves they find is up to them), promotes discussion of competing ideas (what counts as a bite mark), and invites multiple people to engage in*

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*storytelling. We do not provide "facts" about leaf bites or offer a concluding statement or information. Family members can browse activities, take photos of what they explore, and "check off" the activity when completed.*

*Research methods include observing and recording families with at least one child in the 4-10 year age range as they use the app in the home and outside. In preliminary studies, family members have worn a Go Pro wearable camera, and currently, we collect user video and audio through the app itself. We employ interaction analysis processes to describe the features of interactions with the app. We transcribe segments of the sessions that include engagement with the app and the card activities, specifically attending to the conversations around the card explorations and sensemaking episodes. We also look at the duration and flow of conversations on all topics across the entire user-testing session. We interrogate how family members engage with the app, with each other and with the science. We report on sessions with several families, highlighting the science sensemaking and reasoning that took place while they were engaged in the activities.*

*The analysis of family activity and conversation offers new insights into how families can help children construct a foundation for further science learning. We seek to understand the role the app plays in focusing attention onto phenomena in the world and how it anchors joint engagement. These analyses offer new insights into when and how scientific sensemaking and reasoning develops in the context of meaningful engagement with others and the world, particularly how the app might function as a resource for family activity.*

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# Early Childhood Mental Health in the Classroom

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*University of Wisconsin, Superior*

## Abstract

*For the past ten years the Child Development Project at the University of Wisconsin--Superior has worked in collaboration with local Head Start and Early Childhood Programs to develop infant and early childhood mental health services. This workshop will present findings from this longitudinal research project. Specifically, a Developmental Systems Model for early childhood mental health intervention is presented based on what we currently understand about the developing brain. Drawing from the field of Neurosequential Therapeutics, Cognitive Behavioral Therapy, and traditional Play Therapy the current model has been taken from the clinic to the classroom to further assist teachers in providing emotionally corrective experiences for young children.*

*This research employed a quasi-experimental longitudinal clinical model of over 400 subjects between the ages of 3-6 years. Children were seen by individual clinicians for 32 to 47 weeks. During this time successful strategies were slowly integrated into the classroom setting. Both clinical and empirical data are used to inform and guide the implementation of the Developmental Systems Model. While the general outline and findings of the research project will be introduced, the main focus of this presentation will be on the implementation of the model itself.*

*The Developmental Systems Model for early childhood mental health comprises four phases. The first phase includes exploring the self and establishing core processes of inter-affectivity, inter-intentionality, and inter-attentionality. The second phase includes exploring emotions and includes identification of feelings within the context of relationship. The third phase involves exploring thoughts within the context of emotionally meaningful relationships. Finally, children explore their capacity for self regulation and effective interactions within the classroom environment.*

## References

[1] Axline, V. (1948). Some observations on play therapy. Journal of Consulting Psychology, 12 (4), 209-216.

[2] Erikson, E. (1987). Dorothy Burlingham's School in Vienna. A Way of Looking at Things. New York, NY: W.W. Norton & Company.

[3] Freud, S. (1990). The Ego and the Id. New York, NY: W.W. Norton & Company

[4] Freud, A. (1974). Lectures for child analysts and teachers. The writings of Anna Freud, v 1. Madison, CT: International Universities Press, Inc.

[5] Geidner, J. (2008). Developmental science looks at play therapy. Journal of Play Therapy, v. 4.

[6] Geidner, J. (2009). Developmental science and counseling. Journal of Counseling and Development, 87 (3).

[7] Perry, B. (2006). Applying principles of neurodevelopment to clinical work with maltreated and traumatized children: The neurosequential model of therapeutics. In Webb, N. (Ed). Working with Traumatized Young in Child Welfare. New York, NY: The Guilford Press.

 Published by Infonomics Society ISBN 978-1-908320-77-3 

[8] Stern, D. (2008). The clinical relevance of infancy: A progress report. Infant Mental Health Journal, 29 (3), 177-188.

# Disadvantaged Students' Multiple Goals for Learning Mathematics: Implications for Sustaining Motivation to take Advanced Mathematics

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## Abstract

*Many Australian students from economically disadvantaged families will drop advanced mathematics when they reach senior secondary school, resulting in an under-representation of disadvantaged student groups in the advanced mathematics stream. It is important to promote disadvantaged students' aspiration for advanced mathematics given the significance of this important subject for future academic and career opportunities. As a first step in a longitudinal project, the current study interviewed a selected group of achieving year 10 students from economically disadvantaged families (N=27) to understand what motivates them to learn mathematics. The interview findings showed that these students, notwithstanding their disadvantaged backgrounds, were motivated to learn mathematics. Their motivation, as reported in form of reasons for learning mathematics, was multiple and diverse. This paper discusses various considerations to support students' motivation and sustain their interest in taking on advanced mathematics.*

## 1. Introduction

In Australia, and many other OECD countries, urgent attention is required to examine the problem of limited academic aspiration for advanced Mathematics among students coming from economically disadvantaged backgrounds. Not only are disadvantaged students in Australia over-represented among those who fail to meet the benchmark in national and international testings in school Mathematics, they are also under-represented in Mathematics-related degree programs at the university level. Few students from disadvantaged groups have shown sustained aspirations for learning Mathematics. It is therefore important to understand what motivates disadvantaged students to learn Mathematics. In particular, it is important to understand why some disadvantaged students who are achieving in mathematics do not intend to take advanced mathematics streams in the senior secondary levels.

An important way to understand their motivation is to explore what reasons they hold for learning mathematics. Middleton and Spanias [7] describe motivation as "reasons individuals have for behaving in a given manner in a given situation" (p. 66). In this study, students' reasons for learning mathematics are conceptualised as their perceived goals for learning based on achievement goal theory. According to achievement goal theory, students' perceived reasons or goals for learning and achievement are significant because different goals are associated with different patterns of strategy use, emotional responses and achievement levels [12].

## 2. Achievement goal theory

Achievement goal theory is currently a dominant perspective in the field of achievement motivation research. A wealth of studies, accumulated over the past three decades, has firmly established the benefits of student learning derived from mastery goals, with a focus on the development of student competence Promoting mastery goals has been proposed as an effective way to optimise students' motivation from a normative goal perspective or mastery goal perspective [8], [10], which considers performance goals as generally detrimental to the learning process. An important point of debate [6] has emerged regarding additional benefits of pursuing approaching form of performance goals that focuses students on competence demonstration through outperforming others alongside with mastery goals. Subsequent studies, for example, Carr [2], Harackiewicz and colleagues [6], and Pintrich [10], have reported the positive effects on learning derived from simultaneously endorsing mastery and performance-approach goals. However, there are few instances of multiple goal research that has included additional goals other than those focusing on mastery and performance [12]In addition, most studies on multiple goals have focused on college students [17], with few having investigated high school students' multiple goals.

Early studies on multiple goals were based on the premise that performance goals can be distinguished into two contrasting orientations, performance-approach and performance-avoidance. The research of Elliot and Harackiewicz [1], [4] and [5] have

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provided empirical evidence showing that detrimental effects of performance goals are confined to an avoidance orientation, such as attempts to avoid displaying a lack of ability while adaptive benefits can be derived from approaching performance goals such as focusing on outperforming others. Their findings supported a multiple goal perspective endorsing the use of performance-approach goals alongside mastery goals.

Building on these previous studies, several researchers, for example, Ng [9], Suarez, Cabanach and Valle [13], and Valle et al. [15] have recently advocated for an extended multiple goal perspective and inclusion of additional goals to the multiple goal research agenda. For example, using a sample of Spanish undergraduate students, Valle and colleagues [15] found a group of multiple-goal students endorsing mastery, performance and social reinforcement goals simultaneously, alongside with two groups of single-goal students, orienting towards performance and mastery respectively. This group of multiple-goal students used more deep strategies than did performance-oriented students and had a better achievement than did both mastery- and performance-oriented groups.

This extended multiple goal perspective aligns with the development of the achievement goal theory in that achievement goal research has moved beyond a dichotomous framework concentrating solely on mastery versus performance goals [3], to a trichotomous framework [5] that separates performance goals into approach and avoidance orientations, and, more recently, a 2x2 framework [4] that has applied the approach-avoidance distinction to both mastery and performance goals. Adding to this theoretical development, an extended multiple goal perspective maintains that students bring other goals with them to their studies, in addition to those focusing on performance and mastery considerations [14], [16]. It is therefore important to consider the possibility of additional goals in multiple goal research so as to develop a comprehensive understanding of the complexity of students' learning motivation [4], [11].

## 3. The Current study

The current study was part of a longitudinal project funded by the Australian Research Council that aims to understand factors derived from personal, social and classroom dimensions that affect students' academic aspirations and decisions regarding subject choice in mathematics. The current study was the first interview study in this longitudinal project. It aimed to understand students' reasons for learning mathematics, their perceptions about this subject and whether they had a strong intention to take an advanced mathematics stream in senior school.

## 4. Method

To understand the reasons held by disadvantaged students' for learning mathematics, the current study interviewed a selected group of disadvantaged students using a semi-structured format. In this study, semi-structured interviews were flexible and both the interviewer and interviewee were allowed to raise new questions and bring up additional discussion relevant to general themes covered in the interview.

### 4.1. Participants

A selected group of Year 10 high-achieving students in Mathematics (N=27) from schools situated in high poverty suburbs in Logan City, Queensland were interviewed. These students were nominated by their teachers as high achievers who had received either an A grade or a combination of A and B grades in the past two school terms. It was deemed likely that these achieving students would hold strong aspirations to continue their studies in advanced mathematics in senior secondary levels (Year 11 and 12). The justification for focusing on achieving students is that this study group, unlike low achieving students, will not attribute their learning and future aspiration to their low achievement levels or lack of confidence because of their poor performance. In other words, achieving students who intend to quit advanced mathematics represent a special group of informants that warrants research attention.

### 4.2. Procedure

Based on the Australian Census Statistics, we selected a sample of schools situated in extremely low SES suburbs (lowest 5%) in Australia. We then sought ethical clearance approval from Education Queensland to contact these schools and invite them to participate in the project. Two schools situated in Logan City accepted our invitation.

To select the students, we communicated with school department heads and explained that the project focused on understanding why capable students would not want to study challenging mathematics in senior school. We did not focus on students who were not capable because this type of students can easily attribute their decision to quit advanced mathematics to their lack of confidence and low achievement. We asked teachers to nominate students who had performed well in mathematics in the past two terms, either being awarded an A or a combination of A and B grades. In addition, we used a bipolar scale to assist teachers

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to assess students' engagement characteristics. The bipolar scale required teachers to assess their nominees in terms of frequency of observed engagement/disengagement behaviours, levels of enjoyment and efficacy, purposes for learning, and willingness to take on mathematics. Based on teachers' nominations and their evaluations of students' mathematics achievement, we recruited a group of capable and achieving mathematics students who came from economically disadvantaged families. Consents for these students to participate in the project were sought from gatekeepers including principals, teachers and parents.

### 4.3. Data collection and analyses

The current study reported the findings based on the first round of the interview with these students. The 20-minute semi-structural interview focused on understanding students' learning experiences in Mathematics, and in particular, their reasons for learning Mathematics. It also explored students likes and dislikes about the subject. The main interview questions included:

1. What are some of the exciting/memorable moments/events (positive or negative) in learning Maths?
2. What are your goals/reasons for learning Maths?
3. What strategies you usually use to learn Maths?

The data analytical process included the following steps: 1. Reading and re-reading of a small sample of interview transcripts; 2. Development of a coding system; 3. Coding of sample transcripts and revising the coding system; 4. Coding of all the transcripts using the revised coding system; and 5. Merging of similar and related codes into analytical themes. During the analytical process, two trained research assistants first completed an analytical step individually before they worked together comparing their results and worked through any inconsistencies or discrepancies. At the final step of merging codes into themes, the inter-rater reliability exceeded 95%. In this paper, we concentrated on students' reported reasons for learning mathematics and the findings are described in the section below.

## 5. Results

Students' reasons for learning mathematics were grouped into ten categories, which were: Instrumental goals, mastery goals, performance goals, compliance, importance, parental support, sibling support, teacher support, task, and no goal. Figure 1 summarised the counts of students' responses in these ten categories of reasons.

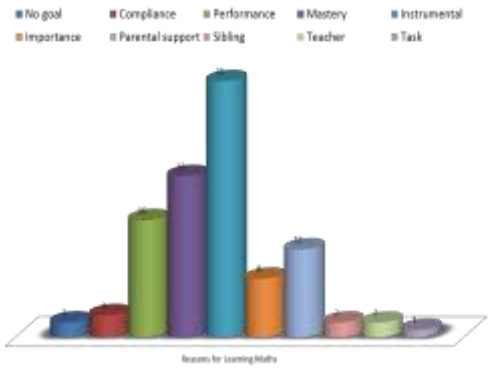


Figure 1. Students' reasons for learning mathematics

As can be seen, the most frequently cited reasons for learning mathematics were instrumental reasons. In this category of reasons, students discussed the utility values of mathematics for their future career (No. of counts; N=18), education (N=4), university studies (N=6), and everyday life (N=6). Below are examples of students' responses in this category.

"*Because it will help my future goals, the future jobs that I want to get. I think they involve maths mostly*" (Career reason)

"*It helps you throughout your life and it gives you a better chance of being educated*" (Education reason)

"*I want to continue going in maths because I would like to go to university once I leave school and hopefully become a doctor or a nurse. So you need maths for that*" (University studies and career reasons)

"*I like learning about maths because it's in so many things of our lives*" (Life relevance)

These examples show that students focused on how useful mathematics would be for academic, work and Engagement in daily life. Mathematical learning, for these high achievers, was not confined to fulfilling school requirements in relation to assessment. They perceived that mathematics learning was important for various future purposes.

The second most cited reason was mastery goals. In this category, students talked about the various forms of mastery considerations for learning mathematics. These considerations include improvement in mathematical understanding (N=12), taking on challenging tasks (N=2), and enjoyment derived from learning mathematics (N=8).

Most students discussed the importance of improvement. Learning from mistakes was considered natural in the process of improvement. The interview excerpt below indicates this belief.

"*Because it helps me more and if I get something wrong or fail an exam I'll know what to do after that and it will help me*" (Improvement reason)

Additionally, students talked quite extensively about enjoyment in learning mathematics.

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"*It's just fun. It's the fun of it and it makes you learn a bit more which is exciting*" (Enjoyment).

In this excerpt, the student did not only talk about learning enjoyment, but also, the motivational nature of enjoyment. It is when a task is enjoyable that students are willing to spend an extended amount of time completing the task, leading to enhanced learning.

There were, however, only two counts of descriptions related to taking on challenges. One student commented that the reason to learn mathematics was "*To challenge myself and to learn more*" (Challenge). Taking on challenging tasks will promote learning and mastery. Nevertheless, this goal was not cited frequently in the interviews.

Performance goals were the third most discussed consideration for learning mathematics. In this reason category, students discussed the importance of performance. They were conversant about the significance of mathematics performance and could explain clearly why they wanted good grades. Their justifications include meeting job expectations (N=8), self-assurance (N=7), and competition (N=1). Surprisingly, competition was the least discussed consideration for learning mathematics. This may be related to the fact that these students were already achieving and most of them were top students in their class. Instead of focusing on competition for performance, they were more concerned about their own well-being and how good grades can help them get a job. Below are sample excerpts that show these reasons:

"*If you want to get a job, most jobs look at your mathematics grades and how you do in NAPLAN*" (Meeting job expectations).

"*Because I'm good at it and I understand stuff*" (Self-assurance)

"*In Grade 5 what kept me going was that – because I'm sort of really competitive and I was in the smartest group there*" (Competition).

Parental support refers mostly to encouragement (N=6) provided to students to support their mathematics learning. While most students talked about parent support in the category, one student mentioned parental encouragement in relation to building his future career as a pilot. He commented that "*Well, my parents encourage me to do maths because they've been asking me what job, what occupation I want to do. I do. I want to be a pilot and that involves maths*" (Encouragement).

Meeting parental expectations was another important social reason for learning mathematics. (N=5). "*They (parents) expect me to do it*" (Expectation) is a typical response indicative of this social reason. Finally, one student specifically talked about how his father modelled (N=1) the learning of mathematics by sharing with him stories of successful learning. The excerpt below shows this form of support from the parent.

"*Because like I find out my dad does it, and I like spending time with my dad, and my dad used to tell me stories about it when he used to do algebra. So, when I use it I like it*" (Modelling).

Importance was another widely-cited category of reasons for learning mathematics (N=8). This category of reasons should not be confused with instrumental reasons which focus on utility value of mathematics. This focal point of concern is why mathematics is important but not whether mathematics can be useful for a particular purpose. For example, one student commented "*Because I think maths is important and the more I learn the better it will be when I'm older*". In this response, the student highlighted the importance of mathematics as a subject matter.

The remaining five categories of reasons, including "compliance", "no goal", "teacher", "sibling" and "task", were mentioned once or twice by different students. For example, one student commented on having interesting tasks as the reason why he wanted to learn mathematics. There were two counts of descriptions about support received from teachers and siblings, respectively. Also, two counts were recorded regarding compliance and a lack of clear goals for learning mathematics.

Taken together, the interview results indicated that these capable students were mostly motivated to engage in mathematics learning by utility values. Mastery and performance considerations were important drivers for learning mathematics. Parental support was an important social reason for learning mathematics. Additionally, there was some recognition of the importance of mathematics as a subject matter for learning.

## 6. Discussion

What motivates capable students from economically disadvantaged families to learn mathematics? A notable finding was that these students held different reasons or goals for learning mathematics. Only two students indicated that they did not have any reasons or goals for learning mathematics. According to the achievement goal theory, endorsing a variety of goals for learning is beneficial because different goals provide different forms of motivation to support learning [5], [9] and [10]. In the current sample, these capable students were motivated mostly by reasons centring on instrumentality, mastery, performance, importance, and parental support. These diverse reasons should be able to provide these students with sufficient motivation to sustain their learning of mathematics. In particular, they seemed to have understood clearly utility values and the importance of mathematics for academic, work and other life considerations. They also held learning-focused considerations, such as wanting to improve, as reasons that drive them to

master mathematics learning and understanding [8]. In relation to performance considerations, the interview responses indicate that these students were less concerned about relative performance or competition, placing more emphasis on using mathematics performance to assure one's achievement identity and meeting certain performance criteria such as meeting job expectations [6]. In relation to motivation derived from social dimensions, these students focused on parental support and encouragement. It was surprising that little was said about the teacher and how the mathematics teacher could motivate them to learn mathematics.

In light of aspiration for taking on challenging mathematics in senior secondary levels, the current study provided qualitative evidence that these students were motivated to learn mathematics. More importantly, their learning motivations were derived from a variety of sources and should be able to sustain their future engagement in mathematics. In other words, if, eventually, some of them do not take advanced mathematics in senior secondary levels, there is no way that we can say they were not motivated to learn mathematics.

An important question then relates to how teachers can capitalise on students' goals or reasons to learn to sustain their learning motivation to the point that they can actualise their mathematics potential and select advanced mathematics in their senior secondary levels. Significantly, these students talked more about the utility values of learning mathematics. It is important for teachers to explain why mathematics learning is useful and demonstrate how the learning is relevant for students' futures including future studies, education and career development. It should also be noted that these reasons, in relation to causes for engagement, are often forward-looking and related to the future in various ways. This is interesting because when many advocate learning for interest and enjoyment in the domain of mathematics, students seem to focus more on values, importance and future orientations.

Parental support is an important source of motivation. This is a new area of development as few pedagogical arrangements in mathematics learning and teaching have taken into account parental support. Given the importance of this social dimension, teachers need to develop innovative ways to incorporate parental support into the learning process in order to tap into this socially-derived motivational support.

The influence of teachers seems to be unimportant as it was mentioned only on two occasions. Two interpretations are viable. First, these students might not consider the teacher an important reason for learning mathematics. This suggests that they have not experienced any teacher who has made any positive impact on their learning. An alternative interpretation argues that the teacher is still important and their influences are implicated in those responses where students referred to the way in which they intended to learn more, found mathematics fun and wanted to get good grades. In this sense, teachers' influences are channeled through curriculum planning, task design and assessment. Both interpretations are tentative and more research is needed to examine the extent to which the teacher can play a role to support these capable students to learn mathematics and sustain their motivation to take advanced mathematics in senior secondary levels.

## 7. Conclusion

Sustaining capable students' motivation to learn mathematics is significant for correcting the under-representation of disadvantaged students in learning advanced mathematics. The current study showed that these capable students were motivated to learn mathematics and their reasons for learning were multiple and diverse. It is important for mathematics teachers to build on these diverse motivational sources and develop pedagogical practices to sustain these students' motivation to learn mathematics. Failing to do so will lead to Mathematics education that is ineffectual in supporting capable and motivated students to take on advanced mathematics in senior years.

## 8. References

[1] K.E. Barron, and J. M. Harackiewicz, "Achievement Goals and Optimal Motivation: Testing Multiple Goal Models, *Journal of Educational Psychology, 80*(5), 2001 pp.706-722.

[2] S. Carr, "An Examination of Multiple Goals in Children's Physical Education: Motivational Effects of Goal Profiles and Role of Perceived Climate in Multiple Goal Development", *Journal of Sports Science, 24*(3) 2006, pp.281-297.

[3] C.S. Dweck, "Motivational Processes Affecting Learning", *American Psychologist, 41*(10), 1986, pp.1040-1048.

[4] A.J. Elliot, "Approach and Avoidance Motivation and Achievement Goals", *Educational Psychologist, 34*, 1999, pp.169-189.

[5] A. Elliot, and J.M. Harackiewicz, "Approach and Avoidance Achievement Goals and Intrinsic Motivation: A Mediational Analysis", *Journal of Personality and Social Psychology, 70*, 1996, pp. 968-980.

[6] J.M. Harackiewicz, K.E. Barron, P.R. Pintrich, A.J. Elliot, and T.M. Thrash, "Revision of Achievement Goal Theory: Necessary and Illuminating", *Journal of Educational Psychology, 94*(3), 2002, pp. 638-645.

[7] J. A. Middleton, and P.A. Spanias, "Motivation for Achievement in Mathematics: Findings, Generalizations, and Criticisms of the Research", *Journal for research in Mathematics Education*, 1999, pp.65-88.

[8] C. Midgley, A. Kaplan, and M. Middleton, "Performance-approach Goals: What, for Whom, under What Circumstances, and at What Cost?", *Journal of Educational Psychology, 93*(1), 2001, pp.77-86.

[9] C. Ng, "Multiple-goal Learners and Their Differential Patterns of Learning", *Educational Psychology, 28*(4), 2008, pp.439-456.

[10] P. R. Pintrich, "Multiple Goals, Multiple Pathways: The Role of Goal Orientation in Learning and Achievement", *Journal of Educational Psychology, 92*(3), 2000, pp. 544-555.

[11] P.R. Pintrich, A.M. Conley, and T. M. Kempler, "Current Issues in Achievement Goal Theory and Research", *International Journal of Educational Research, 39*, 2003, pp. 319-337.

[12] C. Senko, C.S. Hulleman, and J. Harackiewicz, "Achievement Goal Theory at the Crossroads: Old Controversies, Current Challenges, and New Directions", *Educational Psychologist, 46*(1), 2011, pp.26-47.

[13] J.M. Suárez Riveiro, R.G. Cabanach, and A. Valle, "Multiple-goal Pursuit and its Relation to Cognitive, Self-Regulatory, and Motivational Strategies", *British Journal of Educational Psychology, 71*, 2001, pp. 561-572.

[14] T.C. Urdan, and M. L. Maehr, "Beyond a Two-goal Theory of Motivation and Achievement: A Case for Social Goals", *Review of Educational Research, 65*(3), 1995, pp. 213-243.

[15] A. Valle, R. G. Cabanach, J. C. Núñez, J. González-Pienda, S. Rodríguez, and I. Piñeiro, I, "Multiple Goals, Motivation and Academic Learning", *British Journal of Educational Psychology, 73*, 2003, pp. 71-87.

[16] K. R. Wentzel, "Adolescent Classroom Goals, Standards for Performance, and Academic Achievement: An Interactionist Perspective", *Journal of Educational Psychology, 81*(2), 1989, pp. 131-142.

[17] C. A. Wolters, "Advancing Achievement Goal Theory: Using Goal Structures and Goal Orientations to Predict Students' Motivation, Cognition, and Achievement", *Journal of Educational Psychology, 96*(2), 2004, pp.236-250.

## Session 9: Learning / Teaching Methodologies and Assessment

Title: The Educational Value of a Multimodal Classical Concert from a Learners' Perspective
(Author: Daniela Heunis)

Title: Students' Perception of Effective Anatomy Teaching methods in University Settings
(Authors: Eiman Abdel Meguid, William Allen, Ashraf Aly)

Title: 'Shadow Module Leaders' - Student experiences as Peer-Teachers and facilitators of Peer-Assisted Learning
(Authors: Stephen M. Rutherford, Galina Limorenko, Sheila L. Amici-Dargan)

Title: The Relationship Between Studying In Different Fields Of Fine Arts, Environmental Factors And Creative Thinking Skills
(Authors: Sibel Çoban, Birce Doğramacıoğlu, A. Esra Aslan)

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# The Educational Value of a Multimodal Classical Concert from a Learners' Perspective

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## Abstract

*This research paper will report on the findings of a multi-media listening experience. During 2015 an orchestral concert performing Saint-Saëns's Carnival of the Animals was produced in Grahamstown. A narrator first introduced each animal by reciting a poem while simultaneously presenting a picture identifying the animal on a big screen. Primary school learners from several local schools were asked to complete a questionnaire while listening to the piece. The questionnaire not only wanted to gain insight into which animals the learners could identify best, through linking the sound and movement to the music in a table, but asked the following four questions: Which animals did the music describe well? Why? Did the story/poems help you to listen more carefully to the music? How? Did the animal pictures help you to listen more carefully to the music? Why? Have you had fun listening to the Carnival of the Animals? Why?*

## 1. Introduction

According to Kress and Van Leeuwen [3] meaning 'results from human engagement with the world, and the resources we use in articulating and interpreting meaning comprise both semiotic modes and semiotic media. It is the effect of a particular kind of semiotic / cognitive / affective work: the integration by an individual of a semiotic element (or complex semiotic elements) into their already existing – and constantly transformed – systems of classification.'

Jewitt [2] writes: 'The need to rethink what it means to learn and to be literate is a thread that runs through much multimodal research'…'How representation impact on thinking and learning, as well as what literacy is and could be in a multimodal and multilingual communicational landscape.'

Kress and Van Leeuwen (in Jewitt [2]) define multimodality as, 'The use of several semiotic modes in the design of a semiotic product or event.' The semiotic resources selected for the respective modes have each the potential to create communication and meaning for the participants and would therefore result in them choosing whichever mode would suit their personal learning style or level of learning. The participant would therefore 'choose a semiotic resource (signifier) with the meaning (the signified) that they want to express' … 'this choice is always socially located and regulated, both with respect to what resources are made available to whom, and the discourses that regulate and shape how modes are used [2].' Each mode places particular demands on individual learners thus making it essential to include a variety of modes in learning.

Elliott [1] writes: 'A multimodal perspective … is inclusive of modes and systems of making meaning that move beyond writing and speech to include such as music/sound, action and visual communication in various multimodal combinations.' … 'The components of multimodality need to be understood and constantly analyzed to ensure that communicational and representational needs are being met, and the means of making meaning are advanced in a way that improves learning, understanding and the construction of knowledge.'

During the planning of a multimodal event the 'material [are] arranged in relation to the assumed characteristics of the imagined audience' (Kress in Elliott [1]). The ideal would be for the communication to be as effective as possible and for the planned event to include both useful and interesting information for the audience, taking into account their interests and levels of knowledge.

The multimodal event studied in this research paper was built around the orchestral piece the Carnival of the Animals by the French composer of the Romantic Period, Camille Saint-Saëns (1835-1921) [6]. With 'pianists' and 'fossils' appearing as two of the animals, the piece was clearly intended as a musical joke. According to Newson [4] it was written 'as a surprise piece for one of the Mardi Gras concerts in Paris in February 1886.' The work [6] consists of the following fourteen individual pieces, thirteen of which describe various animals while the last, the Finale, shortly quotes several of the individual animal themes:

- Introduction and Royal march of the Lions
- Cocks & Hens
- Wild Horses
- Tortoise
- The Elephant
- The Kangaroo
- The Aquarium

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• Persons with long ears
• The Cuckoo in the depths of the woods
• The Aviary
• Pianists
• Fossils
• The Swan
• Finale

Saint-Saëns creatively used both the sound (typically represented by pitch), and the movement (represented by tempo and duration) of the different animals. The roar of the lion (Introduction and Royal march of the Lions) is represented by an ascending and descending chromatic scale passage on the piano, the hee- haw of the donkey (Persons with long ears) by a big descending jump from a high pitch on the violin and the typical 'soh-me' call of the cuckoo (The Cuckoo in the depths of the woods) is played 21 times by the clarinet. The pieces depicting the movement of the tortoise, elephant and swan are slow and contrasted well with the fast tempos used for the wild horses and the birds in the aviary. This piece is well-suited for a multimodal learning experience, which not only appeals to a wide range of tastes, backgrounds and ages, but could be used across various learning areas.

During 2015 a concert featuring the Carnival of the Animals was produced in Grahamstown, South Africa as an outreach project for local schools. A narrator introduced each animal with a poem (a practice which has become quite common since the American, Ogden Nash [5], wrote his set of humorous poems in 1949) while displaying the picture of each of the animals as a backdrop on a big screen behind the orchestra. The Rhodes Orchestra then performed the individual pieces of the different animals.

The audience comprised of learners from different grades and schools. Permission was obtained from four schools to distribute a questionnaire for completion during the concert. Questionnaires and pencils were distributed before the start of the concert and collected afterwards. This paper will present the findings compiled from the 200 received questionnaires. The participants included 49 grade fours from three different schools, 41 grade fives from two schools, 76 grade sixes from three schools, 19 grade sevens and 15 grade nines, the latter two grades representing one school each.

The questionnaire not only wanted to gain insight into which animals the audience could identify best, which they had to complete in a table format linking the sound and movement to the different animals, but specifically wanted to explore the thoughts of the learners on their multimodal listening experience. Trying to ascertain how much learning happens at a multimodal concert, the following four open- ended questions were asked:

Which animals did the music describe well?
Why?

Did the story/poems help you to listen more carefully to the music? How?

Did the animal pictures help you to listen more carefully to the music? How?

Have you had fun listening to the Carnival of the Animals? Why?

This research project will report on the use of the three modes: music, speech and image within a live performance combining music with a narrator reading poems and visual images as backdrops. Diverse attributes characterize these three modes. Elliott [1] writes: 'speech shares the aspects of grammar, lexis and syntax' with that of the written text, but also features 'resources such as intensity, intonation, tonal quality, length and silence.' The latter four resources, namely intensity, intonation, tonal quality, length and silence, easily align with four of the seven musical resources or elements.

Intensity can be linked to the musical element of dynamics, intonation to one of the aspects resorting under pitch (that would be changed to inflection in this paper as intonation has the meaning of 'playing in or out of tune' in music), tone quality as timbre and length and silences - two of the aspects groups under the wider element of duration or length of sound. Two additional resources namely the elements of tempo and texture would be added to both of the above modes. Image as modal resource 'include spatial relation, shape, colour, and potentially temporal succession and movement.' … 'The variation in modal resources means that modes have different potentials and constraints, or affordances when it comes to meaning making [1].'

The relationship between the three selected modes in this concert event could be described as intersemiotic [2] as the combination to represent meaning would potentially not be evenly distributed. Attending a live music concert would not only result in music perceived as being the main purpose but therefore also naturally become the primary mode to construct meaning for the majority of learners.

This paper will examine whether this assumption was in fact true. Secondly it will examine if any of the above resources selected for the three modes were identified by the learners in their listening experience. Thirdly any additional categories that were listed as resources by the learners that have created meaning for them during the performance will be acknowledged. Results will be analyzed according to the different grades to aid interesting trends or comparisons that might come to light.

## 2. Results

The results discuss the insights gained on each of the four research questions during the analyses of the 200 received questionnaires. All the responses were grouped into categories and specific ones selected to

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represent the participants' views as motivation for their different learning experiences.

## 2.1. Which animals did the music describe well? Why?

The first mode that will be discussed is that of music with the following six elements of music as the resources: dynamics, tempo, pitch, timbre, texture and duration. Apart from the grade nines who indicated the swan as being the best portrayed animal, the elephant was indicated as the easiest to identify by all the other grades in the first question. The aviary was the second choice for the grade fours, the cuckoo for the grade fives, the lions for the grade sixes, while there was no clear second choice for the grade sevens. Thirty-two motivations from the 49 grade fours identified specific sounds and movements.

Although none of the grade fours identified timbres as specific instruments, individual sounds identifying timbre as a general resource were: the participants listening 'could hear' 'the lion roaring', 'hens pecking', 'the sound of the trunk', 'the swimming of the fish'; 'them tweeting', 'them sing', 'heard the cuckoo sound' (timbre and pitch) , while tempo was indicated as 'slow' for both the movements of the tortoise and the elephant. One learner used the dynamics resource and qualified the lion's roar as 'loud'. The movement of the swan described as being 'smooth' and 'gracefully' clearly aligns with the mode of image while the creative description of the aquarium as 'snooshy' and the humorous sound of the donkey as 'nice and funny' with the speech mode.

Similar to the grade fours, the 41 grade fives also recognized the 'roar', 'a trunk noise', 'the bird', 'the swimming sound' of the aquarium and the 'slow' movement of the tortoise. One learner found the cocks and hens 'fun to listen to'. The more advanced level of understanding of the meaning of the different music resources were presented in the comments on pitch and timbre. The pitch of the tortoise is described as 'deep', the cuckoo's sound as: 'it went cuckoo', 'it made the proper noise of a cuckoo', and especially 'because of the notes they were playing'. One learner, describing the movement of the tortoise, combined the elements tempo with pitch as 'slow and deep' while another describing the kangaroo combined the three elements of pitch, duration (the length of the sound) and timbre in the comment: 'the piano were [sic] in short bursts like jumps'.

The following novel comments were made by the 76 grade sixes: The lion: 'it felt like the lion was actually walking' (tempo), the lion 'made a lot of noise' (dynamics); The elephant: it 'sounded how they move', it's 'a heavy sound' (dynamics), 'elephants are heavy. The music was deep, heavy, low' (pitch and dynamics); The kangaroo: 'you can hear the animal jumping', 'kangaroos jump and the music was making bouncing sounds' (tempo and pitch); The aquarium: 'you heard swimming and bubbles' (tempo and ascending pitch); The cuckoo:

This learner 'could imagine a cuckoo with that music in the background' (pitch and texture). The following four instrumental timbres were identified and then associated with an animal: the flute (aviary), double bass and piano (elephant), piano (kangaroo), clarinet (cuckoo). As it was a live concert, learners could both see and hear and then associate the instruments playing with the animal.

Two comments about the aquarium describe not only the tempo but also align with the image mode: 'sound like swimming because of the way it was almost swimming through a stream' and it 'showed the wave movement' while one learner describes the elephant's 'big footsteps'.

The grade 7 comments depicted the lion as: 'it was like he was stalking his prey' (dynamics and tempo); the elephant as: 'powerful, loud' (dynamics), a 'deep, strong sound' (pitch and dynamics) that 'had a rumbling sound' (dynamics); the kangaroo as: 'jumpy' (pitch) and 'the music was quite paced' (tempo); 'the swift, quick sounds' of the aquarium (tempo) and the 'peaceful music' of the swan (tempo and dynamics). Only the double bass and the piano were identified by this group with one respondent believing that the 'double bass represented it [the elephant] right', and 'it sound [sic] like an elephant'; while 'piano playing quickly represented it [the aquarium] well' (timbre and tempo). Other comments describing timbre were: 'it described the exact sound' (the aviary); and the fossils sounded like 'playing on the bones' (describing the timbre of the xylophone played by wooden beaters)

Apart from the timbre describing the fossils as a 'clicking sound', all the comments from the grade nines were of a general nature such as 'the sounds produced characterize the animals well', 'all the instruments used to create their sound were done very well' with one participant remarking that he/she 'could hear them clearly'.

A gradual progression in the insight of the meaning of the music resources was reflected from grade 4 to 7. The grade 9 answers though indicated a lack of interest. Only learners from grades 7 and 9 commented on the fossils and the pianist.

## 2.2. Did the story/poems help you to listen more carefully to the music? How?

The majority of the group, 65% believed that the poems helped them listen more carefully to the music, 20% believed that the poems did not help them, 2% was not sure while 13% did not answer the question.

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The grade fours (81%) especially regarded the poems as a great help while only 59% of the grade fives thought so. The poems explicitly communicated meaning to the audience before the listening experience in providing useful information identifying and explaining some of the characteristics of the individual animals. It specifically acted as a kind of concert programme which revealed the sequence (aligning with the temporal succession resource of the image mode) in which the animals would appear to the listener and as one learner observed: 'it made me know which animal was next'.

The majority of the comments recognized the lexis resource of the speech mode: One specifically realized the humor 'it made you laugh' while another became more interested in 'it got you interested'. Several comments acknowledged the introduction of the animals to them with a number of participants admitting that some of the animals were unfamiliar to them: 'the man told us about the animal', 'it helped [to] know what the animal is', 'by making me understand what it was about', respondents knew 'what the story was about', 'what was happening', 'wouldn't had [sic] known what they were' and 'they helped because sometimes you can't work out some of the animals'. The poems also helped 'explaining [the] animals' as 'he described some of them', 'by how the animals act' and 'it helped me because it told me about its personality', 'it just made me understand the animal more', 'to know what it was doing'.

Several comments aligned the speech mode with the music mode: in general 'they told you the background of the music', what we were 'going to listen to'; and more specific comments mentioned that the poems directed their listening experience: 'Helped you hear which animal was on', 'it make you look for the action of sound', 'so you would know what sound you are listening for', 'know how to listen more to the music', 'yes because the poem will be the music', while one learner identified the music resource of timbre in 'to try and identify the instrument'. One learner believed that it made him more curious: 'they made me wonder if the music described that animal'.

One comment each referred to the music mode's resource of tempo in 'how slow it walks' and the image mode's movement resource: 'bird – aviary because there's a lot of movement'.

The grade 6 classes recognized the lexis resource in: introducing the animals 'then [the respondent] know what animal it was', 'telling what animal they were depicting', 'it said the animal if the music was not clear enough', 'we then knew the sound it might make', 'it described the character', 'by telling what's happening'; and explaining the animals: 'they described it properly' and 'use imagination to describe the animal'. Two described their listening experience with 'it was easier', 'knew what the animal was so … would try to find out what the animal was'. One listening comment align with the image mode: 'they helped me to picture the animals' and four with the music mode: the respondents 'knew what to listen for', 'wanted to hear what animal it would be', 'tried to see if you could hear it', 'we had to listen to see what animal it was'. It was therefore perceived as an active listening experience that activated their interest as indicated by several respondents in: 'was more interested', 'it interested me', 'got you interested', 'it got me focused', 'to understand the music'. Some learners realized that it also stimulated their curiosity, imagination and higher levels of thinking in the comments: it 'makes you guess', 'to use my imagination to the max'. Two comments in this category namely 'wanted to see the relation between the two', 'describing it helped me identify. You wanted to see similarities' strongly aligned the speech and music modes. One learner described the poems as 'it was an inspiration'.

Two grade 7 learners described the introduction of the animals, aligning the speech mode with the music mode in: 'he told me what the animals were and helped me understand the music more', 'it gave me how the animal felt which relates to how the music describes the animal'. The poems explaining the animals were appreciated in the comments: 'they gave me a really nice idea as to what was happening', 'it helped me understand more', 'it helped me to get the feeling of the animal' and 'they added life to the music, gave me a more broad understanding as well as were well worded' (align the speech and music modes). A further three comments align the speech and music modes, with the first two commenting on the narrator's positive influence on the listening experience: 'He made it sound interesting so [this respondent] tried to listen to the sounds', 'he made me want to listen' and the third describing his interest in the calming effect of the music in 'find it very interesting listening to the soothing music'.

Several grade sevens specifically mentioned the humor in the poems: 'they were quite humorous', 'it was really funny', while one learner 'found them to be amusing' and another believed 'it described the animal better and gave understanding except for the exceptional joke'.

Grade 9 learners positively commented on the explanation of the animals: 'he recited them well to help explain what will be happening in the piece', it helped 'to hear the background of the animals as well as a definition of what they are', 'helps you imagine the animal better' as well as the use of humor: 'the humor put [me] in a better mood', 'it gave an aid in understanding the music as well as a pause to let the music sink in and it was humorous' (this aligns the

duration resource (pause) of both the speech and music modes)

Other individual comments across all the grades were directed towards the narrator and the poems. Positive comments regarding the narrator were: 'the man described nicely', the man told the poems well', 'the guy was a good speaker', 'he made it sound interesting so [the respondent] tried to listen to the sounds', 'he made me want to listen' while one learner did not agree with them and believed that 'he read the poems instead of performing them'. One learner mentioned the inflection of the narrator: 'he used different tones'. Three learners commented specifically on the poems: the first 'already knew what each animal was, so … wasn't really interested in the poems. But they were cool.' The second learner specifically showed appreciation for the syntax resource of the written mode in 'They were very interesting and well written' while the third comment - 'really enjoyed the graceful sounds of the animals' movement and the interesting narrations' could refer to both the poems and the reading thereof. One learner believed that 'it was nothing but a magic story' while another grade 9 learner found the poems redundant and 'would prefer just to say that the lion was going next instead of a story'.

## 2.3. Did the animal pictures help you to listen more carefully to the music? How?

The majority of the group namely 60% believed that the pictures helped them listen more carefully to the music, 26% believed that the pictures did not help them, 1% was unsure while 26% did not answer the question.

Comments by the grade 4 learners were as follows: indicating the image mode only: 'could see how it looked', 'It showed me which animal was being described', 'they made me know what animal it was', 'you could imagine the animal', 'could picture them', 'wouldent [sic] had [sic] know what they were', 'yes they did because sometime you don't know what the animals are!' 'because when you close your eyes you can think about the animals more'; identifying the movement resource of the image mode: 'you could see the animals and think of the movement', 'you could see them moving', 'saw what it was doing'; aligning the image mode with the music mode: 'yes it helped to look at the pictures and listen', 'you knew which animals [sic] voice to listen to', 'it helped me to listen more'.

Comments for the image mode from the grade fives were: 'it described the animal', 'it was showing what the animal was', 'it helped to know what the animal is' and 'saw what it was'; specifying the movement resource: 'it helped to see how it would move/jump/swim/fly', 'it showed me a picture that [this respondent] could imagine in [his/her] head so … could kind of see the movement'; identifying the image resource of movement and aligning it with the music mode: 'because you could hear what the animal was doing'; and aligning the speech mode with the music mode: 'by seeing them [this respondent] tried to get something from the sound that matches the animal'.

The grade 6 comments of the image mode only, described the active seeing, the imagination and the knowledge derived from the image. They 'could see what it was', 'could picture it', 'you saw the looks and appearance', 'it goes with the pictures', 'the pictures helped me to imagine', 'it helped my imagination [to] see the animal'; 'it helped me to know what animal it was', as this respondent 'didn't know some of them', 'if you don't know it you can't see it' and 'you can get more confused to what animal it is'. The two respondents that identified the movement resource 'could tell what it was doing' and 'could relate the music to the movement of the animal', the latter one as well as the following three also aligned the image with the music mode: 'You tried to associate the music with the animal', 'It helped me understand the noise of the animal', 'then [this respondent] know what sound to listen for'.

Only one grade 7 comment described the image mode as 'could visualize it' while another grade seven comment is the only from all the grades that identified the resource of colour in 'it helps paint the story', here also aligning with the speech mode. The majority of the comments aligned with the music mode: 'when you see the picture it helps you look for the sound' 'tried to hear the animal', and thus 'gave us an idea of what the sound was' and 'which animal [this learner was] listening to', 'it really helped me because if you didn't show the pictures you would never heard what animal it was'. The pictures 'made me want to listen'.

Grade 9 comments identified the image mode only in: 'we needed to see the animals' as it 'helps me visualize the animals', 'gives me an image', and 'made it clearer to remember what the animals were like'; and aligned the image mode with the music mode with: 'reminded [the respondent] of what animal [he/she] was listening to', 'helps me to remember what sounds the animal makes', 'imagining the animals using the pictures to match with their 'sounds' helped'.

The lack of the movement resource of the image mode was perceived as negatively by one learner: 'the video pictures weren't moving so … couldn't picture the image in my mind'.

Not fully understanding the speech mode's lexis resource was problematic for some learners that reported that the meaning of the poems got lost in comments such as 'did not understand some of the poems', 'didn't understand his comments'. One learner believed that the narrator 'read the poems instead of performing them' and thus felt that some of the speech mode resources (intensity, inflection,

tonal quality, length and silence) could have been better utilized.

The speech mode contradicted the image mode in comments such as: 'to most they would but the animals were already stated before each section', 'it didn't do anything really cause the narrator told us before', he/she 'heard the narrator', 'the story/poem person said the name of each animal in the beginning', 'it was only linked to the poem', 'the poet said it all' and 'they already had a poem'.

The image mode contradicted the music mode as it took away some learners' curiosity: 'It just showed you the answers', 'they just showed pictures of the animals', 'it gave away the animals', 'knew what the animal was [therefore] didn't have to listen as much';. One learner believed 'they made no difference' while another believed 'it was nice to see the pictures but it did not really help me listen'.

The music mode contradicted the image mode in 'couldn't understand the music', 'it was the sound' and the speech mode as three learners reported that the meaning got lost as they 'could not hear the animal what they were'.

Both the speech and the image mode contradicted the music mode as some learners perceived them to have been a distraction: 'it was distracting', 'got distracted', 'it was a little distracting', 'sometimes it distracted me' thus neither modes enhanced or suited their learning styles.

One of the grade 9 learners commented: 'it is a better idea for a younger audience rather than adults, teenagers, etc. a bit cliché at times'.

## 2.4. Have you had fun listening to the Carnival of the Animals? Why?

The majority of the participants that is 77% indicated that they enjoyed the concert, 8% indicated that they did not while 15% did not complete the question.

Humor, the love for music and animals, interest in the musical instruments, the learning experience and general comments on the concert were all listed as reasons that made this a fun learning experience for the learners.

Humor in the music performance, the narration and the poems align the music and speech modes and was recognized in: 'it was funny and fun', 'some of the sounds were funny', 'because the music was fantastic and the speaker guy made me laugh', 'the guy that made the poems made it fun', 'It was nice and because the poem was funny'.

Combining the music and animals sounds conveyed the following positive responses on the different modes: music mode the respondent liked 'how they made it sound like the animals', 'the similarity of animal noises and music', 'it was nice to hear the music in animal form', while the comment 'instead of watching the animal you can listen to it' combined the image and the music modes and 'how they found ways to portray animals' all three modes.

A general appreciation for the novel and different musical experience and their love for music showed in the following comments: 'love music', 'love classical music', 'love all instruments', 'loved it. … really like music. … play the piano and violin'; 'because there is music' 'it was a really nice musical experience', 'fantastic music experience! Fun for all' (+ smiley face), 'it's a beautiful piece of music', 'it was an interesting mix of music', 'really loved the Finale', 'because it's my first listening to Carnival of the Animals'; 'because of all the different sounds that people make', 'exposed music to me', 'it made me see music in a different way', one respondent 'liked it because it sounded nice and it was new', another has 'never heard it before', and 'it was very different to the music [this respondent] listen [sic]'.

Reactions incorporating the music resource of timbre featured in: 'it was nice to see people playing and nice to listen', 'because [this respondent] like seeing and hearing all the different instruments', 'it was interesting to listen to all the different instruments play together', 'it made me see what instruments [the respondent] like', 'it was interesting and made me interested in playing the violin'.

Comments showing their general appreciation were: 'love it', 'it's so enjoyable', 'it was fun', 'it was exciting', 'it was amazing', 'it was entertaining', 'my first time', 'it was something that did not happen often', 'it was calming', 'it was brilliant', 'it was well put together', 'it sounded really well prepared'; and specifically highlighting the learning experience: 'because we learnt more', 'because we learnt', 'it was interesting', 'it was very simple and understanding' [good appropriate level], 'interesting and didn't bore you because it was simple', 'had fun because it was a huge big puzzle that you have [sic] to solve'. One learner commented: 'it was fun. … would enjoyed [sic] a little bit more songs about all the animals'.

Different levels of boredom, the length of the concert and the kind of music and instruments were some of the reasons learners did not enjoy the concert. The comments ranged from 'some was fun and some was boring', 'it was boring', 'got bored', 'found it quite boring', 'it was long and tiring', 'it was too long and [this respondent] don't have a taste for that kind of music: but like[d] the narrator', 'do not like orchestra', 'was very tired and … don't like string instruments'. One learner commented that 'we can listen to it at school' while another believed that 'It would be more fun if they only told us at the beginning'.

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## 3. Conclusion

In this research project as was expected, of the three modes, music was the most frequently identified. The music resources repeatedly mentioned were: pitch, tempo, timbre and dynamics while texture and duration only appeared in one comment each although both in combination with other music resources: 'could imagine a cuckoo with that music in the background' (pitch and texture), 'the piano were [sic] in short bursts like jumps' (timbre, duration and pitch). A gradual progression in the learners' insight of the meaning of the music resources was reflected from grade 4 to 7. The grade 9 answers indicated a lack of interest. Only grade 7 and 9 learners commented on the fossils and the pianist showing that a higher level of thinking would be required to perceive them as animals.

Using the speech mode, the poems explicitly communicated meaning to the audience prior to the listening experience. The majority of the comments implemented the lexis resource of the speech mode and could be categorized under humor, useful information identifying and explaining the characteristics of the individual animals, the listening experience and the narrator's influence on the experience. The responses of the learners frequently reflected that the poems of the speech mode complemented the music mode: 'Yes because the poem will be the music', 'it gave me how the animal felt which relates to how the music describes the animal', 'it gave an aid in understanding the music as well as a pause to let the music sink in and it was humorous'.

The image resource of movement most frequently appeared in the comments. The resource of colour was only apparent in the following comment: 'it helps paint the story' which also aligned with the speech mode. Several comments aligned the image and music modes: 'imagining the animals using the pictures to match with their 'sounds' helped'. It was interesting to note that the majority of the grade 6 learners motivated their answer using the image mode only while the grade 7 learners mostly aligned their comments with the music mode.

The positive results of the three questions in which percentages could be calculated ranged between 60 to 77%. From these results and the comments received it is clear that the learners perceived the concert as a positive experience with many not only indicated that learning happened but that it happened at different levels. Even a fairly negative comment such as 'it didn't make me listen more but it gave me a greater understanding' corroborated it. The comments were overwhelming positive and the compliments such that any educator will treasure. The following two comparing the multimodal experience with a 'puzzle' and a 'game' will suffice: [this respondent] 'had fun because it was a huge big puzzle that you have [sic] to solve' and 'they turned the songs [sic] into more than an orchestral piece, they turned it into a game'.

## 4. References

[1] Elliott, K. Using Fine Arts integration and picture books to enrich middle years' students' literacy learning experiences. MMus Thesis, University of Victoria, Canada, 2011.

[2] Jewitt, C. The Routledge Handbook of Multimodal Analysis. Routledge: Taylor & Francis Group, London and New York, 2009.

[3] Kress, G, and T. Van Leeuwen. Multimodal Discourse: The modes and media of contemporary communication. Arnold, London, 2001.

[4] Newson, Keith R. Listening to music: with material for classroom lessons. Frederick Warne, London, 1967.

[5] Prokofiev, S. and C. Saint-Saëns. Peter and the Wolf, Op. 67 and The Carnival of the Animals (New verses by Ogden Nash). [LP] CBS, ALD 6636, 1949.

[6] Saint-Saens, C. The Carnival of the Animals. 1886. [Internet musical score]. https://musopen.org/sheetmusic /1454/camille-saint-saens/the-carnival-of-the-animals/. (Access Date: 4 January, 2016).

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# Students' Perception of Effective Anatomy Teaching Methods in University Settings

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## Abstract

*The purpose of the study is to examine the perception of n=59 1st year and n=54 2nd year dental students towards different teaching methods of Anatomy. This study is in the context of exploring effective teaching system from a student's perspective. Different pedagogical approaches will be investigated and their effect on improving classroom / laboratory teaching will be studied. The paper will conclude with a set of recommendations for the development of more effective teaching methods of Anatomy in the future.*

## 1. Introduction

Different fields of education, exploring the best ways to guide students to maximize their learning is always the focus of attention and debate in educational institutions [1].

Teaching Anatomy courses face a unique challenge in that they are always considered a foundational course for careers in almost all Medical / Dental and Health Sciences related fields especially with the increasing expectations and demands by students for high quality teaching in Universities. Considering the unfavourable conditions, such as increasing class size and decreasing classroom learning interest among students has made the teaching and learning process evermore challenging [2].

It became obvious to the researchers that understanding some of the perceptions and concerns of dental students about studying anatomy might help faculty and administrators modify or change existing programs in order to be of much higher educational value to their students.

## 2. Perspectives from the Literature

A study in the University of Iowa, 2009 found that Anatomy classes, from a student's perspective, were always being filled with an exceptionally massive amount of terminology and identification that need to be studied in a very conventional mode of instruction that relied on the student learning through memorizing a significantly large amount of information usually in a very short period [3].

However, with the recent evolution in learning modalities, some have looked towards modern student-centred methods of instruction that are grounded in learning approaches such as constructivism, in order to go beyond the memorization of factual information [3].

However, despite the mixed results that came out of different studies that considered different types of instruction and students' overall performance in studying Anatomy, no significant changes have been made regarding the teaching methods. There is however a general consensus on the need for students to be able to learn anatomy within a different dimension that is not limited only to studying factual information [3].

## 3. The Nature of Learning Anatomy

This paper builds further on ideas explored in a recent paper presented at a University of Limerick Symposium on the Nature of Science in Science Education [4]. Discipline specific themes will be further explored in the teaching of Anatomy. The nature of learning in the discipline area of Anatomy appears at first sight to be heavily time-dependent; in which the number of hours required for study of the subject material is anecdotally much greater in comparison to other subjects. Like most of the professional courses such as Medicine and Dentistry, the constraints and the time available for study in relation to the amount of the material studied is a major issue. This affects many areas of students' work, from time to prepare, to the time spent in laboratory activities and in tutorials and even further on to the revision time for sitting final exams [5].

While teaching is still dominated by teacher centred classrooms in which students passively receive information from the teacher and internalise it through memorization [5], other important concepts such as independent learning, flexibility in learning, critical thinking and problem solving are the least recognised [1].

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## 4. Educational Aspects of Anatomy

It became obvious to the researchers that to move Anatomy education forward beyond the concept of only acquiring factual information, instructional changes should take place, more specifically in the direction of student-centred instructional environments. The purpose of this is to ensure that the learning environment is more conducive for student learning and that their focus on understanding and uncovering the reasoning behind the factual information that is normally presented is beyond the simple facts that may be studied in textbooks [6].

This, in turn, may require the instructors of Anatomy to be aware of the ideas that students have regarding learning Anatomy prior to beginning instruction, as well as during the course, as this will help to achieve a distinctive, beneficial and effective teaching approach to the subject of Anatomy. Only a few studies have attempted to develop these ideas and often student views on the teaching they have received are only collected and described after the course has finished.

## 5. Rationale for the Study

The purpose of this study is to examine the attitude and perception of 1st and 2nd year dental students towards different teaching methods of anatomy. This study is in the context of exploring the effective teaching system from a student's perspective.

In order to achieve this the teachers, need to understand and improve their andragogic (teaching methodology for adult learners) methods to suit the needs of present day students. The adult learner is always a self-directed learner who understands his / her own responsibility. 'Motivation of these learners is a vital factor in institutions, where teachers have to adapt specific tools to change the students' perspective of looking at things' [7].

To ensure effective teaching of Anatomy, it will be necessary for the present-day teacher not only to be aware of the changes that are taking place in higher education such as shift from conventional role of teacher from one of 'sage on the stage' to one who more actively facilitates their students' learning. Further changes will also be required in 'teaching styles, in innovative curriculum models and in changes in assessment philosophy, methods and tools' [2].

The purpose of this study is to examine the attitude and perception of 1st and 2nd year dental students towards different teaching methods of Anatomy. This study is in the context of exploring the question as to what is an effective teaching system from the student's perspective.

## 6. Plan of Investigation

Following their engagement with a range of differing teaching methodologies (with permission and ethical approval from the School of Medicine, Dentistry and Biomedical Sciences), 1st and 2nd year dental students were invited to participate in the study by filling out a questionnaire.

## 7. Materials and Methods

First year dental Students (n=59) and Second year dental students (n=54) completed the questionnaire on their perception of different teaching methods of Anatomy.

The respondents were asked to give their opinion on 25 different questions regarding the strength of their agreement on a range of different teaching methods and approaches by using a 5-point Likert-type scale survey with opinions ranging from strongly agree to strongly disagree. Students were instructed to tick out the best possible option for every statement based on their own perception.

There were three parts to the questionnaire:

Part-A Demographic Data, including gender, attainment of previous degree, previous knowledge of anatomy and cultural background.

Part-B Focussed on how much they agreed / disagreed on how certain Anatomy teaching methods were effective in encouraging their self-directed learning, their understanding of clinical anatomy and their motivation to learn Anatomy.

Part-C Collected qualitative data about the students' perception of effective methods of teaching Anatomy and how beneficial they believed the learning of Anatomy would be for then in their future careers.

## 8. Data Analysis

The data was statistically analysed using statistical package for Social Sciences (SPSS software version 20, IBM Corp, Armonk, NY). Descriptive statistics including frequency mean, and standard deviation were calculated for each of the statements in the questionnaire. Table 1. Contains an illustration of one of the questionnaire result tables that was generated.

Results were statistically analysed to find out the students' acceptance and preference of the various teaching methodologies.

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Table 1. Questionnaire Result Table

| Opinion | | Studied students 1st year (n=59) No. | % | 2nd year (n=54) No. | % | Total (n=113) No. | % | Significance |
|---|---|---|---|---|---|---|---|---|
| **Teaching methods provide a good background for clinical disciplines** | | | | | | | | |
| **Dissection** | S. agree | 31 | 52.5 | 36 | 66.7 | 67 | 59.2 | |
| | Agree | 22 | 37.3 | 14 | 25.9 | 36 | 31.9 | $\chi^2$=3.047 |
| | Neutral | 5 | 8.5 | 4 | 7.4 | 9 | 8.0 | MCp=0.360 |
| | Disagree | 1 | 1.7 | 0 | 0.0 | 1 | 0.9 | |
| **Prosection** | S. agree | 30 | 50.8 | 33 | 61.1 | 63 | 55.7 | |
| | Agree | 24 | 40.7 | 17 | 31.4 | 41 | 36.3 | $\chi^2$=1.261 |
| | Neutral | 4 | 6.8 | 3 | 5.6 | 7 | 6.2 | MCp=0.779 |
| | Disagree | 1 | 1.7 | 1 | 1.9 | 2 | 1.8 | |
| **Lectures** | S. agree | 20 | 33.9 | 23 | 42.6 | 43 | 38.1 | |
| | Agree | 27 | 45.8 | 26 | 48.1 | 53 | 46.8 | $\chi^2$=1.203 |
| | Neutral | 11 | 18.6 | 5 | 9.3 | 16 | 14.2 | MCp=0.324 |
| | Disagree | 1 | 1.7 | 0 | 0.0 | 1 | 0.9 | |
| **Models** | S. agree | 18 | 30.4 | 26 | 48.1 | 44 | 38.9 | |
| | Agree | 29 | 49.2 | 16 | 29.7 | 45 | 39.9 | $\chi^2$=11.327 |
| | Neutral | 7 | 11.9 | 12 | 22.2 | 19 | 16.8 | MCp=0.008* |
| | Disagree | 5 | 8.5 | 0 | 0.0 | 5 | 4.4 | |
| **Small Group Work** | S. agree | 13 | 22.0 | 24 | 44.4 | 37 | 32.7 | |
| | Agree | 21 | 35.6 | 19 | 35.2 | 40 | 35.4 | $\chi^2$=8.666 |
| | Neutral | 22 | 37.3 | 10 | 18.5 | 32 | 28.3 | MCp=0.028* |
| | SD/Disagree | 3 | 5.1 | 1 | 1.9 | 4 | 3.6 | |
| **Dissection videos** | S. agree | 5 | 8.5 | 17 | 31.5 | 22 | 19.5 | |
| | Agree | 22 | 37.2 | 16 | 29.6 | 38 | 33.6 | $\chi^2$=9.944 |
| | Neutral | 29 | 49.2 | 20 | 37.0 | 49 | 43.3 | MCp=0.017* |
| | SD/Disagree | 3 | 5.1 | 1 | 1.9 | 4 | 3.6 | |

$\chi^2$: Chi-Square test; MCp: Monte Carlo corrected P-value; *significant at P≤0.05
SD: Strongly disagree

A Kolmogorov Smirnov test was used to examine the normality of data distribution. A T-test analysis was used to compare the score differences in between gender, age, previous educational degree and cultural background. Finally, ANOVA was used to compare the different levels of preference for the current teaching methodologies.

## 9. Results

In the results, there was good agreement between the statistical data and the qualitative data. Whilst students are asking for more digital representations of the teaching materials they are also supportive of more traditional approaches to the teaching of Anatomy for example dissection and prosection. Additionally, formal lectures also rate highly as a teaching methodology.

## 10. Findings and Recommendations

Anatomy is a three-dimensional (3D) science. Traditional teaching methods have included 3D-based approaches such as dissection, prosection and anatomical / plastic models and two-dimensional (2D) representations such as textbooks, chalk drawings and 2D digital images. [8], [9], [10]. Evidence indicates that there is a considerable cognitive effort required to assimilate anatomical structures and their relationships [11], [12].

This has been confirmed in our investigation whilst students are asking for more digital representations of the teaching materials they are also supportive of more traditional approaches to the teaching of Anatomy for example dissection and prosection.

The most effective teaching environment in which students can effectively learn Anatomy therefore is one that combines a wide variety of learning opportunities and although the digitisation of the teaching and learning materials can enrich the learning experience for students ultimately the highly complex nature of the subject area demands that a range of teaching methods will always be needed in order to aid effective learning in this subject area.

## 11. References

[1] E. B. Schreiber, J. Fukuta, F. Gordon, Live lecture versus video podcast in Undergraduate Medical Education, A randomised controlled trial. BMC Medical Education 2010; 10: p 68.

[2] J. S. Dieter, L. Salme, M. Randy, N, Orla, Students' Perceptions of effective classroom and clinical teaching in dental and dental hygiene education, Journal of Dental Education, 2006, 70: p 624-635.

[3] A. Notebaert, Student perceptions about learning anatomy, University of Iowa, 2009, p 1-3.

[4] W. J. Allen, "Using the PGCHET to Develop Higher Education Practice," paper presented at The Limerick Symposium on the Nature of Science in Science Education, University of Limerick, 2016.

[5] M. Adib-Hajbaghery, M. Aghajani, M, Traditional Lectures, Socratic Method and Student Lectures: Which one does the Students Prefer? Webmed Central Medical Education 2011.

[6] C. F. Smith et al. The context of learning anatomy J. Anat. 2014; 224: pp 270—278.

[7] Association of Canadian Faculties of Dentistry: W.W. Wood Awards for Excellence in Dental Education: past recipients. Ottawa, On: Association of Canadian Faculties of Dentistry, 2005.

[8] Garg, A., Norman, G. R., et al. (1999). Do virtual computer models hinder anatomy learning? Academic Medicine, 74, S87–S89.

[9] Garg, A. X., Norman, G., et al. (2001). How medical students learn spatial anatomy. The Lancet, 357.

[10] Garg, A. X., Norman, G. R., Eva, K. W., et al. (2002). Is there any real virtue of virtual reality? The minor role of multiple orientations in learning anatomy from computers. Academic Medicine, 77, S97–S99.

[11] Garg, A., Haley, H. L., et al. (2010). Modern Moulage: Evaluating the use of 3-dimensional prosthetic mimics in a dermatology teaching program for second-year medical students. Archives of Dermatology, 146, 143–146.

[12] Seixas-Mikelus, S. A., Adal, A., et al. (2010). Can image-based virtual reality help teach anatomy? Journal of Endourology, 24, 629–634.

# ‘Shadow Module Leaders’ - Student Experiences as Peer-Teachers and Facilitators of Peer-Assisted Learning

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## Abstract

*Peer-assisted learning is a powerful pedagogy that benefits both the student tutor and the student being instructed. In student-focused and student-led ‘Shadow Modules’, students work collaboratively on supplementing and supporting their learning, in collaborative sessions organized or taught by a fellow student ‘Shadow Module Leader’ (SML). The SML either structures collaborative learning sessions, or actively teaches fellow students. This study aims to investigate the motivations, experiences and insights of SMLs. 6 SMLs kept reflective logs of their experiences running Shadow Modules. These reflective logs were analysed qualitatively, and questions identified for semi-structured intensive interviews with 4 SMLs. Preliminary findings suggest that SMLs find peer-teaching to be empowering and beneficial to their own development. But SMLs also exhibit concern over their own potential limitations, and frustration at limited student engagement. SMLs were universally positive overall about peer-teaching.*

## 1. Introduction

Engaging students as partners in learning is a current concern within the UK HE sector. Engaging students as partners can increase participation and enhance development of independence and lifelong-learning skills. One partnership approach, peer-mediated, or peer-assisted learning (PAL) has a considerable body of evidence to support its effectiveness [1], [2]. There are several formats in which PAL can be effective, the most common format in HE being ‘co-operative learning’, which typically involves a group of students being tasked with an activity and a subsequent division of labour between members of the group. This approach is limiting in impact, as meaning-making is only undertaken by individuals, and so each student becomes an expert in only one aspect of the subject. Truly collaborative approaches, where students discuss concepts and come to a shared understanding of the whole of the task [1], have significantly greater potential for supporting all participants’ understanding across all aspects of the subject.

A key activity within the collaborative process is an individual explaining, coaching or teaching peers in an aspect that they understand, but their peers do not. Peer-teaching can therefore also be a powerful pedagogy, helping consolidate the learning of the peer-teacher, as well as supporting the understanding of the peer-tutee. The peer-tutee benefits from the insights of a peer who has recently undergone the same ‘learning journey’ that is required, and can feel more comfortable, safe, and more willing to admit knowledge deficiencies, with someone who is not a member of staff [3]. Recipients of peer-teaching can show equal or greater knowledge compared to formal didactic teaching by an expert, and demonstrate increased knowledge in areas they themselves taught [4]. A peer-teacher can be either a true peer (a student from the same year group), near-peer (from a close, but senior year group), or a far-peer (a more-senior student, such as a postgraduate). Both collaborative learning and peer-teaching are effective learning tools, and ways of engaging students as partners in learning, rather than passive consumers.

We have pioneered ‘Shadow Modules’ [1], [5] - student-led, student-focused learning communities that parallel taught modules (see Figure 1).

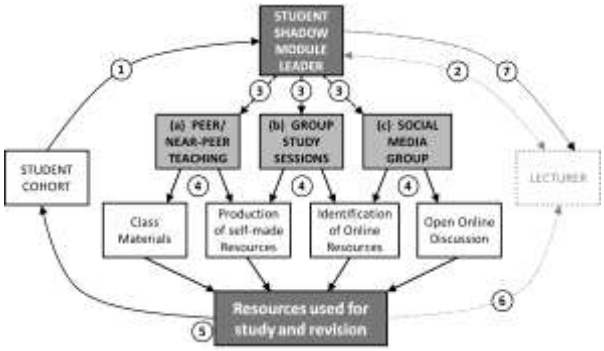


Figure 1. Shadow Module flow chart. [1]

Shadow Modules are led by a student (see (1) on figure 1), either a true-, near- or far-peer, who organizes and co-ordinates collaborative activities and liaises with the academic Module Leader (2). Shadow Module sessions (3) are either peer-taught classes, large collaborative group sessions, or online communities through social media and each produces a range of outputs (4) which can then be

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shared with other students in the module (5) who are not actively engaged in the collaborative sessions. Shadow Module outputs (6) and SML feedback (7) frequently impacts on the Academic Module Leader, and lead to revisions of the module content or teaching approach. The SML therefore has the potential to impact on the ongoing revision of the academic module [1], [5].

Due to their significance of SMLs in the PAL process, their experiences are of interest to our understanding of students as peer-teachers. The aim of this study is to investigate the motivations and experiences of the SMLs, and their perceived long-term impact on themselves and others.

## 2. Shadow Module Leaders

### 2.1. Methodology

6 SMLs were asked to keep a session-by-session reflective log of their experiences during a semester in which they coordinated a Shadow Module. These logs were analysed using a Constructivist Grounded Theory approach to identify significant themes. Analysis was undertaken using NVivo coding software. Initial coding was performed independently by 3 researchers, then discussed and agreed categories identified. A subsequent round of independent coding by 3 researchers was also used to frame a question set for interviews with SMLs.

Semi-structured intensive interviews were held with 4 SMLs. Interviews were transcribed and analysed independently in a similar manner to the reflective logs. Further rounds of coding on logs and interviews will be performed until full saturation is reached in the analysis.

### 2.2. Initial findings

The initial analysis of reflective logs identified numerous codes, grouped into 12 categories.

1) Approaches and methods for Collaboration
2) Curriculum development for Shadow Module and critique of taught module curriculum
3) Perceived impact on SML
4) Positive and negative SML emotions
5) Factors affecting motivation of SML
6) Perceived impact on student participants
7) Extent of student participation
8) Self-perception and critique of own ability
9) Logistics of organising sessions
10) Communication with students and staff
11) Academic staff involvement
12) Workload of SML and students

Major themes from these categories are an understanding of the empowering potential of peer-taught activities, both for peer-teachers and participants; concern from the SML over their own capabilities and knowledge base, and euphoria from peer-teaching sessions that worked well, but frustration at the limited engagement by other students, the often-poor turnout at Shadow Module sessions or limited engagement in online discussions.

The analysis of the reflective logs enabled the framing to a question set for semi-structured intensive interviews with 4 of the SMLs to further investigate their experiences. These have yet to be analysed in full, but initial review of the transcripts suggests that the SMLs themselves showed considerable adaptability and resilience in the planning of the pee-teaching activities, and that typically the SMLs adopted a role of facilitator and coach, rather than didactic teacher. All SMLs interviewed felt they had made a positive contribution to the taught academic module through their feedback to the module academic staff.

## 3. Conclusions

The overriding feedback from SMLs was that organizing a peer-taught activity was extremely beneficial overall, and something which they felt has had a significant positive impact on their own personal development. Peer-teaching is empowering for the peer-teacher, and supports the peer-teacher in developing confidence in their own ability, but also reflecting on their own knowledge base and limitations. The SML role is therefore a powerful example of students as partners in learning for HE.

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## 4. References

[1] J.L. Scott, S. Mistry, B.J. Moxham, and S.M. Rutherford, "How can technology support and enhance collaborative activity and student engagement within and outside-of the formal curriculum?" In. S.M. Rutherford (Ed.) *Collaborative Learning: Theory, Strategies and Educational Benefits*. Nova, New York, 2014, pp.149-174.

[2] J.A. Hammond, C.P. Bithell, L. Jones, *et al*. "A first year experience of student-directed peer-assisted learning", *Active Learning in HE*, Sage, London, 2010, pp. 201–212.

[3] S. Hall, M. Lewis, and S. Border, "Near-peer teaching in clinical neuroanatomy", *Clinical Teacher*, Wiley, Malden, 2013, pp. 230–235.

[4] W.J. Hendelman, M. Boss, "Reciprocal peer teaching by medical students in the gross anatomy laboratory", *J. Medical Education*, Wiley, Malden, 1986, pp. 674–680.

[5] J.L. Scott, B.J. Moxham, and S.M. Rutherford, "Building an Open Academic Environment - New Approaches to Empowering Students in their Learning of Anatomy". *J. Anatomy*, Wiley, Malden, 2014, pp. 286-289.

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# The Relationships between Studying in Different Fields of the Fine Arts, Environmental Factors and Creative Thinking Skills

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## Abstract

*This research's main was to compare the characteristics of students who are studying in different fields of the Fine Arts (painting and music) as regards their creative thinking skills, involvement in related extra-curricular activities, their families' engagement with the Fine Arts and some other demographic variables.*

*The population consists of the State Fine Arts High School within the province of Istanbul (N=3). The research scales were given to all students registered in those schools during the 2015-16 Academic Term. Out of these, 294 students were selected as study participants on the basis of the validity of their responses. Study data were collected using the Torrance Test of Creative Thinking (verbal and figural) and demographic information form. The test and the form were given to 156 students from the Department of Painting and another 138 students from the D epartment of Music in the Fine Arts High School.*

*It was found that the variables of studying in different branches of the Fine Arts and gender cause differences in the creativity of some students. Also, a positive correlation was found between students' creative thinking and their involvement in Fine Arts-related activities outside the school and playing an instrument.*

## 1. Introduction

It is interesting that "integrated" programs, in which all types of the Fine Arts are studied, rather than just specialized fields such as science and technology, exist as one of the common factors in the countries that are most developed in the fields of economics, politics and technology.[1, 2, 11, 13, 17]

We see that both the international high school programs like international Baccalaureate and the highly industrially and technologically developed countries such as England, the USA and Japan have included the development of creative thinking within their curricula and even among the special objectives of their national education programs. [2]

It is known that developments in creative thinking can be achieved alongside cognitive developments through education and "enriching the environment". Many factors, such as culture, geography and the historical era, political events and media the student lives through enable the enrichment and full use of her/his intellectual capacity. [4, 5, 7, 8, 12, 16, 21, 22]

Torrance stated in many works he conducted about different countries that the creativity curve varied from culture to culture and that the attitude towards and need of creativity was different as well. [7]

Over- and wrong exaggeration of gender roles is among the factors affecting creativity negatively. Approval of types of behaviors that are thought to be unique to females and males and disapproval of behaviors considered to be of the opposite gender, assessments based clothes, choice of toys, type of games being played and the gender of the playmate are factors that extinguish creativity. [1]

Researchers have shown that children of higher socio-economic levels were more creative than children of lower socio-economic levels. [1] Study he/she conducted found that the scores the children received in terms of creativity showed a significant increase from a low socio-economic level to high socio-economic level. However, when the views of the families on their children's developing creativity were analyzed, it was seen that socio-economic level did not make a difference. The fact that families at a high socio-economic level have high cultural levels and more advantages is a known truth that affects the child's creativity positively [5].

Through certain attitudes and the behavior of parents, creativity can be developed or extinguished. Being insistent with the children, forcing children to stop dreaming and to be realistic, constantly comparing them with others and discouraging their curiosity all blunt creativity in children.

In a study, where the relationship between the attitudes of the family and creativity was analyzed, it was determined that 17 individuality scores from Torrance Test of Creative Thinking gained by the children with mothers with basic education levels were significantly lower than for the children with mothers

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with higher education. Parents' being overprotective was determined as an attitude preventing creativity. [10, 24]

Specific examples from studies conducted in Turkey and elsewhere relating to this matter are given below.

## 2. Literature Review

The research conducted in Turkey and other parts of the world are presented below:

### 2.1. Research in Turkey

The first study conducted in Turkey concerning creative thinking was applied to high school students by Samurçay using Meunier's creativity test in 1974-1975. In a study that included a total of 60 students, female and male students from science and literature departments underwent a creativity test. According to the research, it was seen that the creativity level of the female students from the literature group was higher than the other groups [20].

A study was conducted in a sample group of 214 people in total ($N_{male}$=113, $N_{female}$=101 female) by using a creative thinking-drawing product. The scores acquired by female and male students was compared using the t test. As a result of the study, no significant difference between the two groups was found. [13]

The creativity levels of people continuing and not continuing at a state conservatory were analyzed, and as a result no significant difference was found in terms of gender. [14]

The relation between the special talent test results acquired by students in Turkey's Education Faculties' Department of Fine Arts Education, Field of Music Education when entering the department and the scores acquired by the same students in Torrance Test of Creative Thinking (B Form) was analyzed. In a study conducted on a total of 134 people with 84 female and 60 male students from among 1st and 4th year students, no significant relation was found between creativity and musical ability. When socio-cultural data was analyzed, it was seen that creativity scores differed according to the type of school, type of instrument being played, type of music being listened to and type of music listened to by the family, type of profession of the father, residential location, mother and father's relationship status, mother's living status, employment status of working, the income level of the family, family's support of the child's ideas and following an occupational media program. [8]

The relationship between the creativity levels of the prospective music teachers and the type of high schools they graduated from was analyzed. The Torrance Test of Creative Thinking (Verbal A Form) was applied to 33 students. As a result of the research, a significant difference was found between the pre-test and post-test creativity scores of the students. [16]

N=60 people participated in another study aiming to analyze the differences of Anatolian Fine Arts High School Department of Music students' creativity levels in terms of variants such as gender, learning methods, main types of instrument and class level. The Torrance Test of Creative Thinking (Figural Form) and Kolb Learning Styles Inventory were used as data collection tools. According to the research results, significant statistical differences were observed in the fluency dimension of creativity based on class levels and gender. No statistically significant difference was observed in the total creativity scores based on learning styles and main type of instrument and in the sub-dimensions of creativity. [9]

In another study, the impact of improvisation-intensive Orff studies used in a Music course on the musical creativity process of the students was analyzed. In this experimental study, am experimental (n=21) and control group (n=21) were created among 4th year students. The scale "Thinking Creatively with Sounds and Words" developed by Khatena and Torrance was applied during the pre-test phase of the study. Later, an improvisation study was conducted with the experimental group only for 6 weeks using the Orff approach, and the control group was exempted from this study. In the post-test phase of the study, the same scale was applied to the experimental and control group, and a significant increase was observed on the musical creativity levels of the students in experimental group according to the analysis results. [14]

A study was conducted to determine whether the creativity levels of 1028 university students,(711 females and 317 males)studying in the fields of Art Education, Music Education, Class Education, Preschool Education, Physical Science Education, Social Studies Education differed in relation to various variables. Statistically significant differences were determined between the creativity test score averages of the students studying in different departments. No significant difference could be found between the creativity scores of the students based on their gender, class, age or the high school graduated from. [23]

### 2.2. Global Research

In a study related to the qualities different teachers see as necessary and look for in an ideal student, differentiations among the first three qualities were found in the data collected from the teachers the USA, Malaysia, China, England, India, Greece, Germany and the Philippines. In the first rank of the ideal student type for American, German and English teachers was having "a productive and creative personality". The ideal student type of the German teacher in Berlin had these personal characteristics: courageous, taking on challenging duties, independent in her/his judgment and ideas, diligent, self-reliant, sincere, not withdrawn and shy. The ideal student type

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for American teachers was thinking of others, initiating a task him/herself, diligent and sincere. The ideal student characteristics for the Filipino teachers were: undertakes a project, does not get into conflict with the authorities, does not develop new ideas or show her/his creativity [3].

As can be seen, the characteristics to be found in an ideal student differ based on the understanding of education in the countries.

There are other factors that affect creativity levels. Education levels, socio-economic status, gender etc. of the parents are among the first that come to mind.

Studies that analyze the relation between gender and creative thinking scores give different results. While creative thinking test results differ significantly between females and males for certain age groups in terms of statistics, in certain research significant differences are determined, and different results are displayed based on the sample, research design and tests being used. [4, 5, 18, 19]

A study in which the creative thinking abilities of high school students taking and not taking dancing lessons were compared was carried out with 286 students. Dance topics were included in the class for creative study in various forms by using the Torrance Test of Creative Thinking (TTCT) pre-test / post-test format. The general TTCT scores for students taking and not taking dance lessons showed significant difference. Significant difference was found among the individuality and abstractness headings in the TTCT sub-scale scores of the students taking dance lessons. [15]

The general artistic and scientific similarities and differences among the university students studying in the departments of engineering and music were analyzed. It was stated in the results that while there was a significant difference between musicians and engineers in terms of scientific creativity, musicians received higher scores in general and artistic creativity. There was no significant difference among genders in terms of general scientific or artistic creativity. Significant differences were found in terms of general artistic and scientific creativity in regard to the age groups. When students of the department of music were compared to engineers, they had a tendency to high scores both in general and artistic creativity. According to the general data, while there was no scientific creativity when the scientists were compared to the artists, the artists had the tendency to have high levels of general and artistic creativity. [10].

The research's main aim was to compare the characteristics of students who are studying in different fields of the Fine Arts (painting and music) as regards their creative thinking skills, involvement in their respective extra-curricular activities, their families' engagement in fine arts and some other demographic variables. In the scope of the study's sub-problems, students attending the music and painting departments of the Fine Arts High School were examined to see whether there was a difference between

- Their scores obtained from creativity,
- Their involvement in music-related activities outside the school and creativity scores,
- The educational status of families and their creativity scores,
- The monthly income status of families and their creativity scores, and
- Whether gender causes significant difference in the creativity scores.

## 3. Methodology

The population consisted of students in the State Fine Arts High school within the province of Istanbul (N=3). Research scales were given to all students registered in those schools during the 2015-16 Academic Year. Out of these, 294 students were selected as study participants on the basis of the validity of their responses. Study data were collected by using the Torrance Test of Creative Thinking (verbal and figural) and demographic information form. The test and the form were given to 156 students from painting departments and another 138 students from the music department in the Fine Arts High Schools.

During data analysis, the normality distribution of the groups was investigated with the Shapiro Wilk's method. Since they did not show normal distribution, Mann Whitney U and Kruskal Wallis-H methods were used to compare the creative thinking scores of the students. Creative thinking performance levels were examined in relation to 21 different types of scores.

## 4. Analysis of Findings

### 4.1. Comparison of the creativity levels of students

Among the Verbal Fluency scores (z= -1.967 $p<0.05$) – one of the Verbal score types – of painting and music students, a statistically significant difference was found in favor of the Department of Painting ($X_{music}$=33.22 $X_{painting}$= 35.56). Among the Verbal Flexibility scores (z= -2.816 p<0, 05), a statistically significant difference was also found in favor of the Department of Painting ($X_{music}$=21.11 $X_{painting}$= 19.24).

No statistically significant difference was found among the Verbal Originality specialty scores of the students studying in the Fine Arts High School (z= -0, 969 p>.05) and among the total scores for Verbal Creativity (z= -1.885 p>.05).

A statistically significant difference was found among the Abstractness of Titles scores of the students in the different departments (z=-4.388 $p<0.001$) in

favor of the students studying in the Department of painting ($X_{music}$= 6.94 $X_{painting}$= 4.43); among Enrichment scores (z= -3,528 p<0,.001) in favor of the students in the Department of Painting ($X_{music}$= 10,45 $X_{painting}$=9,34); among (z= -6,941 p<0,001) again in favor of the students in the Department of Painting ($X_{music}$=4,01 $X_{painting}$=1,73).

No significance differences were found between the Figural Fluency (z= -1,059 p>.05) and Figural Originality (z= -0, 59 p>.05) scores, as indicators of the Figural Creativity of students in the different departments.

A statistically significant difference was found among the Emotional Expressiveness scores as part of Figural Creativity scores of students in the different departments of the Fine Arts High School (z= -4.178 p<0.001) in favor of students studying in the Department of Painting ($X_{music}$=0.38 $X_{painting}$=0.85); among Storytelling Articulateness scores (z= -4.764 p<0.001) in favor of students in the Department of Painting ($X_{music}$=1.88 $X_{painting}$=3.06); among Movement or Action scores (z= -3.836 p<0.001) in favor of students in the Department of Painting ($X_{music}$=0.86 $X_{painting}$=1.46); among Unusual Visualization scores (z= -4.909 p<0.001) in favor of students in the Department of Painting ($X_{music}$=0.9 $X_{painting}$=1.69); among Internal Visualization scores (z= -2.192 p<0,05) in favor of students in the Department of Painting ($X_{music}$=0.52 $X_{painting}$=0.74); among Extending or Breaking Boundaries scores (z= -6.585 p<0.001) in favor of students in the Department of Painting ($X_{music}$=1.36 $X_{painting}$= 2.99); among Humor scores (z= -4.593 p<0.001) in favor of students in the Department of Painting; among Richness of Imagery scores (z= -4.837 p<0.001) in favor of students in the Department of Painting ($X_{music}$=0.98 $X_{painting}$=1.78); among Colorfulness of Imagery scores (z= -5.828 p<0.001) in favor of students in the Department of Painting ($X_{music}$=0.33 $X_{painting}$=0.97) and among Fantasy scores (z= -4.134 p<0.001) in favor of students in the Department of Painting ($X_{music}$=0.35 $X_{painting}$= 2.17).

No significant difference was found among the scores of specializing students for the scores for types of Expressiveness of Titles (z=-0.189 p>.05), Synthesis of Incomplete Figures (z=-1.063 p>.05), and Synthesis of Incomplete Lines (z=-0.092 p>.05).

## 4.2. Comparison of students participating in extracurricular activities relating to music and their creativity scores

No significant difference was found among the verbal creativity scores of the students in the Fine Arts High School based on whether they participated in activities relating to music in their free time.

However, with regard to their creativity scores, a statistically significant difference was determined among the Resistance to Premature Closure (z=-2.631 p<0.05) (RPC) in favor of those not participating inparticipating in these activities (Xyes==2.61 Xno=3.55).

The Resistance to Premature Closure score indicates the individual's work towards perfecting a unique thought s/he has put forth. This score type was the lowest score type the Turkish children received during the work adapting it to Turkish.[5] It is possible to see this as result of the reliance of our education system in testing and rewarding only correct answers to the questions posed in the shortest time. This result can be interpreted as showing that although the students follow artistic activities in their free time this does not affect their resistance to premature closure score type.

A statistically significant difference (Xyes=1.1 Xno=1.31) was found in favor of the students who did not participate in free time activities involving music (z= -2, 13 p<0, 05) in terms of the Movement or Action score type.

It is understood from the Fine Arts students that the participants in artistic activities were not able to develop sufficient and cold not transfer this into their creative thinking skills.

A statistically significant difference was found among the students studying fine arts on behalf of the participants (Xyes=7,19 Xno=6,27) in terms of Expressiveness of Titles (z= -2,399 p<0,05) of those who did or did not participate in free time music activities.

The Expressiveness of Titles score type belongs to the Figural Creativity test and it means the act of giving a title to paintings for the purpose of adding abstract or philosophical meaning. To acquire high scores for this score type, the student must have abstract thinking skills, culturally rich knowledge and be able to think philosophically and creatively. These students are thought to partially have and use a basic critical thinking ability. Moreover, they are thought to be able to interpret events and facts philosophically.

A statistically significant difference was found among the Extending or Breaking Boundaries score averages of students (z= -2.309 p<0.05) participating or not participating in activities in their free time in favor of non-participants (Xyes=2.01 Xno=2.61).

The Extending or Breaking Boundaries score type is a score type that again belongs to the figural creativity test. It defines how much the person taking the test questions the given rules, or her/his courage not to take the rules into consideration if they are an obstacle against creative thinking and creating unique thought. It symbolizes that people thinking creatively re-consider the rules given during assigned tasks and the use opportunities and are flexible enough to be able to think differently. According to this result, it can be interpreted that the people participating in music activities outside school are able to extend or break the boundaries of directives and requests.

It was determined that, among the Colorfulness of Imagery scores of participants and non-participants in

free time activities related to music (z= -2.392 p<0.05), a statistically significant difference was found in favor of non-participants (Xyes=0.58 Xno=0.83).

It was also found that, among the Fantasy scores of participants and non-participants in free time activities involving music (z= -2.094 p<0.05) a statistically significant difference (p<.05) was found in favor of non-participants (Xyes=0.51 Xno=2.81).

The Fantasy score is a score type in the figural creativity test involving creating a new product from material given to the test taker and is related to the creation of unusual ideas. As is known, one of the most important characteristics of creative thinkers is to have the habit of book reading and research and to create new syntheses and products using symbols derived from different cultures.

### 4.3. Analysis of the relation between students' creativity scores and families' educational status

No statistically significant difference was found between the creativity scores of the students studying in different departments of the Fine Arts High School with regard to their families' educational status.

### 4.4. Analysis of the relation between students' creativity scores and monthly familial income

There was a statistically significant difference (p<0.05) with regard to the monthly familial income of the students studying Fine Arts in terms of the Verbal Originality score (H=9.112 p<0,05). The Verbal Originality score of the students of Fine Arts with a monthly familial income between 1000-1500 TL (X=14.13) and 1500-2000 TL (X=14.31) was significantly different in favor of the higher income level compared to those with families with a monthly income of 2000 TL and above (X=16.9).

A statistically significant difference was also found among the monthly familial income levels of the students studying Fine Arts in terms of the Verbal Total scores (H=9.363 p<0.05). The Verbal Total Score of the students studying Fine Arts whose families had a monthly income of 1500-2000 TL (X=58.76) was significantly different in favor of the higher income level when compared to the students from families with monthly income of 2000 TL and above (X=66.54).

Additionally, a statistically significant difference was determined between the monthly familial income levels of the students studying Fine Arts in terms of Abstractness of Titles (H=7,895 p<0,05). The Abstractness of Titles score of the students studying Fine Arts with monthly income of 1000-1500 (X=4.7) TL was significantly different in favor of the higher income level when compared to the students whose families had a monthly income of 2000 TL and above (X=6.2).

There was a statistically significant difference between the monthly familial income levels of the students studying Fine Arts in terms of Resistance to Premature Closure (H=9.124 p<0.05). The RPC score of the students studying Fine Arts with monthly familial income of 1000-1500 (X=2.34) TL was significantly different in favor of the higher income level when compared to the students whose families had a monthly income of 2000 TL and above (X=2.7).

A statistically significant difference was also determined between the monthly familial income levels of the students studying Fine Arts in terms of Storytelling Articulateness (H=9.397 p<0.05). The Storytelling Articulateness score of the students studying Fine Arts with monthly income of 1000-1500 (X=1.98) TL was significantly different in favor of the higher income level when compared to the students whose families had a monthly income of 2000 TL and above (X=2.73).

Finally, a statistically significant difference emerged between the monthly familial income levels of the students studying Fine Arts in terms of Movement or Action (H=9.362 p<0.05). The Movement or Action score of the students studying Fine Arts in families with a monthly income of 1000-1500 (X=0.99) TL was significantly different in favor of the higher income level when compared to the students with monthly familial incomes of 2000 TL and above (X=1.37).

### 4.5. Comparison of students' creativity scores and gender

A statistically significant difference was found between the genders (z= -3,473 p<0.001) in terms of Verbal Fluency score. The Verbal fluency score of the students was significantly different in favor of the females (Xfemales=36.53).

There was also a statistically significant difference was between the genders (z= -3.322 p<0.001) in terms of Verbal Flexibility score. The Verbal Flexibility score of the students was significantly different in favor of the females; (Xmales=18.89), (Xfemales=21.19).

In addition, a statistically significant difference was seen between the genders (z= -3.871 p<0.001) in terms of Verbal Originality score. The Verbal Originality score of the students was significantly different in favor of the females; (Xmales=13.3), (Xfemales=17.16).

A statistically significant difference was also found between the genders (z= -3.983 p<0.001) in terms of Verbal Total Score. The Verbal Total Score of the students was significantly different in favor of the females (Xmales=56.59), (Xfemales=67.73).

There was a statistically significant difference between the genders (z= -3.555 p<0.001) in terms of

Figural Originality score. The Figural Originality score of the students was significantly different in favor of the females; (Xmales=5.23), (Xfemales=6.67).

A statistically significant difference was also found between the genders (z= -3.032 p<0.001) in terms of Abstractness of Titles score. The Abstractness of Titles score of the students was significantly different in favor of the females; (Xmales=4.9), (Xfemales=6.38).

There was, additionally, a statistically significant difference between the genders (z= -2.899 p<0.001) in terms of Enrichment score. The Enrichment score of the students was significantly different in favor of the females; (Xmales=9.36), (Xfemales=10.33).

A statistically significant difference was noted between the genders (z= -3,768 p<0,001) in terms of Storytelling Articulateness score. The Storytelling Articulateness score of the students was significantly different in favor of the females; (Xmales=1.95), (Xfemales=2.9).

There was a statistically significant difference between the genders (z= -3.192 p<0.001) in terms of Movement or Action score. The Movement or Action score of the students was significantly different (Xmales=0.91) in favor of the females (Xfemales=1.37).

A statistically significant difference emerged between the genders (z= -3.603 p<0.001) in terms of Expressiveness of Titles score. The Expressiveness of Titles score of the students was significantly different in favor of the females; (Xfemales=7.43), (Xmales=6.07) There was a statistically significant difference between the genders (z= -3.481 p<0.001) in terms of Internal Visualization score. The score of the students was significantly different in favor of the females; (Xmales=0.4), (Xfemales=0.81).

A statistically significant difference was also determined between the genders (z= -3.209 p<0.001) in terms of the Humor score. Score of the students was significantly different in favor of the females; (Xmales=1.09), (Xfemales=1.46).

Finally, there was a statistically significant difference between the genders (z= -3,731 p<0,001) in terms of Figural Total score. The Figural Total score of the students was significantly different in favor of the females; (Xmales=15.47), (Xfemales=22.14).

## 5. Discussion

While a statistically significant difference emerged between Verbal Fluency and Verbal Flexibility scores which belong to the Verbal Creativity score types.

As a result of the creativity tests applied to students in the Music and Painting Departments of the Fine Arts High School, no statistically significant difference was found among the Verbal Originality scores.

A statistically significant difference was found on behalf of the students studying painting with regard to the scores for Abstractness of Titles, Enrichment, Resistance to Premature Closure, Emotional Expressiveness, Storytelling Articulateness, Movement or Action, Unusual Visualization, Internal Visualization, Extending or Breaking Boundaries, Humor, Richness of Imagery, Colorfulness of Imagery and Fantasy scores as part of Figural Creativity point types. However, no significant difference was found among the scores of specializing students for the score types Expressiveness of Titles, Synthesis of Incomplete Figures and Synthesis of Incomplete Lines.

No significant difference was found when comparing students who participated in activities relating to music outside their school time with those who did not in terms of their Verbal Creativity scores.

However, with regard to their Figural Creativity scores, significant differences were found in favor of the non-participants in the score types of Resistance to Premature Closure, Movement or Action, Extending or Breaking Boundaries, Colorfulness of Imagery and Fantasy. This finding can be interpreted as showing that students were not able to make the expected gains from activities relating to music in their free time and were not able to use the benefits acquired from these cultural activities to develop their creative thinking abilities.

In terms of Verbal Originality score, there was a statistically significant difference to the benefit of students with a higher monthly familial income and in regard to their participation in extra-curricular activities involving music. A statistically significant difference was determined between the Abstractness of Titles, Storytelling Articulateness and Movement or Action scores within the Figural Creativity scores in favor of a higher income level.

There was a statistically significant difference between the genders of the students studying Fine Arts in favor of the females in terms of Verbal Fluency, Verbal Flexibility and Verbal Total score.

Among the students studying Fine Arts, a statistically significant difference was found between the genders, also in favor of the females, in the Abstractness of Titles, Enrichment, Storytelling Expressiveness, Movement or Action, Expressiveness of Titles, Internal Visualization, Humor and Figural Total scores in terms of Figural Originality scores and standard scores.

## 6. Conclusion

It was found in this study that students of the Department of Painting within the Fine Arts High School had more advanced levels of verbal and figural creativity than the students in the Department of Music.

## 7. Acknowledgment

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## 8. References

[1] Akdoğan, E., "İlkokul İkinci Sınıfa Devam Eden Çocukların Yaratıcılık Düzeyleri Arasındaki İlişkinin İncelenmesi". Yayınlanmamış Bilim Uzmanlığı Tezi. Hacettepe Üniversitesi Sosyal Bilimler Enstitüsü, (1992), p,12-13.

[2] Aral, N., Sanat Eğitimi- Yaratıcılık Etkileşimi. Hacettepe Üniversitesi Eğitim Fakültesi Dergisi. 15, (1999), p. 11-17.

[3] Arık, Ġ, A., "Yaratıcılık (Üç Derleme)", Kültür ve Turizm Bakanlığı Yayınları, Ankara, (1987), p. 11-12.

[4] Aslan, A. E. and Imamoglu, S., Attachment styles in gifted children: Can creativity be correlated? *Sakarya Üniversitesi Eğitim Fakültesi Dergisi*, Bahar/Mayıs 17, (2009), p.18-38, [ISSN: 1303-0310].

[5] Aslan, A. E., & Puccio, G., Developing and Testing A Turkish Version of Torrance Tests of Creative Thinking: A Study of Adults. Journal of Creative Behavior, Massachusetts:40 (3), (2006), 163-178.

[6] Aslan, A. E., Educational Design for Creative Thinking. İn Creativity in Educational Research and Practice. UK: Elena Xeni (Editor). İnterdisiplinary Press, (2014), ISBN: 978-1-84888-308-6.

[7] Aydın, Ç., "Üniversite Okullarına Devam Eden 5-6 Yaş Çocuklarının Yaratıcılık Düzeylerinin İncelenmesi". (Yayınlanmamış Bilim Uzmanlığı Tezi). Hacettepe Üniversitesi Sağlık Bilimleri Enstitüsü, (1997), p.14.

[8] Bağcı, H., "Eğitim Fakülteleri Müzik Eğitimi Öğrencilerinin Girişte Aldıkları Özel Yetenek Sınavı Sonuçlarının ve Bölüm Programlarının Öğrencilerin Yaratıcılık Düzeyine Etkisi". Yüksek Lisans Tezi. Marmara Üniversitesi Eğitim Bilimleri Enstitüsü Güzel Sanatlar Eğitimi Anabilim Dalı Müzik Öğretmenliği Bilim Dalı, (2003).

[9] Başaran, S.S.,"Anadolu Güzel Sanatlar Lisesi Müzik Bölümü Öğrencilerinin Yaratıcılık Düzeylerinin Bazı Değişkenler Açısından İncelenmesi". www.muzikeğitimcileri.net, (Access Date: 03.03.2016), (2008).

[10] Charyton, C., "Creativity (Scientific, Artistic, General) and Risk Tolerance among Engineering and Music Student". Temple University, Philadelphia, USA., (2005).

[11] Craft , A., Jeffrey, B. And Leibling, M., Creativity Education. London: Continuum Press, (2001).

[12] Davaslıgil, Ü.,"Anksiyete Düzeyi ve Aile Tutumlarının Yaratıcı Düşünmeye Olan Etkileri". İstanbul Üniversitesi. Pedagoji Dergisi. 3, (1994), p.47-52.

[13] Gürsoy, F., "Çocukta Yaratıcılığın Gelişimi" Ankara Üniversitesi Ev Ekonomisi Yüksek Okulu Anaokulu/ Anasınıfı Öğretmeni El Kitabı, Ya-Pa Yayınları İstanbul, (2001), p.92.

[14] Japan Instructional Systems. Center on International Benchmarking sytems_http://ncee.org/what-we-do/center-on international-education-benchmarking/top-performing-countries/japan-overview/japan-instructional-systems/ (Access date: 21.01.2017).

[15] Kandemir, T., Çoban, S. "A Study of the Effectof School Music Education with Orff-Schulwerk Improvisation Studies on Musical Creativity Process", 10th International Educational Technology Conference&Exhibition 26-28 April 2010 İstanbul-Turkey, Conference Proceedings Book Volume-1, (2010), p.70-73.

[16] Minton, S., "Assessment of High School Students' Creative Thinking Skills: A Comparison of Dance and Nondance" Classes.(ERIC Document Reproduction Service No.EJ824162), (2003).

[17] Mumford, Michael D., Kelsey, Medeiros E., Partlow, Paul J. "Creative Thinking: Processes, Strategies and Knowledge", Journal of Creative Behavior 46.1 (2012), p. 30-47.

[18] Nickerson, R. S. "Enhancing Creativity", Handbook of Creativity, edited by Robert J. Sternberg, Cambridge: Cambridge University Press, (1999), 392-430.

[19] Ömeroğlu, E., Anaokuluna Giden 5-6 Yaşındaki Çocukların Sözel Yaratıcılıklarının Gelişimine Yaratıcı Drama Eğitiminn Etkisi, (Yayınlanmmış doktora tezi), Hacettepe Üniversitesi Sağlık Bilimleri Enstitüsü, (1990).

[20] Öncü, T., Torrance Yaratıcı Düşünme Testleri-Şekil Testi Aracılığıyla 12-14 Yaşları Arasındaki Çocukların Yaratıcılık Düzeylerinin Yaş ve Cinsiyete Göre Karşılaştırılması. Ankara Üniversitesi Dil ve Tarih Coğrafya Fakültesi Dergisi 43, (2003), 1: 221-237

[21] Sungur, N. "Yaratıcı Düşünce", Evrim Yayınevi, İstanbul, (1997), page, 55.

[22]Süzen, D., "İlkokul Sınıf Öğretmenlerinde Yaratıcı Düşünme Yeteneği İle Benlik Kavramı Arasındaki İlişki", Yayınlanmamış Yüksek Lisans Tezi, Hacettepe Üniversitesi Sosyal Bilimler Enstitüsü, Ankara, (1987).

[23] Tekin G. E. and Bilen, S., "Müzik Alan Derslerinin Müzik Öğretmeni Adaylarının Yaratıcı Düşünme Becerileri Üzerindeki Etkileri", Gazi Üniversitesi Gazi Eğitim Fakültesi Dergisi (25), (2005), p. 325-338.

[24] Tok, Emel and Sevinç, Müzeyyen. 'Düşünme Becerileri Eğitiminin Eleştirel Düşünme ve Problem Çözme Becerilerine Etkisi.' Education and Science 37.164 (2012), p. 204-222.

[25] Topoğlu, O., "Eğitim Fakültesinde Öğrenim Gören Öğretmen Adaylarının Yaratıcılık Düzeylerinin Çeşitli Değişkenler Açısından İncelenmesi", International Journal of Social Science (Internet), (2015), Doi number: http://dx.doi.org/10.9761/JASSS2861 (35), p. 371-383 (Access Date: 10.03.2016).

[26] Yontar, T. A. “Yaratıcı Düşünme Testi Çizim Ürünü’nün Türk Örnekleminde Kullanımı”. Eğitim ve Bilim. (1999), p. 45-49.

## Session 10: Ubiquitous Learning

Title: Case Study of Information and Communication Technology (ICT) Use in Four Canadian Aboriginal Schools
(Authors: Gerald Laronde, Katarin MacLeod, Lorraine Frost)

Title: Robotics Simulator in the Classroom: The First Step for a Good Practice
(Authors: Yolanda Bolea, Antoni Grau, Alberto Sanfeliu)

Title: E-learning Design Strategies for Older Adults: A Study from Taiwan
(Authors: Horng-Ji Lai, Ching-Yi Wang)

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# Case Study of Information and Communication Technology (ICT) Use in Four Canadian Aboriginal Schools

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## Abstract

*A case study approach was taken in examining Information and Communication Technology (ICT) use in schools among four geographically and culturally different Aboriginal communities located in Canada. Quantitative and qualitative data were gathered from students, teachers, and administrators, who participated in an online survey followed by interviews. ICT use in the classroom was examined as well as the challenges and benefits. There were different types of challenges among the schools including; access to Internet, number and types of computers, supportive infrastructure, teacher use of ICT in teaching, professional development, available software, and student use of computers. Lack of software in Aboriginal languages was a problem unique to these schools.*

## 1. Introduction

A case study approach was used in examining Information and Communication Technology (ICT) in schools among four geographically and culturally different Aboriginal communities located in Canada. The schools were from communities of Ojibway, Algonquin, Inuit, and Haudenosaunee (Iroquois) people, located in Ontario, Quebec and Nunavut. One of the communities was an isolated fly in community, while the other three could be considered rural with varying drivable distances from a larger mainstream community. Quantitative and qualitative data was gathered from students, teachers, and administrators. Participants completed an online survey, followed by interviews, on their use of ICT in education. The use of ICT in the classroom was examined as well as identification of the challenges and benefits.

## 2. Literature Review

Secondary and post-secondary completion rates among Aboriginal persons in Canada are considerably lower than those found in the general population, especially for those Aboriginal persons who live in more northern and remote communities. Increasingly, strong digital literacy and fluency is needed to be successful in the workplace and the classroom and, therefore, it is essential that Aboriginal Canadians develop these skills in order to enjoy the same benefits of education and employment as do other Canadians. Laronde, MacLeod, and Frost [9] note that research to date has focused on the adoption of new technologies, the efficacy of laptops in education especially when used 1:1, professional preparation of teachers for the use of ICT, and identifying barriers to ICT integration into the classroom. Research on ubiquitous laptop programs in schools in Aboriginal communities, however, virtually does not exist [5]. Laronde, MacLeod, and Frost [9], in reviewing the available literature, found that ubiquitous laptop programs are one of the most effective means of achieving fluency in ICT, yet many schools lack the infrastructure and personnel to support such programs. The purpose of the research was to examine the extent to which ubiquitous laptop programs were being used effectively in selected Aboriginal communities.

Previous research conducted in 31 countries by the European Commission has found wide variance in use of ICT in members' schools [2]. Previous meta-analyses completed in areas of ubiquitous computing in schools include studies in student achievement [3], measurement of student writing [4], mathematics [8]; [10], and pre-service teacher education [7].

This research contributes to the literature on ICT use in schools and also the literature on Aboriginal education. The term "Aboriginal" lumps all indigenous people of North America together, yet there are distinct cultures and languages within this large group, with further differences defined by geography and proximity to larger populated areas. The case studies reported in this paper were conducted in four different regions of Canada, representing four different cultural and language groups.

## 3. Methodology

These case studies of four schools in Canadian Aboriginal communities involved both quantitative

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and qualitative data collection [1]. A case study approach was used as it recognizes the uniqueness of the communities defined through their geography and culture. The schools were chosen as a convenience sample from communities of Ojibway, Algonquin, Inuit, and Haudenosaunee (Iroquois) people, located in Ontario, Quebec and Nunavut.

The schools were initially approached by the researchers through contact with the Administrator of the school to determine if ICT was being used in the school and if there was a willingness to participate in the study. Consideration was given to sensitivity in working with Aboriginal people, as well as young students in obtaining ethical approval at the university and community level.

Data gathering consisted of online surveys with students, teachers, and administrators using Fluidsurveys.com. The online survey link was sent to a Gmail address created by the researchers then given to and opened by the participants. This Gmail address was specifically created to maintain anonymity among the participants. It took approximately an hour of class time for the students to complete the online survey and participate in the focus group interview. Individual interviews with teachers and administrators were completed in private within a room in the school. All of the students' parents signed letters of consent prior to completion of the surveys and interviews. All participants signed letters of consent for the interviews and acknowledged consent in participating in the online survey. The interviews were recorded and transcribed at a later date. A follow up visit to the school for classroom observation was conducted for triangulation. Notes were taken throughout the data gathering process. Some data analysis of the online surveys was conducted with tools from Fluidsurveys.com. Some sample sizes, however, were too small for statistical analysis.

The online survey questions were loosely derived from the Survey of Schools: ICT in Education used in the European Commission carried out by European Schoolnet [2]. In the interest of time and cultural appropriateness, the European Schoolnet survey instrument utilized was shortened and made more relevant to Aboriginal Canadians. The ISTE Essential conditions [6] were considered in the construction of the survey instrument and analysis of the data.

## 4. Results

The Ojibway First Nation high school was located in Northern Ontario. The Internet connection was high speed, with password protected wifi being used throughout the school. The students had iPads and MacBooks that were stored in the school on a charging cart. The laptops and iPads were used on a daily basis. The students' benefits included easier access to research through the Internet, facilitated organization through the use of Google drive, and the use of social media. Challenges were similar to those found in mainstream schools with concerns of technical problems, off task behavior, and improper referencing. The teacher and administrator identified barriers preventing the increased use of ICT, including the lack of professional development, resources, and Aboriginal language software. In the previous year, free access to wifi by students' use of phones slowed the Internet speed. This problem was solved by putting a password on the wifi which freed bandwith for only school ipads and computers access. Students could still use their phones but would have to use a data package on their phone. The administrator recognized there was a wide skill set range among teachers in the adoption of ICT integration into their teaching. Recommendations included more professional development in ICT for teachers, additional resources for ICT, and more development of Aboriginal language software.

The Algonquin First Nation school was located in Quebec. The school had a high speed fiber optic connection with wifi being used throughout the school. The school had a class set of iPads that were not used on a regular basis. The school was waiting for a new school to be built to improve access to computer use and storage. The school would benefit from a better infrastructure to support the storage and distribution of computers as well as professional development of teachers.

The Internet within the school in Nunavut was limited as all Internet is via satellite and is controlled by the government of Nunavut. The government limited the use of Google mail, which eliminated our use of the online survey but was substituted with the same questions in paper format. The lack of practical Internet usage greatly reduced the use of the Internet in the classroom and the amount of computer use. The computers were used occasionally, perhaps once a week. The school would benefit from more accessible Internet, more up to date computers, an infrastructure that supports ICT, and more professional development for teachers.

The Haudenosaunee (Iroquois) school, located in Ontario, was remote enough that it depended only on satellite use of Internet and suffered a similar lack of Internet speed as Nunavut. The school lacked portable computers and relied on about 10 outdated stand alone computers that were not used on a regular basis. The computers had to be set up for the students to take the online test. The school would also benefit from more accessible Internet, more up to date computers, an infrastructure that supports ICT, and more professional development for teachers.

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## 5. Conclusion

There were different degrees of challenges among the schools including; access to Internet, lack of computers, supportive infrastructure, teacher use of ICT in teaching, professional development, available software, and student use of computers. Some challenges were common to those found in mainstream schools such as technical problems and off task behavior of students. The teachers and administrators identified barriers preventing the increased use of ICT, including the lack of professional development, resources, and Aboriginal language software. The administrators recognized there was a wide skill set range among teachers in the adoption of ICT integration into their teaching. Two communities only had access to Internet via satellite, which restricted the use of the Internet in the schools. Two communities had 'fast' Internet connections where the students' benefits included easier access to research through the Internet, facilitated organization through the use of Google drive, and the use of social media. The teachers desired more professional development in ICT integration, additional resources for ICT, and more development of Aboriginal language software.

## 6. References

[1] Creswell, J. W., & Plano Clark, V. L. (2007). Designing and conducting mixed methods research. Thousand Oaks, CA: Sage Publications.

[2] European Schoolnet (2013). Survey of schools ICT in education: Benchmarking access, use and attitudes to technology in Europe's schools (2013). Luxembourg: Publications Office of the European Union.

[3] Gulek, J. C., & Demrirtas, H. (2005). Learning with technology: The impact of laptop use on student achievement. Journal of Technology, Learning and Assessment 3(2), 4-38.

[4] Goldberg, A., Russell, M., & Cook, A. (2003). The effect of computers on student writing: A meta-analysis of studies from 1992 to 2002. Journal of Technology, Learning, and Assessment, 2(1) 1-52.

[5] Human Resources and Development Canada (2013). Indicators of Well-Being in Canada. Retrieved from: http://www4.hrsdc.gc.ca/.3ndic.1t.4r@-eng.jsp?iid=29 (Access date: 14 October 2013).

[6] ISTE NETS. (2009). Essential conditions. Retrieved from www.iste.org/docs/pdfs/netsessentialconditions (Access date: 15 October 2013).

[7] Kay, R. H. (2006). Evaluating strategies used to incorporate technology into preservice education: A review of the literature. Journal of Research on Technology in Education; 38(4), 383.

[8] Lagrange, J., Artigue, M., Laborde, C., & Trouche, L. (2001). A meta study on IC Technologies in education: Towards a multidimensional framework to tackle their integration. In PME Conference (1), 1-111. Retrieved from http://didmat.dima.unige.it/miur/miur_dima/G/STORIA_DI_UNA_RICERCA/LAGRANGE.PDF (Access date: 26 October 2013).

[9] Laronde, G., MacLeod, K., & Frost, L. (In press). A case study of the integration of information and communication technology in a Northern Ontario First Nation high school: Challenges and benefits. Journal of International Education Research, 13(1).

[10] Li, Q. & Ma, X. (2010). A meta-analysis of the effects of computer technology on school students' mathematics learning. Educational Psychology Review. 22(3), 215-243.

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# Robotics Simulator in the Classroom: the First Step for a Good Practice

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## Abstract

*In the not-too-distant past, robots were only used in the automation industry, but in some recent years the scientific community turned its attention to applications where the objective was not merely the increase of productivity and effectiveness. Those new applications focus in yielding useful services to humans requiring robots with features completely different to the industrial robots developed so far; these new robots are called "service robots".*

*Service robotics has become a main axis in research at international level, and nowadays the number of robots used in people's assistance, surgery, therapy, services, education and entertainment has been growing. In this work authors will focus in Robotics regarding the teaching/learning processes. Robotics can be used not only as a subject of study but as a support tool that facilitates the learning process by inquiry providing an easy approach to the concepts. In general, robotics is a great pedagogical tool and it is very important to take advantage of the motivation that generates among the students the fact of interacting with a robot to introduce concepts in an easy and didactical way such as computation, electronics, physics, mechanics and mathematics.*

*There exists a great variety of educational robotic kits to be used in the classroom, such as RoboCub, Qrio, Robonova, etc. Most of these kits are oriented to robot building and programming as well. It is well worth to remark that in engineering simulations play an important role because is the first stage in the design process and it has to be used before the implementation stage in order to guarantee the efficiency and performance of any system.*

*Thanks to simulation is not only possible to know a priori how a particular robotic configuration evolves but also allows implementing functions and algorithms. This fact will permit students to be introduced in the programming world as well as in the learning of more theoretical concepts such as kinematics, dynamics, control, robot navigation, locomotion... from a more practical, visual point of view connecting students with the real world. Some of the most popular simulators in humanoid robotics are: Webots, SimRobot, Gazebo, SimPark, among others. The main problem with the existing simulators is that they are not freely available in the market and they have an unaffordable cost per license for the educational centres and researchers. Moreover, in many cases, those simulators do not fit exactly with the available equipment in the robotics labs and for those reasons and for the sake of the innovation authors propose the development of their own simulator that is adapted to their robotics lab equipment. This experience can be adapted to any robotics lab configuration.*

*In this work a new software interface has been developed in order to introduce Humanoid Robotics to the students in their initial courses of engineering. This simulator is under test and assessment in the Robotics subject at the Industrial Engineering degree during this academic year. This work expects to be an illustrative example to implement software interfaces according to the robot availability in each robotics lab.*

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# E-learning Design Strategies for Older Adults: A Study from Taiwan

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## Abstract

*This study aims to understand the important elements in the design of e-leaning courses for older adults. It also seeks to identify and analyze the content selection and interface design issues for e-learning courses. The study employed a qualitative approach. In-depth interviews were used to collect research data; the interviewees were five instructors from senior education institutes in Taiwan. Research results revealed that e-learning courses can be an effective alternative to classroom lessons for learning by older adults. It was found that older adults preferred courses related to communication, health and travelling, all of which are subjects relevant to their needs. Ease of learning and use were found to be critical component of the interface design; graphics and text should be clear and navigation must be effortless. In addition, due to the high acceptance rate of mobile device among older adults, e-learning courses can be developed for the tablet and smartphone platforms. Apps can be downloaded to learners' mobile devices. Based on the results of the study, suggestions are provided for instructors and practitioners while developing e-learning courses for older adults.*

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## Session 11: Inclusive Education

Title: When Global Meets Local: The Grenadian Perspective of Non-academic Factors in International Medical Education
(Authors: Lauren Orlando, Emily Harms, Heather Brathwaite, Jill Paterson, Glen Jacobs)

Title: The Meaning of Media in Teacher Biographies – Insights into a Narrative Study with Teacher with Diverse Cultural and Religious Background in Austria
(Author: Doreen Cerny)

Title: An Analysis of the COMET Project (Communication and Education Together) and an Assessment of the COMET Intervention Approach
(Author: Dorota Zolnowska)

Title: Implementing Yoga for Young Children
(Author: Michelle Mochan)

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# When Global Meets Local: The Grenadian Perspective of Non-academic Factors in International Medical Education

Lauren Orlando, Emily Harms, Heather Brathwaite, Jill Paterson, Glen Jacobs
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## Abstract

*The purpose of the study was to investigate the non-academic challenges for Grenadian students who are a minority at an international university (St. George's University) in their own country, and how these non-academic challenges have changed in the past 17 years. All 36 Grenadian students enrolled in the two years of basic sciences in the School of Medicine were invited to participate in an optional, anonymous survey, which gathered demographic information and information regarding non-academic factors that students' perceived affected their studies. Questions in the descriptive survey included open-ended, Likert scale, ranking, and multiple choice questions. Twenty-four of the 36 students (67%) responded to the questionnaire. Three major issues were identified. Ten students (n=21, 48%) ranked housing as the number one problem for them. Sixteen participants (n=21, 71%) have financial difficulties, which makes it difficult to afford on-campus or even off-campus housing. Traveling to and from campus was a problem for 17 students (n=21, 76%), who stated it was time consuming. Transportation, housing, and financial issues still pose a challenge for Grenadian students. In fact, housing opportunities have become more limited in the past 17 years. The challenges could be lessened if Grenadian students were guaranteed on-campus housing and if the government scholarship provided a small living stipend.*

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# The Meaning of Media in Teacher Biographies – Insights into a Narrative Study with Teacher with Diverse Cultural and Religious Background in Austria

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## Abstract

*The presentation deals with the question of the role media plays in teachers' biographies — from the perspective of teachers from an immigrant background. The paper is based on a study that investigates the biographies of teachers in Austria who have an immigrant background, covering teachers of different ages and with various regional or religious affiliations. The teachers provided their biographies, and methods of narrative analysis are currently being used to analyse these biographical interviews. This presentation will reflect the initial impressions of these case studies involving teachers, with a focus on a non-human actor: the media. The importance of the media in educational processes is discussed within the German-speaking research community, although to the extent to which the media constructs a worldview for people who educate pupils remains a marginal field. The following aspects will be discussed in this presentation: (1) What kinds of media were relevant to a person's biography? (2) What kinds of thought-provoking stimuli and worldviews were teachers given by "their" media? The results will be discussed with reference to, for example, Humboldt [1], Mollenhauer [2], [3] as well as Röll [4]. In this regard, the initial results will be investigated with regard to two main concepts of appropriation (action-oriented appropriation and viral appropriation).*

## References

[1] Humboldt, W. von (1963): Theorie der Bildung des Menschen. In: Flitner, A/Giele, K. (Hrsg.): Wilhelm von Humboldt Werke in fünf Bänden, Bd.1, Schriften zur Anthropologie und Geschichte, 1. Auflage. Darmstadt: Rüttgen&Loening (Lizenzausgabe d. wissenschaftlichen Buchgesellschaft für die DDR), 234-240.

[2] Mollenhauer, K. (1972): Theorien zum Erziehungsprozess. Zur Einführung in erziehungswissenschaftliche Fragestellungen. München: Juventa.

[3] Mollenhauer, K. (2003): Vergessene Zusammenhänge. Über Kultur und Erziehung. 6. Auflage. Weinheim/München: Juventa.

[4] Röll, F.J. (2014): Die Macht der inneren Bilder. Zum Spannungsverhältnis von virtueller und realer Aneignung von Wirklichkeit. In: Deinet, U./Reutlinger, C. (Hrsg.): Tätigkeit-Aneignung-Bildung. Positionierung zwischen Virtualität und Gegenständlichkeit. VS: Wiesbaden, 259-273.

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# An Analysis of the COMET Project and an Assessment of the COMET Intervention Approach

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## Abstract

*In 2003 Belfast Education and Library Board introduced an intervention programme COMET (Communication and Education Together) to tackle poor communication skills and language deficiencies among primary school children from socially disadvantaged background. As children's language and communication skills can exert a significant influence on their learning as well as their social and emotional development, addressing this issue is of crucial importance. Applying a mixed-methods approach, this longitudinal study evaluates the effectiveness of the COMET intervention and examines its impact on the children's development of oral language skills as well as their reading performance. The quantitative data demonstrated the children involved in the programme had exhibited the higher levels of oral language skills as well as reading and reading-related abilities than the children who had not participated in the intervention. The children involved in the programme improved at a faster rate and had caught up with, or exceeded their peers who had not followed the COMET approach. The effectiveness of the COMET intervention was also confirmed by the qualitative data. The interviews with the principals, literacy coordinators, teachers and learning support assistants revealed that the intervention was an effective, valuable and very informative initiative that was manageable and functioned well in a highly complex and busy school environment. The findings of this study suggest that the COMET intervention is an effective and successful initiative, which not only assists the children in their development of oral language skills and reading abilities, but also positively contributes to reducing the gaps that exists between the children, providing them with a solid foundation and a greater chance for experiencing a school success.*

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# Implementing Yoga for Young Children

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## Abstract

*Yoga has many benefits for children and has been shown to improve health and well-being. However, much of the research on the effects of teaching yoga to young children use methodologies that are unsuited for that particular age group. The purpose of this study is to contribute to the research by implementing a more effective methodology. Furthermore, this study is of practical use to teachers as it discusses how yoga can be brought into the classroom and integrated with the curriculum.*

## 1. Introduction

Teachers have been asked to keep up with the growing needs of the students in their classrooms, as the number of students with special needs in classrooms increases yearly. Frequently children with special needs display unique behaviours that require additional classroom management. It is at the crossroads between teaching, accommodating students with special needs, and classroom management, where incorporating yoga into the day becomes beneficial for teachers [1] [2] [3].

Numerous papers focus on the benefits of yoga for students but treat yoga as something that should be added to the day separate from everything else, or as something that can be added onto physical education [4]. However, few papers discuss how yoga can be incorporated into the typical school day [5].

Additionally, few studies are conducted in an elementary school and fewer still focus on young children and preschoolers [2] [6]. The appropriateness of yoga is called into question. Recent systematic reviews of the literature concur that the benefits of yoga to young children are inconstant primarily due to issues of appropriateness in the methods [6] [7]. Meaning that the yoga sessions were unsuitable for children either due to their length, inappropriate testing (asking young children to complete a battery of cognitive tests, or relied solely on self-report measures), or lack of control for confounding variables, such as drugs [2] [4] [7]. Where the duration of individual sessions was listed the studies that did not find yoga to be beneficial were often an hour or longer, with some sessions with four to six year olds being two hours long [6] [7].

The aim of this paper is to examine the literature, in conjunction with the Ontario curriculum in order to establish how yoga can be incorporated into the curriculum. The following study examines how yoga can be taught to young children between the ages of 4 to 8, with the intention of determining which methods are most appropriate for teaching yoga to young children.

Yoga is a Hindu philosophy that teaches people to control their body and mind in order to reach inner peace [8]. Traditionally yoga was a way to unite the physical, spiritual, and emotional aspects of a person, thereby allowing them to reach a state of inner peace, or mindfulness [8]. Yoga has three components: the emotional (breath), the physical (poses), and the spiritual (meditation) [8]. Yoga consists of many different subtypes which focus more heavily on certain aspects compared to other components.

Physically, yoga improves balance, flexibility, coordination; helps develop kinesthetic awareness, and motor skills [8]. Emotionally, yoga helps children recognize and control their emotions and improve emotional regulation, which helps develop empathy and provides them with tools to calm down if they are upset or angry [2]. Socially, yoga improves relationships among peers by building a community of mutual trust and respect; children who can identify and explain their emotions are better able to communicate with others [2] [3]. Developing empathy fosters a greater understanding and appreciation for their peers, thus fostering stronger social ties [3]. Mentally, yoga improves concentration, focus, and creativity. The development of such skills fosters resilience and teaches children the coping skills necessary to encourage mental wellbeing. Thus, yoga allows children to explore and develop their identity [8].

In Canada, the average person starts school at age 6 with the option to start kindergarten at the age of 4, the school day lasts approximately 6 hours with students spending a minimum of 12 years in school. As a result, school is one of the primary means of socialization and has a significant role in shaping people's lives [7]. Consequently, schools have the ability to teach students about health and resilience early so they can form meaningful lifelong habits that positively impact their health over their lifespan [7] [8]. If students are to learn

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they must be healthy both mentally and physically; and research has long established that health and academic performance are closely related [8]. Therefore, it is crucial to develop and investigate programs that improve the overall health and development of children.

## 2. Literature Review

Various articles cite the physical and mental benefits of yoga. Yoga is a means for improving students' academic performance, concentration, and attention, which help children learn and retain new information [1] [2] [6] [5] [8]. Yoga can be integrated into the curriculum to facilitate teaching movement competence and emotional regulation, two key aspects of the physical education and health curriculum [2] [9]. Nevertheless, yoga is not limited to meeting the expectations of the health curriculum. Depending on how the lessons are designed yoga can meet a variety of curriculum expectations in different subjects.

### 2.1. How yoga meets diverse learning needs

Research suggests that yoga can be used to help children diagnosed with Autism Spectrum Disorder (ASD) [6] [5]. Yoga is often taught through imitation, which is a critical skill for all children and one that many children with Autism lack; continuous practice of imitation in young children will improve language outcomes, and social skills [5]. Furthermore, children with ASD often interpret input from muscles easier than other forms of sensory input (e.g. hearing, sight) and as such may have an easier time learning yoga [5]. Developing language and social skills early is critical for any child and has beneficial long-term effects on the outcomes for children, particularly those affected by ASD.

Yoga has been shown to increase in the levels of y-amino butyric acid (GABA) in the brain by as much as 27%. Low levels of GABA are associated with depression and anxiety thus; increasing the levels of GABA in the brain through yoga may reduce the severity of these disorders [5].

Research concurs that yoga is useful for treating children with disorders such as attention deficit hyperactivity disorder (ADHD) by increasing focus and the ability to delay gratification [9] [10]. Some studies suggest that yoga can improve the blood flow to the frontal lobe, thus improving executive functioning [8]. Low executive functioning is a main component of many developmental and learning disabilities [1] [6] [8]. Improving executive functioning improves concentration and memory, boosting the academic performance of all students [2] [7] [5].

### 2.2. Yoga as a classroom management tool

Yoga's primary use as a tool for classroom management is through teaching self-regulation [2, 9]. Teaching children to self-regulate at an early age means that teachers spend less time managing student behavior; as children learn to control the emotions that cause them to act out; leaving more time for teaching [2].

Mindfulness allows children to become aware of emotions and behaviors. Recognizing their emotions and behaviors is the first step to controlling them [2]. Additionally, meditation and deep breathing exercises are commonly used as a way to deal with a variety of emotions such as anger, frustration, sadness, and anxiety. Children and teachers can only benefit when students learn how to calm down when they feel themselves becoming upset or frustrated [2].

## 3. Methods

The population for this study consisted of 20 children between the ages of 4 to 8 who attend a local daycare centre in Sudbury, Ontario. As the research took place over the summer the children were attending full day daycare. The children were previously acquainted with yoga as it had been included in their programming. Before teaching the yoga session, a visit was arranged so the researcher could become familiar with the environment and the children.

The session occurred shortly after lunch and took place indoors due to the weather. Yoga mats were set up in a horseshoe shape, ensuring that all children could clearly see and had enough room to move. The yoga lesson lasted for 30 minutes though an additional fifteen minutes each was given for set up, and to collect feedback after the lesson [7]. The children were absent during the set up of the classroom, and thus the total time of the session was 45 minutes.

The session started with a five minute breathing exercise, wherein students were instructed to close their eyes and put their finger's in their ears, breathe in for 7 breaths, hold the breath for three seconds and breathe out while humming for seven seconds. Putting their fingers in their ears and closing their eyes helped to block extraneous sensory input, while the humming helped focus their attention inwards. Students were asked to repeat this breath 5 times; followed by fifteen minutes of yoga. The yoga poses were demonstrated before the students were asked to try them. The researcher participated in the session along with the children so they had someone to mimic if they needed help. The students were asked to perform 4 different animal poses and to hold each pose for 1 minute and repeated each pose twice. Students were asked to make animal poses while

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exhaling to help them focus on their breath. Students were performed the Cat, Cow, Snake and Bear poses, these poses were chosen as they were simple to perform and were easily adaptable to students needs. To consolidate what they had learned the students were instructed briefly on how to play a game called Bear Hunt. The students would sing the Bear Hunt song while performing the poses that corresponded to the song. Animal poses were used as these poses are simple to learn and often enjoyed by children [2].

To ease into the regular classroom routine after yoga another 5 minutes of breathing combined with stretching took place. Students were instructed to perform the same breath as the one they started with, then tense and release their shoulders, arms, fists, stomach, legs and toes, three times each.

The session concluded with 5 minutes of guided meditation where students were told to close their eyes and imagine a balloon floating on a string, being released and floating up into the clouds before finally coming down to earth. At which point they were told to open their eyes [7]. Finally, children were given 15 minutes to provide feedback and share their thoughts on the lesson.

As a result of the brief nature of the feedback given by the children, qualitative methods were used to pull important themes from the feedback. Themes were categorized based on how they related to the guidelines for early childhood education, and according to what the children thought was the most important part of the lesson.

## 4. Analysis of Findings

All the children could successfully complete the Cat/Cow and Snake poses though three children had difficulty differentiating between flexing and arching their back. One child could not complete the Bear pose in a standing position and had to kneel in order to touch the floor. Most of the children could accurately guess what the poses would look like based on the names of the animals.

The most important finding concerned the attention span and appropriateness of the length of the session. In the beginning of the session 18 out of 20 children chose to participate and preformed the poses (Fig. 1).All of the children participated in the game however, during the breathing and stretching exercises five children began fidgeting and were off topic (Fig. 1). Once the guided mediation session was complete nine of the children had lost their concentration. While giving

feedback thirteen of the children had lost interest and had difficulty sitting still (Fig. 1).

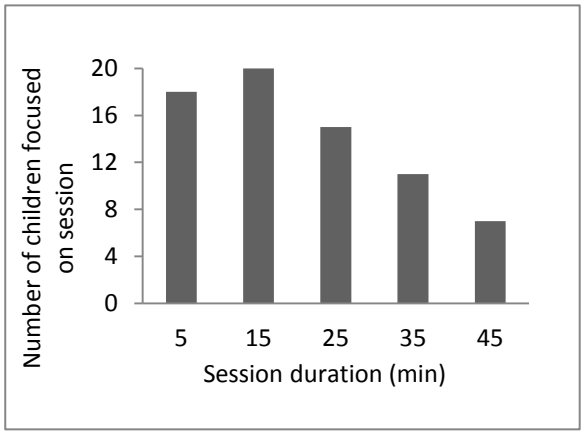


**Figure 1. Students' attention spans over the duration of the session**

## 5. Discussion

Yoga does not have to be taught independent of the curriculum; this merely adds to the workload of both teachers and students reducing the amount of time available in the day. Instead, it is more productive if yoga can be integrated into the curriculum and combined with other teaching expectations. The lesson incorporated curriculum expectations from three different subjects: health and physical education, social studies, and drama [9].

Yoga easily fits into the Ontario health and physical education curriculum, as the meditation aspects of yoga help them learn personal skills like self-awareness; and different yoga poses teach movement competence and help children label body parts teaching children about human development [9]. Teaching yoga to young children sets the foundation for active living throughout the child's life. Furthermore, yoga can be used to teach social studies as mindfulness helps children develop a sense of identity. Yoga also teaches children about other cultural practices and emphasizes the importance of respect for others [9] [10]. Yoga can also be incorporated into drama as poses enable children to learn how to use their bodies to represent characters (e.g. cats, bears, snakes) and ideas (e.g. wind, grass, water) [9].

The kindergarten curriculum in Ontario consists of four key components: engagement, belonging, expression, and well-being [10]. The teacher's engagement is a precursor to the student's success. Disengaged teachers produce disengaged students which is detrimental to the atmosphere and culture of a classroom [10]. In yoga it is crucial that teachers participate in the session because modelling the correct poses allows students to understand how to move their bodies.

Fostering a sense of belonging by creating trusting, genuine relationships between teachers and

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students is crucial for the student's ability to learn [10]. Much of the feedback from the students focused on how much they enjoyed sharing and giving feedback, and how their relationships with others encouraged them to participate in the session. If there is not a positive trusting relationship established in the classroom, students will not contribute to their learning [10]. Yoga teaches children how to express themselves by fostering a sense of identity and using movement to convey meaning, and fosters a sense of well-being as they learn to identify and express emotions in addition to improving their ability to focus and learn new information [2] [10].

For the duration of the guided meditation children began to lose focus and talk with each other (Fig. 1). Many students had difficulty following the meditation as the session started to drift off topic, and the amount of fidgeting increased towards the end of the meditation, around 25 minutes into the session (Fig. 1). This is a key methodological finding as it demonstrates that much of the previous research was not effective as the yoga sessions were not of an appropriate length for young children. This study concludes that yoga sessions should be no more than 30 minutes, as that appeared to be the upper limit of their attention span (Fig. 1). Once students cease paying attention they stop learning, can disrupt the learning of other's and may start displaying behavioral problems. At which point the teacher loses instructional time to classroom management and the children no longer receive the benefit from the yoga.

All of the students provided feedback on how silly the animal noises were, or how much they liked the song. This speaks to the appropriateness of using concrete examples, and songs to make yoga engaging [2].

## 6. Conclusion

A few limitations exist in this study, mainly due to the age of the population. As many students were learning their letters or just beginning to read they were not asked to fill out any questionnaires or to perform a pre and post tests. Additionally, engaging in such tests would have extended the length of the session and students would have lost focus and become disengaged. For these same reason, interviews were not conducted either as they would have been conducted immediately after the lesson, extending the period of time that students were asked to concentrate. Young children often do not give detailed answers to interview questions and feedback was usually brief and often consisted of variations of the phrase "it was fun".

In conclusion, this study has highlighted the inadequate methodologies used in much of the existing research, as yoga sessions over 30 minutes in length are less effective for young children [2] [4] [5] [6] [7]. Therefore, additional research needs to be done using shorter session duration to determine the best practises for teaching yoga to this age group.

## 7. References

[1] S. Avashalom, A. Bar-Dov, and M. Ehud, "Here and Now: Yoga in Israeli Schools", *International Journal of Yoga*, 2010; 3, pp. 42-47.

[2] D. Bergen-Cico, K. Raymond, and R.A. Razza, " Enhancing Preschoolers' Self-Regulation Via Mindful Yoga", *Journal of Child and Family Studies,* Springer Science and Buissness Media, Syracuse NY, 2013; 24(2), pp.372-385.

[3] N. Copeland-Linder, C. Perry-Parrish, E. M S. Siblings, and L. Webb. "Mindfulness-Based Approaches for Children and Youth", *Current Problems in Pediatric and Adolescent Health Care,* Mosby Inc., 2016; 46(6) pp. 172-178.

[4] J. Porter, "Yoga as an Effective Behavioural Intervention for Children Diagnosed with an Autism Spectrum Disorder", *Graduate Annual,* Philadelphia, USA, 2012, 1(9), pp. 25-30.

[5] K. Satheeshkumar, and S. Rajaguru. "Impact of Yogic Practice on Adjustment Behaviour of School Children", *International Education and Research Journal,* 2016, 2(4), pp. 17-18.

[6] B. Butzer, and S.B.S. Khalsa, "Yoga in School Settings: A research review", *Annals of the new York Academy of Sciences,* New York Academy of Sciences, New York, 2016; 1373, pp. 45-55.

[7] J. M. Feitoza, C. Ferreira-Vorkapic, E. Kozasa, M. Marchioro, J. Simões, and S. Telles. "Are there benefits from Teaching Yoga at Schools? A Systematic Review of Randomized Control Trials of Yoga-Based Interventions", *Evidence-Based Complementary and Alternative Medicine,* Hindawi Publishing Co., 2015, pp. 1-17.

[8] L.S. White. "Yoga for Children", *Pediatric Nursing,* Coimbatore India, 2009, 35(5), pp. 277-295.

[9] Ontario Ministry of Education. "Grade 1 Curriculum Documents", *The Ontario Curriculum: Elementary,* Queen's Printer for Ontario, Ontario Canada, 2016.

[10] Ontario Ministry of Education. "The Kindergarten Program" Queen's Printer for Ontario, Ontario Canada, 2016, pp. 46-92.

## Session 12: Educational Foundations

Title: Siyakhulisa: An empowerment driven journey towards quality Early Childhood Development Practices
(Author: Elsa Fourie)

Title: Learning Modules to Enhance Study Skills in an Introductory Psychology Class
(Authors: Ken Cramer, Lisa Plant, Rebecca Pschibul)

Title: Understanding the Ethical Imaginary of Social Science Research in China: A Case Study
(Authors: Bailing Zhang, Dongyan Ru Blachford)

Title: Beyond the Culture of Poverty, Again
(Author: Ray McDermott)

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# Siyakhulisa: An Empowerment Driven Journey towards Quality Early Childhood Development Practices

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## Abstract

*This paper presents a descriptive study of an early childhood development intervention project, grounded in a community-based research approach that resulted in more conducive ECD teaching and learning environments in township ECD centres in the Gauteng Province (Vaal Triangle) of South Africa. During the implementation of the project, grade R (the year before formal schooling) ECD practitioners from townships in the Vaal Triangle of the Gauteng Province participated actively. The ECD practitioners and the researcher planned the intervention programme together. The components of the intervention programme were implemented as intended and what was delivered went according to the way it was planned.*

*Data was gathered through administering open-ended questionnaires and conducting semi-structured, face-to-face interviews before- and after the intervention programme was implemented. The outcomes of this intervention varied. However, reflection from all the participants, including practitioners, lecturers and students indicates that this intervention has addressed the learning needs of Grade R ECD practitioners and resulted in a wide range of learning and development opportunities for children in townships in the Vaal Triangle.*

*It became evident that ECD practitioners face a number of challenges in the implementation of the knowledge and skills that they gained during the intervention programme. Limitations in the management skills of managers (sometimes referred to as principals with no formal training) of the ECD centres, were identified as the most critical challenges. These limitations will be addressed in a next intervention project.*

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# Learning Modules to Enhance Study Skills in an Introductory Psychology Class

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## Abstract

*Two preliminary studies were conducted to investigate the usefulness of learning modules for students in an introductory course. We compared students' midterm and examination scores by those who received two modular skill sets (exam taking strategies and time management) before or after the midterm. Relative motivation, interest, and perceived effectiveness were measured. Results showed a significant association between module delivery and improved performance on the midterm and exam, regardless of when the modules were presented (before or after the midterm). Additionally, students who completed the modules enjoyed them and scored higher on their final exam. Based on these results, we encourage instructors to offer learning modules to students in first-year courses to enhance student success across their college or university experience.*

## 1. Introduction

Many students acquire basic learning skills through special workshops, previous learning experiences, classroom exercises, university counselling services, and tutoring (from either peers or teachers). However, not all students receive these opportunities, and the extent of learning development that occurs will necessarily vary across these students. Previous research has shown that modules which provide much needed skills on time management, exam strategies, reading, and note-taking techniques increase student success through their coursework [3] [8] [15] [17], thereby creating a useful framework from which students can learn effectively. There is reason to believe students will make use of resources provided to them [5] [19] that is, students who acquire these modular skills prior to their midterm should apply them to any given evaluation.

The adjustment period from high school to university or college is often a difficult transition for many post-secondary students. Along with the differences between the learning environments and expectations, students must also learn to firmly grasp (and take responsibility) for their own learning. Essentially, students must become active participants in their own learning process. In the past, statistics have shown that approximately 48% of first-year students were doing less well academically than initially expected, and that only around 7% of these students' expectations matched their actual experience regarding academic requirements and demands [9]. This presents further evidence for the ongoing need of new post-secondary students in navigating the university learning environment so as to reach their full academic potential.

Instilling and developing learning skills in university students is a goal shared by many university and college instructors throughout higher education who seek to prepare their students for post-graduate, real-world situations. The unfortunate reality is that, despite the necessity of these learning skills, many incoming university students lack the ability to learn effectively. Additionally, many professors have perhaps not been educated in the specific manner by which they can foster the development of such learning skills; thus they lack a clear framework or model for how to cultivate these skills in students [1] Professors often also do not have the allocated time to spend with first-year students to ensure that each has the necessary skills to learn successfully. It has further been recommended that faculty members and counsellors should emphasize student participation in furthering their learning skills to improve student academic success, and moreover to buffer the effect of academic stress on students [16].

Researchers have investigated the beneficial effects of offering programs, workshops, and classroom lectures on various learning skills to students to determine the usefulness of such assistance in enhancing academic performance. For example, these studies have looked at time management practices [20], critical thinking skills [1], and strategies for learning success [12] in relation to their effects on anxiety, stress [16], life satisfaction, motivation, academic performance, and overall coping strategies [10]. These studies took place in multiple settings including virtual and on-site classrooms [22], and surveyed various student populations such as high school and college undergraduates [7] [18] and both part-time and full-time students [15], as well as working professionals [13].

The benefits that accompany acquired time management skills, exam taking, and textbook reading strategies will necessarily impact higher

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education in several ways. Recently, growing emphasis has been placed in the modern education system on time management issues faced by students and thus studies on student attitudes and behaviours related to time and its management are being conducted [20]. For instance, numerous studies have demonstrated that time management skills are directly related to successful academic performance [14] [21] moreover, effective time management strategies increase academic performance [4]. Students who do not have such skills are often found to (a) manage their time poorly, (b) have difficulty with allocating time properly for homework, (c) cram for exams, and (d) fail to meet important deadlines. These detriments influence and even augment academic stress, but further impede academic performance [6]. It is also widely understood that, given the continuously changing educational environment, time management is becoming increasingly important. Education offered through e-learning and virtual teaching are gaining popularity; and for such programs where face-to-face time with instructors is compromised or limited, time management becomes crucial for students who are responsible for scheduling their own time for learning [15]. This example demonstrates one of the many ways students can benefit from learning how to learn, study, plan, and use time more effectively. Britton and Tesser [2] examined the effects of time-management practices on college grades and determined that effective time-management practices were significant predictors of grade point average, and ultimately that these practices are positive influences on college achievement. A study by Sevari and Kandy [21] also looked at time management skills but more specifically at its effects on self-efficacy and academic performance. They found that training of time management skills was influential in increasing academic performance and self-efficacy. Macan and colleagues [14] also conducted a study with students assessing their time management behaviours (with the use of a questionnaire), attitudes, stress, and self-perceptions of performance and grade point average. They found that students who perceived control of their time also reported significantly greater evaluations of their performance and work as well as greater life satisfaction and fewer somatic tensions among other variables. For a further review of studies investigating students' time-management skills, see Pehlivan [20]. Overall, what these studies indicate is that skills such as time-management do increase academic performance and therefore ought to be taught to students in an effective manner in order to ensure further academic success in the context of higher learning.

Previous research has suggested that more objective measures of performance, such as grades and test scores, should be used in future research instead of self-reported performance [14], and thus the current research acquired such information of students to determine performance improvement. The present study compared the midterm and final examination performance of students who received two modular skill sets (text reading and exam strategies) either before or after the midterm evaluation. Relative motivation, interest, and perceived effectiveness were also assessed. As a vital benchmark, student test performance was also compared to those students who did not complete either of the two modules. Secondarily, we also wished to determine more definitively when the two learning modules would be optimally delivered for maximal effectiveness – either before or after a midterm test. On the one hand, there is reason to believe that students will make use of resources provided to them [19]. As such, students who acquire these modular skills prior to the midterm will be able to apply them to the present evaluation, though we anticipate that they may not be especially motivated to learn the skills. Conversely, students who already have an evaluation of their performance in the course should be more motivated to learn the materials presented in the modules and should subsequently perform better on future evaluations (i.e., the final examination). Ultimately, it is expected that the students who engage in these learning modules will see their subsequent performance positively improve over time. The activities included in the learning models allow an opportunity for students to practice and receive some feedback on the use of the learning strategies and to transfer material to actual learning environments. The essential goal of the learning modules is to provide students with procedures to follow and resources to use to help avoid or cope with academic difficulties and the stresses of university life.

The learning modules provided information on learning strategies to better prepare students to meet the academic challenges of post-secondary studies. The objectives of these models were to increase the students' knowledge and understanding of learning and study skills as well as to increase their ability to use the learning strategies through practice. Familiarizing and training students to implement time management and exam strategies can be further reinforced when the teaching of skills is part of the meta-curriculum in content-area courses as is the case with these models being presented in the introductory psychology courses. This study considered whether differences in material mastery could be uncovered when comparing students who received learning modules to those who did not.

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## 2. Method Using Study 1

### 2.1 Participants

The flagship first-year Introductory Psychology class at a midsized Canadian university is offered in two large daytime sections taught by the same instructor, plus two evening sections taught by separate instructors. Students in the two large daytime sections were divided (by self-selection) into those who completed the two assigned learning modules ($n$ = 398) and those who did not ($n$ = 427).

Two modules (viz. time management and exam strategies) were presented in twenty-five minute instructional units (i.e., labs) to students either before ($n$ = 220) or after ($n$ = 178) the course midterm conducted six weeks after the start of the semester. The module on time management aimed to improve student's ability to juggle many responsibilities such as academic assignments, a part time job, and family obligations while maintain a social life involving getting out into the community and pursuing varying hobbies. Thus, this module presented a discussion regarding procrastination and study problems related to time management and helped students to identify individual time management problems and implement strategies to solve them. Materials for this module were presented to assist students in the preparation of a semester study plan and activity schedules encompassing: preparing a master list of term requirements, setting up monthly calendars, developing a weekly schedule, and keeping a daily 'to do' list. Ultimately, these in class lab tutorials emphasized that successful time management must be flexible and requires personal discipline.

The module on exam strategies aimed to teach students a new set of techniques to deal with testing in the university setting. The module provided students with information on how to write an objective exam and more specifically how to write a multiple-choice exam. The module also included a discussion regarding test anxiety and how to respond to short answer questions. The main objective of the module was for students to be able to effectively practice and apply general test-taking tips (e.g., trying an initial 'data dump', reading directions and questions carefully, using time wisely, doing the easiest questions first, attempting every question and doing what you can, and actively reasoning through questions) and the nine principles of multiple-choice test-taking: (1) choosing the answer which the test marker intended, (2) anticipating the answer and then looking for it, (3) considering all the alternatives, (4) relating the options to the questions, (5) balancing options against each other, (6) using logical reasoning, (7) looking for special cue words, (8) knowing the specific, detailed answers tend to be correct, and (9) using information obtained from other questions and options. Ultimately, this module aimed to reinforce to students that exam taking, like any other skill, must be practiced.

At the completion of the two modular units, students then indicated their age and sex, and the extent to which they believed they were (a) interested in, (b) motivated by, and (c) focused on the two modules presented (as each was measured on a 5-point Likert scale, where 1 = 'strongly disagree' and 5 = 'strongly agree') (See Appendix for precise working of the survey questions). Using this same scale, students also rated the extent to which they believed the two modules had the potential to be effective in their learning, and that they were presented in a way that could be readily incorporated into their own future studies. Finally, students were asked whether they believed the two modules were presented at an appropriate time in the scope of the course, or whether the two modules should have been presented either earlier or later than the midterm. Student midterm and final examination scores were merged with these survey data to compare module perceptions to student test performance. Upon completion of all materials, students were fully debriefed as to the nature and purpose of the study, including the experimental hypotheses. Students were alerted to the final results once available upon the completion of data collection.

## 3. Findings of study 1

The significance level benchmark was set at alpha = .05 for all statistical tests. However, we wish to caution the reader given that with such a high sample size, significant effects may still be trivial in magnitude. Means and standard deviations can be found in Table 1. Upon analysis of the data, results showed no significant differences (in midterm or exam performance and survey perceptions) between students who completed the modules either before or after the midterm ($p$s > .05). However, several key differences were significant when comparing students who completed the modules to those students who did not. Compared to students who did not complete the modules, students given the two modular units performed significantly better on the course midterm, $t$ (806) = 4.39, $p$ < .001; and exam, $t$ (806) = 3.88, $p$ < .001. Furthermore, when compared to students who received instruction in the evening sections of the same course (who did not receive the two modular units), students who completed the two modules performed significantly better on the course midterm, $t$ (657) = 2.92, $p$ = .004; but not the final examination ($p$ > .05).

Using data from only those students who completed the two modules, an analysis of student assessment of modules to assist learning showed no significant differences ($p$s > .05) in their perceptions of their relative (a) interest in (overall $M$ = 3.49,

*SD* = .94), (b) motivation by (*M* = 3.31, *SD* = .93), (c) focus on (*M* = 3.40, *SD* = .91), (b) effectiveness (*M* = 3.75, *SD* = .72), and (e) likelihood to use what was learned from the two modules in their future studies (*M* = 3.79, *SD* = .95). Using this same scale, students also rated the extent to which they believed the two modules had the potential to be effective in their learning, and that they were presented in a way that could be readily incorporated into their own future studies. Finally, whereas students who completed the two modules *before* the midterm were evenly split on believing the timing of modular presentation was appropriate (49.8%) vs. wishing it to have been presented earlier in the course (50.2%), a majority of students completing the modules *after* the midterm (74.6%) wished that the two modules had been presented earlier in the course, $\chi^2$ (1, *N* = 398) = 23.97, *p* < .001.

## 4. Analysis of findings (Study 1)

Overall, results showed that students who completed the two modules scored significantly higher on both their final examination and midterm scores than participants who did not complete the modules. Furthermore, the moment in the course when the two modules were presented (either before or after the course midterm) was not significantly

**Table 1: Midterm and Final Examination Means and Standard Deviations by Group**

| | N | Midterm Mean (sd) | Examination Mean (sd) |
|---|---|---|---|
| Daytime Lectures | | | |
| Before Midterm | 211 | 63% [a] (.11) | 63% [a] (.14) |
| After Midterm | 170 | 62% [a] (.11) | 61% [a] (.13) |
| No Modules | 427 | 59% [b] (.13) | 58% [b] (.15) |
| Afternoon/Evening Lectures | | | |
| No Modules | 278 | 60% [b] (.13) | 60% [b] (.16) |

*Note*. Means with identical superscripts are not significantly different (*p* > .05).

Related to student performance on either the course midterm or final examination scores. When students were asked if the two modules were presented at the appropriate time in the course, or they should have been presented earlier, students given the two modules before the course midterm were evenly divided (approximately fifty-fifty). However, seventy-five percent of those students who received the two modules after the course midterm believed they should have been presented earlier (even though time of module presentation made no significant difference in student performance).

Further consideration of these results raises additional questions. To begin, we failed to address the issue of assessing which students may have received learning modules or specialty training skills prior to our study, whether recently or in the distant past. This certainly can be assessed and either act as a covariate, or a filter variable that may exclude data from analysis. In addition, we are puzzled by one curious effect; the course midterm scores for students who received modules either before or after the midterm were significantly higher than scores for students who did not receive the two modules; however, some students did not receive their modules until after the midterm was administered, rendering them akin to those who had not received the two modules. Whereas the final examination score is truly the main dependent variable of interest, it remains an odd effect, and warrants a replication. We addressed these questions in the following study.

## 5. Method of Study 2

### 5.1 Participants

The Introductory psychology course at the University of Windsor in Southern Ontario Canada consists of two large sections taught by the same instructor and three afternoon/evening sections taught separately. Students in the two large sections were divided (by self-selection) into those who completed the modules (*n* = 352), either early (*n* = 209) or late (*n* = 143) in the term; and those who did not (*n* = 415). Two modules (viz. time management and exam taking strategies) were presented as a twenty-five minute instructional unit, conducted six or nine weeks into the course. For comparison, 150 students from the afternoon class received the modules early, eighty-one students from one of the evening sections received them later; and eighty-eight students from the other evening class did not receive any learning modules. At completion of the modules, students indicated their relative level of interest, motivation, and focus during the presentation, as well as the likelihood to use modules (as measured on a 5-point Likert scale: 1 = strongly disagree 5 = strongly agree). They also indicated the extent to which they believed the modules had the potential to be effective and were presented in a way that could be readily incorporated into their own studies. Finally, students were asked whether they believed the modules were presented at an appropriate time in the course or whether they should have been presented earlier or later. Student final examination scores were merged with these survey data to compare module perceptions to student test performance.

## 6. Analysis of Findings (Study 2)

There were no significant differences (in exam performance and survey perceptions) between students who completed the modules either before or

after the midterm (that is, early or late in the semester; *p*s > .05). However, some differences were significant when comparing students who completed the modules to those who did not. Compared to students who did not complete the modules, students given skills training performed significantly better on the exam, $t$ (1083) = 2.95, $p$ = .003. Whereas there were no significant differences between students' exam scores in the two pre-midterm module sections ($p$ > .05), exam scores were higher for post-midterm module students in the daytime (compared to the evening) section; $t$ (291) = 2.28, $p$ = .023.

Most students who completed the modules *before* the midterm believed it was an appropriate time of the year (61%); 39% wished it was earlier. However, a greater percentage (75%) of students who received modules *after* the midterm wished they had received the presentation earlier, $\chi^2$ ($N$ = 483, 1) = 61.35, $p$ < .001. In addition, there were several significant differences in the survey based on when students received the two modules in the course of their semester. With respect to perceived interest in the modules delivered, students receiving the two modules before the course midterm were significantly less interested ($n$ = 280, $M$ = 3.47, $SD$ = 1.02) compared to students receiving the two modules after the course midterm ($n$ = 204, $M$ = 3.74, $SD$ = .82); $t$ (477) = 3.21, $p$ < .001. Moreover, with respect to perceived interest in the modules delivered, students receiving the two modules before the course midterm were significantly less motivated by the two modules ($n$ = 280, $M$ = 3.44, $SD$ = .93) compared to students receiving the two modules after the course midterm ($n$ = 205, $M$ = 3.65, $SD$ = .84); $t$ (481) = 2.56, $p$ = .010. Finally, with respect to their level of focus on the modules delivered, students receiving the two modules before the course midterm were significantly less focused on the modules ($n$ = 278, $M$ = 3.50, $SD$ = .93) compared to students receiving the two modules after the course midterm ($n$ = 206, $M$ = 3.66, $SD$ = .81); $t$ (477) = 2.00, $p$ = .046.

**Table 2: Midterm and Final Examination Means and Standard Deviations by Group**

| | Midterm | Examination | |
|---|---|---|---|
| | N | Mean (sd) | Mean (sd) |
| Daytime Lectures | | | |
| Modules Before | 209 | 60% (.12) | 59% (.13) |
| Modules After | 143 | 60% (.12) | 60% (.13) |
| No Modules | 415 | 56% (.12) | 56% (.14) |
| Afternoon/Evening Lectures | | | |
| Modules (Before) | 150 | 59% (.11) | 57% (.12) |
| Modules (After) | 81 | 61% (.11) | 57% (.12) |
| No Modules | 88 | 61% (.12) | 58% (.12) |

## 7. Discussion of study 2

Overall, the results of the second study mirror those of the first; participants who completed the two learning modules performed significantly better on the final examination than participants who did not complete the modules. The exact point in the course when the modules were presented (before/after the midterm) did not significantly affect student performance for their final examination. When asked if the two modules were presented at the appropriate time (or should have been presented earlier), almost three of five students believed the timing was suitable, whereas seventy-five percent of students given the two modules *after* the course midterm believed it should have been presented earlier (even though time of module presentation made no difference in students' final examination results). However, time of modular presentation did affect students' perceptions of the value of the exercises, since each of interest, motivation, and focus were significantly lower among those students who completed the two modules before the course midterm was administered; this suggests that students who performed poorly on the course midterm could well have taken the two modular units more seriously in an effort to finish the semester with a better overall score in the course.

## 8. Discussions

Students attend classes with a variety of educational foundations and skills; these learning modules will ensure students receive a rich educational skill set by which to enhance effective learning in today's context of higher learning. It should be taken into consideration that the correlational nature of these studies precludes making any causal statements. There is a possibility that our results could have been influenced by several other factors such as personality differences, varying personal stress loads, motivational differences, and other forms of tutoring or mentoring. For example, there is some potential for the observed differences in test performance to be attributable to student motivation, which may be improved through appropriate training in general learning skills. That being said, given the introduction of control groups in this study, a similar range of these individual differences was likely present in both groups and thus this possibility is minimized.

Previous research has suggested that even brief training in time management, for example, can have beneficial effects. Expanding this idea of training to delivering learning modules to first year students, for short-term effort the long-term gain appears evident. The skills acquired from these learning modules are those that ought to be offered prior to commencing

post-graduate studies. The current study was undertaken to target the first-year student experience, and to offer and improve the necessary skills to ensure their success. Many instructors who greet the incoming students lament that many students lack the foundations of time management skills, and even fail to appreciate how to effectively take notes in class, study for tests, and how to take tests. These problems have been addressed for the first-year students in the Introductory Psychology class, offering learning modules for these vital skills within the laboratory sessions. Our results show that no matter when in the semester students receive the learning modules, their final exam performance was enhanced after receiving them. Given that past research has found that effective time management can lead to lower academic stress for example [16] further work and research should continue building more structurally sound foundations of student learning

Based on previous research and on our own preliminary studies, the next question is to determine whether more students, across campus, could benefit from learning modules delivered in a convenient and widely accessible online format. We propose to develop a program that will adapt the previously in-lab learning modules into online learning modules format (e.g., time management, note taking, study, memorization, textbook reading and test taking skills). Further development of the presentation of such learning modules by including modular testing of knowledge retained and occasional maintenance sessions of learning module content would prove useful. This program would offer many future opportunities to educational institutions across the country by transforming students' learning experiences as they commence post-secondary studies.

Research and applied work have both shown that regardless of the types of delivery format, applicability of learning content appears to be an imperative issue to enhance student's learning experience in the context of higher education. The skills presented in our learning modules are not only applicable in nature but they are offered in an applicable way being offered during a course semester where such skills are evidently necessary. The goal for this area of research on teaching and learning should be to continue building more structurally sound foundations of student learning by offering basic learning skills (e.g., time management, exam taking strategies, reading, note taking, and study skills) at the onset of post-secondary studies in order to give students appropriate tools in which to use to forge their future.

## 9. References

[1] C. J. Brahler, I. J. Quitadamo, and E. C. Johnson, "Student critical thinking is enhanced by developing exercise prescriptions using online learning modules." *Advances in Physiology Education, 26*, 2002, pp. 210-221.

[2] B. K. Britton, and A. Tesser, "Effects of time-management practices on college grades." *Journal of Educational Psychology, 83*, 1991, pp. 405-410.

[3] P. C. Brown, H. L., Roediger III, and M. A. McDaniel "*Make it stick: The science of successful learning."* Boston, MA: Belknap Harvard, 2013.

[4] R. L. Campbell, and L. W. Svenson, "Perceived level of stress among university undergraduate students in Edmonton, Canada." *Perceptual and Motor Skills, 75*, 1992, pp. 552-554.

[5] H. E. Douglas, M. Bore, and D. Munro, "Coping with university education: The relationships of time management behaviour and work engagement with the five factor model aspects." *Learning and Individual Differences, 45*, 2016, pp. 268–274.

[6] M. D. Gall, "*Making the Grade*." Rocklin, CA: Prima, 1988.

[7] R. García-Ros, F. Pérez-Gonźalez, and E. Hinojosa, "Assessing time management skills as an important aspect of student learning: The construction and evaluation of a time management scale with Spanish high school students." *School Psychology International, 25*, 2004, pp. 167-183.

[8] A. Häfner, V. Oberst, and A. Stock, "Avoiding procrastination through time management: An experimental intervention study." *Educational Studies*, *40*, 2014, pp. 352-360.

[9] E. A. Holdaway, and K. R. Kelloway, "First year at university: Perceptions and experiences of students." *Canadian Journal of Higher Education, 17*, 1987, pp. 47-63.

[10] M. Lincoln, B. Adamson, and T. Covic, "Perceptions of stress, time management and coping strategies of speech pathology students on clinical placement." *Advances in Speech-Language Pathology, 6*, 2004, pp. 91-99.

[11] D. G., Longman, and R. H. Atkinson, "*College Learning and Study Skills*. St. Paul, MN: West, 1988.

[12] D. C. Lynch, S. R. Swing, S. D. Horowitz, K. Holt, and J. V. Messer, "Assessing practice-based learning and improvement." *Teaching and Learning in Medicine, 16*, 2004, pp. 85-92.

[13] T. H. Macan, "Time management: Test of a process model." *Journal of Applied Psychology, 79*, 1994, pp. 381-391.

[14] T. H. Macan, C. Shahani, R. L. Dipboye, and A. P. Phillips, "College students' time management: Correlations with academic performance and stress. " *Journal of Educational Psychology, 82*, 1990, pp. 760-768.

[15] C. MacCann, G. J. Fogarty, and R. D. Roberts, "Strategies for success in education: Time management is

more important for part-time than full-time community college students." *Learning and Individual Differences, 22,* 2012, pp. 618-623.

[16] R. Misra and M. McKean, "College students' academic stress and its relation to their anxiety, time management, and leisure satisfaction." *American Journal of Health Studies, 16,* 2000, pp. 41-51.

[17] L. B. Nilson, "*Creating self-regulated learners: Strategies to strengthen students' self-awareness and learning skills.*" Sterling, VA: Stylus Publishing, 2014.

[18] C. M. P. O'Tuathaigh, E. Duggan, A. S. Khashan, G. B. Boylan, and S. O'Flynn, "Selection of student-selected component (SSCs) modules across the undergraduate curriculum: Relationship with motivational factors." *Medical Teacher, 34,* 2012, pp. 813-820.

[19] M. Peat, C. E. Taylor, and S. Franklin, "Re-engineering of undergraduate science curricula to emphasize development of lifelong learning skills. " *Technology in Education, 42,* 2005, pp. 135-146.

[20] A. Pehlivan, "The effect of the time management skills of students taking a financial accounting course on their course grades and grade point averages." *International Journal of Business and Social Science, 4,* 2013, pp. 196-203.

[21] K. Sevari, and M. Kandy, "Time management skills impact on self-efficacy and academic performance." *Journal of American Science, 7,* 2011, pp. 720-726.

[22] T. Stelzer, G. Gladding, J. Mestre, and D. T. Brookes, "*Comparing the efficacy of multimedia modules with traditional textbooks for learning introductory physics content."* PhD diss., The University of Illinois at Urbana-Champaign, Urbana, Illinois, United States of America.

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# Understanding the Ethical Imaginaries of Social Science Research in China: A Case Study

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## Abstract

*Drawing upon a number of complementary critical social theories [1] [2] [3] [4] [5] [6] [7], this paper explores how "ethical imaginaries" of social science research have been discursively constructed within a specific sociocultural context at the contemporary era of globalization. Through conducting in-depth, semi-structured interviews with twelve faculty members from social sciences departments at universities across mainland China, this paper examines the prevailing social discourses and cultural realities that have shaped the research ethical imaginaries among these academics. The findings suggest that the ethical imaginaries of the participants have been constructed through their continuous negotiations with various global, national and local discourses. In the end, the paper points to the importance of localizing the research ethical imaginaries and constructing a culturally sensitive ethics approval process in China and beyond. This paper enriches the debates on social science research ethics at the present stage of globalization and has both empirical and theoretical implications for future studies.*

## References

[1] Ball, S. J. (1994). Education reform: A critical and post-structural approach. Buckingham: Open University.

[2] Ball, S. J. (2005). Education policy and social class: The selected works of Stephen Ball. London: Routledge.

[3] Ball, S. J. (2013). Foucault, Power, and Education. New York: Routledge.

[4] Ball, S. J., Maguire, M. & Braun, A. (2012). How schools do policy: Policy enactments in secondary schools. London, UK: Routledge.

[5] Foucault, M. (1980a). Truth and power, in C. Gordon (ed.) Power/Knowledge: Selected interview and other writings 1972-1977 (pp. 109-133). Brighton: Harvester Press.

[6] Foucault, M. (1980b). Two Lectures, in C. Gordon (ed.) Power/Knowledge: Selected interview and other writings 1972-1977 (pp. 78-108). Brighton: Harvester Press.

[7] Foucault, M. (1988). Technologies of the self. In L. Martin, H. Gutman & P. Hutton (Eds.) Technologies of the self: A seminar with Michel Foucault (pp. 16-49). Amherst: The University of Massachusetts Press.

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# Beyond the Culture of Poverty, Again

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## Abstract

*The This paper explores a half-century of Culture of Poverty thinking applied to the description and alleviation of the plight of the poor: from its beginning in 1959, through its prominence in the1960s, to its research-led rejection from 1968 to 1980, and finally to its surprising reemergence in the last decade. The primary claim of Culture of Poverty thinking is that poverty can become a way of life and that children raised among the poor not only suffer a lack of material resources, but diminished skills and values that might aid their move into the middle classes. The primary critique is that Culture of Poverty thinking blames the poor and excuses more successful citizens for their role in suppressing the poor. At its worst, Culture of Poverty thinking assumes, documents, remediates, and replicates the bias against the poor: that broken circumstances lead necessarily to broken children.*

*A historical discussion pits the work of early enthusiasts (anthropologist Oscar Lewis, who coined the term, sociologist Daniel Moynihan in his report on The Negro Family, and psychologist Martin Deutsch, who measured and made policy out of the cognitive skills of the "culturally deprived child") against their critics: linguist William Labov, who showed that the language of African American poor children was as fully coherent and useful as its more school based middle class alternative; psychologist Michael Cole, who showed that the cognitive skills much prized in school had a full life of development among poor people in both village Africa and inner-city American schools; anthropologist Eleanor Leacock, who described the ideological biases of the white middle class analyses of those they thought to be lesser; and novelist Toni Morrison, who delivered portraits of how the racial and class biases of the whole society play out in the daily lives of children. All the critiques make two points: first, that whatever poor children seem unable to do they can do well under encouraging circumstances; and, second, that schools and high-policy reform programs rarely deliver the circumstances that poor children might use to show their cultural wares; in a badly divided society, reforms can make things worse.*

*In the last decade, culture of poverty ideas have reemerged in the work of Michèle Lamont, Mario Small, and especially, and for a far longer period of time, William Julius Wilson. The new culture of poverty theories are remarkable in repeating the mistakes of their predecessors and ignoring the empirical and analytic work brought to down on the early culture of poverty theories by their critics. Our response is to reapply the critiques of the 1960s and 1970s to current formulations.*

*The paper concludes with an anthropological discussion of how reform moves often make a social problem worse by having individuals named, studied, and explained as social problems. People of conscience are often concerned for the poor. Hand-wringing policy makers record and report the problems. They do their best. Someone should fix it, they say, and we say, but grand efforts do not help enough. Full employment or a sufficient wage for all heads of family might have a better chance, but until that version of redemption takes center stage, we face a smaller and trickier task: how not to make things worse by turning the poor over to mainstream social sciences for objectifying interrogations and self-aggrandizing explanations.*

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## Session 13: Learning / Teaching Methodologies and Assessment

Title: A Study on Interactive Learning for Students' Understanding
(Author: Yoshinori Naruse)

Title: Review on Learning Theories of MOOC and other Investigated Educational Aspects that Lack on E-learning Environment
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Title: Assessment of Learning Outcomes of Medical Students in First Year MBBS Based on Blooms Taxonomy
(Authors: Hamid Mahmood, Amara Waqar, Sohail Rasul)

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# A Study on Interactive Learning for Students' Understanding

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## Abstract

*Active learning is extremely effective for encouraging students to take the initiative in solving given tasks. Interactive learning and group work should be employed in class to raise students' independent and active learning attitudes. Evaluation activities also influence the effectiveness of their interactive learning. This paper presents a description of interactive learning using evaluation activities and describes observations of their educational effects.*

## 1. Introduction

Teachers in Japan are expected to have skills for using Information and Communication Technologies (ICT) in class effectively and are expected to promote active learning. Several approaches to active learning have been demonstrated by teachers in Japan. The Ministry of Education, Culture, Sports, Science and Technology, Japan (MEXT) has reported that proactive learning, dialogic interaction, and deep considerations are extremely important to promote active learning [1].

The use of ICT in class has four purposes: to improve students' ICT skills, to improve basic academic skills, to stimulate group work, and to enrich students' understanding. The purpose of active learning is to encourage students to learn how to take the initiative in solving given tasks [2], [3]. Students' group work and their interactive learning activities should be promoted to achieve these purposes.

Especially, interactive learning among students has drawn attention for K-12 education. Many studies have examined educational systems in which students work for a given task with others and solve it [4], [5]. However, educational effects of their system are not investigated fully. It is necessary to investigate educational effects for learners' works taking in mutual assessment because their works promote interactive learning among students.

Activities were conducted for in-service teachers and students hoping to become educators. The two evaluation activities were conducted to develop students' interactive learning. Students had a lesson in which the importance of self-evaluation and self-evaluation items were explained to them. Students reflected on their activities and examined them objectively by themselves. Later, students evaluated their activities using self-evaluation items. Student activities were also evaluated by other students in the classroom. Every student evaluated others in the classroom using the same self-evaluation items. Some students realized that several items were more highly evaluated by others than by their self-assessment. This report describes these two valuation activities.

## 2. Interactive learning through mutual evaluation

It is meaningful for teachers to have the capability to analyze activities and to deepen their ability of self-analysis by being evaluated by others. Details of activities for self-evaluation and evaluation by others are described next. Teachers created their ICT materials. Each teacher gave a trial lesson for ten minutes in their group. When trial lessons finished, they evaluated ten-minute trial lessons using five evaluation items: 1 Display of lesson goals and check of learning attitude, 2 Clarity of learning processes, 3 Preparation of thinking time, 4 Confirmation of learning contents, and 5 Application of learning contents. After evaluation activities were completed, the author presented the two evaluation results to the teachers in the course: self-evaluation by each teacher and evaluation by observers in a trial lesson.

It is worthwhile to reflect upon class activities objectively. Self-reflection strengthens the abilities of self-analysis and quality improvement. Evaluating other teachers' activities also cultivates abilities of self-evaluation. The author explained the usefulness of evaluation activities to teachers in the course after they had experienced self-evaluation and evaluation by other teachers in the course.

Table 1 presents the results. These results demonstrate that the values of self-evaluation are lower than those of evaluation by others, and that in-service teachers evaluated their own classes very strictly. These results also suggest that self-evaluation and evaluation by others are extremely effective because teachers read the results of evaluation by others for reference when they

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evaluated themselves. Consequently, they recognize what they did not notice by themselves and understood what they should revise, reviewing evaluations by others.

**Table 1. Difference of the mean values between self-evaluation and evaluation by others**

| Evaluation items | evaluation by others | | self-evaluation | |
|---|---|---|---|---|
| | mean value | standard deviation | mean value | standard deviation |
| 1 Display of lesson goals and check of learners' attitude | 4.15 | 0.43 | 3.54 | 0.66 |
| 2 Clarity of learning process | 4.14 | 0.41 | 3.46 | 0.88 |
| 3 Preparation of thinking time | 4.48 | 0.35 | 4.08 | 0.49 |
| 4 Confirmation of learning contents | 4.19 | 0.61 | 3.62 | 0.87 |
| 5 Application of learning contents | 3.94 | 0.71 | 3.38 | 0.87 |

## 3. Interactive learning using immediacy of ICT

A salient educational benefit of ICT use in the classroom is that it offers students' immediate responses to teachers. The author conducted educational activities using an e-learning system. Information ethics was a discussion topic of the activities. After students watched a two-minute video about the topic, they thought about several problems presented in the video and considered how a main character in the video should make a good decision in a situation. Three solutions were explained to students using the e-learning system.

1. The main character should discuss a problem with persons who caused the problem.
2. The main character should discuss a problem with persons who were adversely affected by the problem.
3. The main character should consult with teachers about the problem.

Then students chose one solution from the three. Student choices were collected and presented to them instantly. Students grasped a tendency of their choices. Teachers explained several problems that might arise from each solution.

Students then made groups of two or three, discussed the problems in groups and deepened their understanding. The same three solutions were presented to students again. Students chose one solution from the three and reflected upon the results. In this way, interactive learning was introduced to the class to develop students' understanding.

Results of votes cast on the first day were shown to students immediately: 55% of students chose 1, 39% of students chose 2, and 6% of students chose 3.

Teachers explained problems that might arise from each solution. They asked students to consider this topic again in their groups. Students chose one of three solutions again.

Finally, students' three solutions were presented to the students once more. The results were displayed on the screen: 44% of students chose 1, 31% of students chose 2, and 28% of students chose 3. Some students changed their opinions and chose different solutions.

Interactive learning activities were conducted in this lesson. Such interaction enabled students to realize differences between their own opinions and others' opinions through reflection upon their self-evaluation.

## 4. Conclusions

Japanese K-12 education requires interactive learning activities because the possibility exists that students create new ideas through collaborative work and deepen their understanding through interaction and reflection. ICT should be recommended for use in developing students' interactive learning.

## 5. References

[1] Ministry of Education, Culture, Sports, Science and Technology, http://www.mext.go.jp/b_menu/shingi /chukyo/chukyo3/053/siryo/__icsFiles/afieldfile/2016/08/02/1375316_1_1.pdf, 2016. (Access date: 15 February 2017)

[2] Fujishiro, N., and Miyaji, I., "Effectiveness of Blended Instruction in Class on the Skills of Oral Reading and Speaking in English", *Educational Technology Research*, 32(1), 2009, pp.79-90.

[3] Naruse, Y., "A Study on the Class of Learning Optimal Decision Making Using AHP", *Journal of Japan Society of Educational Information*, 25 (1), 2009, pp.25-35.

[4] Mizuochi, Y., and Nishikawa, J., "Indirect Transmission of Computer Literacy by Making Visible Other Student's Learning Situation", *Japan Journal of Educational Technology*, 2003, Vol. 27, Suppl., pp.177-180.

[5] Naruse, Y., Miyaji, I., Toga, S., Hayase, Y., and Hayakawa, Y., "Educational Effect on Analyzing Others' Experimental Products", *Proceedings of Society for Information Technology & Teacher Education International Conference*, New Orleans, U.S.A., 2013, pp. 3996-4000.

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# Review on Learning Theories of MOOC and other Investigated Educational Aspects that Lack on E-Learning Environment

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## Abstract

*Learning theories (LT), and other educational aspects are not usually considered and weighed during implementing e-learning environment, especially in open courses like MOOCs. This review discusses the recent advances in fundamental learning theories that form a solid introduction to initiate standard LT for e-learning environment. In fact, LT's should be emphasized on independent self-study environment to enable learners acquire knowledge in a structured way, where they can re implement it in a different environment.*

## 1. Introduction

This review aims to uncover the principles behind learner disengagement in MOOCs and is broadly applicable to any e-learning environment in general. Massive open online course (MOOC) is a form of e-learning that has become popular in recent years and is a major topic of interest in the field of educational technology [1] [2] [3] [4]. MOOCs promise free or low-cost access to online education for anyone from anywhere in the world, without the need for pre-qualifications or any other pre-condition [2] [5] [6]. Because of their popularity, some MOOCs have seen enrolments exceed 100,000 [2] [5]. Despite their initial promise, the experience of MOOCs has been a mixed bag. Although there usually is a very high enrolment rate at the start of a MOOC, there are also a significant number of inactive participants (enrolled learners who do not interact with the available course material and/or with other learners). As the course progresses, it tends to experience a steep dropout rate, representing poor engagement across all aspects, particularly in terms of active engagement with the MOOC environment's tools, the course content, and peer learners [7] [8]. Recent research has considered poor active engagement with resources and peers as a feature of any online education platform [3], whereas other research suggests that poor engagement is the result of other factors such as the immaturity of MOOC environment and the tools currently available to empower and engage learners.

## 2. Issues causing learner disengagement and methods suggested to overcome them

Researchers have suggested various reasons behind learner disengagement on MOOCs. For example, one of the reasons suggested is the absence of teacher–student interaction [9]. It is known that observation by and interaction with more experienced individuals, such as teachers or highly qualified people, increases problem solving and aids in improving learning ability [10], and these aspects are inherently absent in the MOOC environment. Instead, they have been replaced with structured scaffolding strategies [11]. In addition, implementing meaningful systematic feedback upon task accomplishment, regularly monitored by real tutors, has been suggested as an essential method that could be used to support learner engagement; this was discussed as a motivational method that encourages learners to engage with the learning platform [12] [13] [14].

However, despite these strategies, learners continue to drop out and disengage with MOOCs, even when they are launched by highly specialized institutes like the Massachusetts Institute of Technology [15]. And even though researchers have proposed several methods to reduce learner disengagement on MOOCs, learners continue to disengage significantly [16]. In the remainder of the paper, we will discuss most recent and intensively researched issues that are major factors that are interfering with learners' engagement and disengagement with MOOCs.

## 3. Learning processes and learning theories

Learning theory provides an insight into what it means to learn, and how learning is perceived to occur [17]. It explains the psychological process of learning in regards to the cognitive process, specifically the way in which learners interact psychologically and how that changes their concepts [17]. In addition, learning theories clarify how

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learners understand the surrounding world and how they interpret situations and actions [17]
Hence, learning theories have been considered by number of researchers as a significant field that needs to be improved on MOOC platforms [5] and how it could significantly effect improving learner's engagement on e-learning and MOOC environment as learners need an online tailored learning theory that adjusts to the e-learning environment [18] [19]. In general, researchers have noted that one of the major disadvantages of e-learning is its lack of designed learning theories and pedagogies [18] [19].

### 3.1. What is learning?

Although all learning is considered to be rooted in and founded biologically and neurologically [20], the process of learning has been defined in various ways by researchers; some define it simply as the process of acquiring knowledge, while others define it as "an increase, through experience, of problem solving ability" [21]. Similarly, e-learning is defined as the "delivery of learning, training or educational program by electronic means" [13]. Alternatively, it is also defined as "the delivery, over the internet, of concise and dynamic educational content and instructional methods which aims to build knowledge and skills for quality learning" [18]. For our analysis, we are more concerned with the second definition as it caters to our aim of precisely building knowledge as a dynamic approach due to the vast community of learners and resources rather than delivering it. In addition, MOOC can specifically be delivered via the wide web and not over a LAN or other electronic means.

David Scott [11] defines learning as internally sequenced processes. This has implications for the types of learning that can take place, such as retaining the original concept, attaching new concepts, deleting concepts and making progress in a concept. A concept or the initial brief knowledge is acquired and formed in the first place within a socio-historical context, which is then externally and internally mediated based on the life the person is leading. The form taken is determined by whether the learning process is cognitive, affective, conative, metacognitive or expressive [11], whereas some researchers believe the four can serve as learning tools [22]. In brief, cognition is a set of learning processes that deal with the process of relating, sorting, practicing, memorizing, concreting, retrieving and analyzing knowledge [23], whereas metacognition is the higher level of cognition [22], described as the control of the cognition processes [10] or the knowledge of cognition [22]. On the other hand, affective learning has been characterized with eight learning activities (attributing, motivating, concentrating, judging one-self, appraising or valuing, exerting effort, generating emotions and expecting) [22] whereas conative learning deals with the control or awareness of emotion and desire such as drive, persistence, preservation, will, or sometimes the feeling that is applicable to interests and achievement [24]. Kellogg [25] defined four major types of learning: non-voluntary or forced conditioning, skills, perceptual learning and conceptual or symbolic learning. Based on above discussion, Figure 1 could be used as guidance for planning creating learning material for MOOC platform.

In Figure 1 we illustrate that learners are introduced to the learning processes within the social context, in our case it would be by watching a video of the instructor introducing the topic of the lesson. Learners will be provided with allocated resources that are configured as appropriate for the learning level and topic. In addition, various types of motivational methods such as pop up positive messages on achievements, hints on learning strategies drive the learning into peer- collaboration. This in return increases the variety of activities, concepts and other aspects on the learning processes. The learners, based on individual preferences, learning style as well as the provided external stimulus on the MOOC environment in general, process the information using one or more of the learning processes; affective, conative, cognitive, expressive or met-cognitive. This process leads to one or more of the four major types of learning (non-voluntary, skills, perceptual or conceptual) learning. Thus, learners form one or more of the knowledge construction (retaining, attaching, deleting or making progress on concept) as an outcome of their learning process. As we become aware of at least one suggested flow of learning process, we will plan and allocate the learning material on the MOOC environment in more useful way.

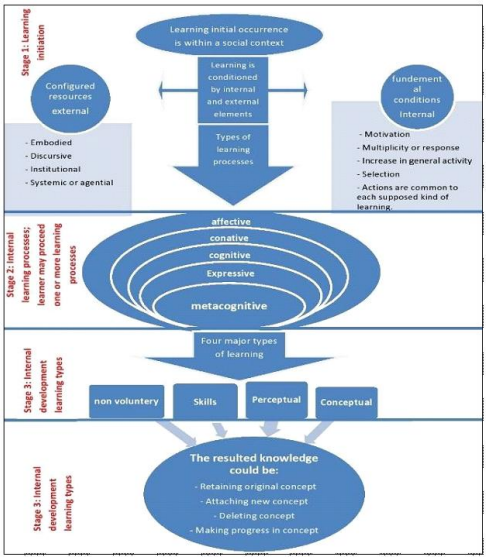


**Figure 1. Summary of the internal and external learning stages**

### 3.1. Human learning and memory

The lesson content's design should consider learner memory capacity and information retention and retrieval [26] [11] [18], and facilitate information storage in the long-term memory [10]. This involves engaging learner attention by presenting the learner with material within a limited timeframe and with a specific number of concepts, ideally around seven concepts [27] [28].

Working memory is a cognitive mechanism in learning and researchers argue that working memory has a limited capacity for storing and consolidating information within complex activities, and it is centralized within an executive system that is supported by two domain storage components [29]. and researchers have developed different types of successful methods to improve working memory [29]. In MOOC's the learning material should be delivered in a meaningful way that promotes knowledge construction, rather than retention; in other words, it is building new concepts over prior existing knowledge. In addition, the courses should be comprised of visual and audio material [10].

## 4. Fundamental learning theories review

### 4.1. Behaviourism

One of the oldest and first learning theories is Behaviourism. Behaviourists [10] [11] [30] initially started by describing the learning process as an automatic, involuntary, permanent change in a person's behaviour which is a reaction to environmental stimulus. Behaviourist-led teaching strategies involved individuals learning within conditioned environments and performing correctly based on external feedback [30]. Some researchers questioned whether behavioral learning is purely automatic or whether it is an automatic response to the interpretation of cognitively processed, symbolic stimulus [25]. Therefore, researchers have extended the behaviourist process's description; for example, Pavlov's [10] theory of classical conditioning states that learning is an involuntary response or reflex, and a change in behaviour based on environmental stimulus. Skinner's [10], theory of operant conditioning discussed a method of managing this type of learning.

### 4.2. Cognitivism

Behaviourists were challenged by cognitivists who suggested that the human being is an active learner who selects, filters and evaluates based on his or her needs and goals [10], and that such processes take place within social interactions and not inside the learner's mind [11]. Cognition learning theory has had a wide influence in modern learning, particularly with the two concepts of assimilation and accommodation. Assimilation suggests that knowledge is acquired through relating new information to prior existing knowledge, whereas accommodation suggests that learners adjust, amending or adding to the prior knowledge in order to fit with the new information [10] [30].

### 4.3. Bloom's Taxonomy

Bloom's Taxonomy [31], divides the cognition domain or ability of learners into six levels which are ordered from simple to complex. It starts with the knowledge level which represents the lowest category as information is processed with a minimum understanding. Then it progresses into Comprehension, Application, Analysis, and Synthesis. The highest level is Evaluation which involves critical judgement and it exhibits the accumulative inputs of the five preceding levels. In Bloom's Taxonomy researchers argue that higher level of instructional questions, driven by the Bloom's Taxonomy, may improve learner's achievements [31]. Each category of the six level of Bloom's Taxonomy has been divided into sub category [32].

## 5. Suggested learning theories for MOOC

In modern learning research [10], the learning process has been defined from three perspectives: behavioural, cognitive and social. The process starts with acquiring the knowledge through stimulus-response behaviour, and then it is constructed through cognitive processes. Researchers do not define learning, such as cognitive or behaviour as simple processes anymore; they include other essential aspects that have direct impact on learning such as personal perspectives of the world, time, situations, and reciprocity between learners and cultural practices [20].

### 5.1. Connectivism

Connectivism has been suggested as a learning theory that matches MOOC environment as it relies

on knowledge creation and generation by learner rather than duplication where learners act as passive member. However, the theory has been debatable since its suggestion and has not been agreed on by a wide range of researchers [33] [34]. On the same topic, researchers have stated that the fundamental challenge on e-learning (where MOOC is one of them) is to reduce structure of content and to increase the dialog to move the learner from the state of being a recipient to an actively interacting member with objective knowledge and to perceive it as his/her own [35].

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### 5.2. Inquiry-based learning theory

One of the modern learning theories that facilitate cognitive learning which could be adopted in MOOC platforms is inquiry-based learning. This method encompasses many strategies: inquiry, expository and discovery learning, problem-based learning and experiential learning. And learners are driven to work collaboratively on a problem, and gain hands-on field experience in order to define, examine, analyze, evaluate and present their own ideas and concepts [10]. These strategies mainly focus on enhancing learners' deep thinking, i.e. generating new knowledge rather than merely repeating information. Hence, there is a greater chance of meaningful learning occurring, particularly in terms of memorizing and the ability to transfer the acquired knowledge to a new field [10] [36].

### 5.3. Sociocultural learning theory

Powerful construction of knowledge was developed over decades within organizations as people teach each other [20]. Based on this fact, Socio-cultural theory has been defined as a main learning theory [10], which is concerned with peer collaboration learning and can be designed and implemented as an important method on our user model. . In order to create successful peer collaboration, some researchers believe that learners should be categorized based on their shared interest and experience, and placed within small groups to avoid cognitive conflict and to reduce noise [14]. However, other researchers believe that the highest cognitive functioning occurs when learners from different knowledge and cultural backgrounds collaborate [6].

### 5.4. Other learning theories

Constructivism learning theory is based on the philosophy that learners acquire and build their knowledge through their interactions, both socially and with the environment [19], which has been main learning theory on many MOOCs. Constructivism defines learning as mental work [30]. Ideally, Constructivism would be initiated through external stimulus. It would then be cognitively processed and encourage the learner to adjust their thinking [37], as the learning progresses, from simple to complex concepts [25] [13]. Therefore, the learning material must enable learners to construct the knowledge rather than reproduce it [19].

## 6. Suggested pedagogies for MOOC

It is widely believed that quality instructions are what actually affect learning process and it is not the learning medium. However, this perspective has been challenged by the educational technology community who argue that media matter too. All media tend to support specific types of instruction and are less supportive of others [9].

To plan a whole course, the tutor would resolve the following question: what will the learners be able to retain in one or two years after completing the course? This allows the tutor to estimate the course learning goals. In addition, it will help him or her to develop the objectives of the course content. The tutor should then identify how learners accomplish these objectives [19]. The tutor should keep in mind that e-learning theories overlap with other theories, such as psychology and how people learn in general, the theory of how learners' behaviour changes depending on the interface, and the theory of information construction and how it is retrieved by computers.

There are several suggested pedagogy designs to be implemented in a MOOC platform. The first one is technology-led curriculum design, where the default environment structure, content design tools and template are built for the tutor to use and loaded with the learning material. The other approach is pedagogy-led, where the learning material and models, outcomes, activities, strategies and goals are defined first, then the platform is implemented based on these inputs. The third approach is learner-centered, which relies on pre-assessment of the learners to define their level of knowledge with the content, previous experience, learning needs, and other learning variables, such as the best motivational methods, and then designing the content level, sequence, and activities that best cater to the learners' attributes [13].

In addition, subjects are introduced to the concept through a process of simplification and elaboration [21]. This may include using a real-life example which represents or is directly related to the topic, or giving a clear, short definition followed by an elaboration [11]. Furthermore, providing the learners with information on what they are going to learn and how they will do that—known as goal clarity—is another element of effective learning [9], as it improves metacognition in learners [13].

Each lesson could start with a stimulation method, such as an answer-driven question, diagram or relevant documentary. This is to be followed by tools which help retain the acquired knowledge, such as guiding the learner to write a short reflection (a form of cognitive learning [11] and applying reflection to improve the level of cognitive learning [18] [37] as it is believed that it highly promotes knowledge transfer [22].

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## 7. Learning style on MOOC

Learning style [23] is another aspect that needs to be considered while developing the learning material presentation for a MOOC platform [18], as content presentation in online learning is a significant determinant of learner engagement [19]and in facilitating learning transfer [36]. In this respect, it is widely agreed that individuals' choices regarding learning approach and learning process, as well as their personal preferences, have a direct impact on achievements and learning outcomes. Hence, researchers define a scale for learning style based on learner interaction (Independent/dependent, collaborative/competitive, participant/ avoidant) [23]. These layers can be utilized to plan course content.

Learners may be initially presented with text and visual information to assess their response level to each type, as individuals have preferences for visual or verbal and this has an impact on their learning [23]. Then, based on the results and the number of completed text-based tasks and visual-based ones, they would be advised and allocated the resources that best support their learning style [38].

## 8. Learning strategies

Good learning habits or strategies result in good academic performance [39]. Learning strategies is defined as the strategies that a learner chooses to deal with different tasks while learning [23]. Consistency in presenting structured resources both supports and enhances learners' self-regulation [20], which is an essential feature required of e-learners, whereby they are able to monitor their learning and act independently [11] [40], and in fact self-regulation has been promoted in education and learning in general and not only on e-learning [22].

Self-regulation in learning includes metacognitive, motivational and behavioural processes which are established by the learner to acquire knowledge and skills [40] [39]. Individuals with self-regulation skills are able to plan their learning strategies, record, observe, evaluate and reinforce their learning, and undertake other self-initiated processes in order to achieve more proactive learning [40] [14]..On the same field, researchers believe that in order to produce effective learning, learners should extend their self-regulation to co-regulation, where they discuss, debate and analyze each other's ideas collaboratively [14] as co-regulation support learner's metacognition which is an advanced level of thinking [41].

Hence, a MOOC platform should implement a clear, structured yet flexible design and access to resources to promote learners' self-regulation. Researchers have developed various self-regulation tools and environments, such as gStudy and MetaTutor [40] which could be utilized in MOOC.

## 9. Learning transfer

Learning transfer is viewed as a critical factor in validating effective learning [13]. Hence, learning activities should aim to equip learners with the ability to transfer knowledge into another environment [36]. In learning transfer, learning material may adopt the symbolic approach to knowledge transfer, while maintaining the same underlying system of relationships [36]. Cognitively, this is the learner's capacity of analogy, where he or she sees connections between the systems of relationships in two represented situations (their "deep structure", which is a similarity in the structure of the knowledge rather than the surface), regardless of any differences in the objects and features they involve (their "surface features") [36].

An approach that is proven to enhance learning and knowledge transfer within complex contexts is labelling as this emphasizes the structural relationship [36]. Other researchers suggest strategies which have been successfully implemented in e-learning environments and proven to support learning transfer; these include learning by doing, problem-based learning, case-based learning and action learning [13].

Based on our review, there are some strategies that enable learning transfer, for example learning goal. There are two types of learning goals in education: mastery goal and performance goal [37]. The first focuses on deep learning and has an internal motivation which lasts longer as the learner is not satisfied unless he or she masters the skills they are trying to learn—this, in turn, has a positive impact on the learner's achievement. Mastery-goal learners automatically use reflection and critical thinking as they enable better understanding of information and the development of new skills [37] and this offers better chance for learning transfer.

On the other hand, Performance-goal learners aim to perform the task and receive immediate outcomes which means this goal type is related to surface learning [36] [37]. Goal performance relies on external feedback and it has a short-term motivation. Accordingly, some researchers argue that performance-goal learning still has a positive impact on learners as it motivates them to accomplish tasks and learn skills in order to obtain positive feedback, and this could be another approach to learning [37].

## 10. References

[1] Baggaley, "MOOC rampant", Distance Education [serial online], 2013, 34(3), pp. 368-378.

[2] C. Sandeen, "Integrating MOOCS into Traditional Higher Education: The Emerging "MOOC 3.0" Era", The Magazine of Higher Learning, 2013, 45(6), pp. 34-39.

[3] D. Clow, MOOCs and the funnel of participation. In: Third Converence on Learning Analytics and Knowledge. ACM, New York, 2013, pp. P185-189.

[4] P.J. Muñoz-Merino, "Precise Effectiveness Strategy for analyzing the effectiveness of students with educational resources and activities in MOOCs", Computers in Humman Behavior, 47, 2014.

[5] T. Daradoumis et al., "A Review on Massive E-Learning (MOOC) Design, Delivery and Assessment. Compiegne, Eighth International Conference on P2P, Parallel, Grid, Cloud and Internet Computing (3PGCIC)", 2013, pp. 208-213.

[6] Mackness et al, The ideals and reality of participating in a MOOC. In:Dirckinck-Holmfeld, L., Hodgson, V., Jones, C., De Laat, M., McConnell, D. and Ryberg, T., eds.. Lancaster, s.n., 2010, pp. 266-275.

[7] J. B. Huett et al., "Improving the Motivation and Retention of Online Students Through the Use of ARCS-Based E-Mails", American Journal of Distance Education, 2008, 22(3), pp. 159-176.

[8] A. Pamela, D. Brayant, "Pre-entry Variables Related to Retention in Online Distance Education", American Journal of Distance Education, 2004, 18(4), pp. 199-206.

[9] K. Swan, "Learning effectiveness: what the research tells us", Elements of quality online education, practice and direction, 2003, 4, pp. 13-47.

[10] Collins et al., "Educational Learning Theory", International Encyclopedia of the Social and Behavioral Sciences of Social and Behavioral Sciences, 2002, pp. 4276–4279.

[11] D. Scott, "Theories of Learning Overview Introduction Editor ' s Introduction : Learning", In: D. Scott, ed. Theories of Learning. s.l.:SAGE Publications Ltd, 2013, pp. 2-32.

[12] Kop, Helene, Mark, "A Pedagogy of Abundance or a Pedagogy to Support Human Beings? Participant Support on Massive Open Online Courses", International Review Of Research In Open & Distance Learning, 2011, 12(7), pp. 74-93.

[13] D.H. Lim, "A Comprehensive Approach of E-learning Design for Effective Learning Transfer", International Journal on E-Learning, 11(1), 2012, pp. 55-71.

[14] K.J. Topping, "Trends in Peer Learning", Educational Psychology, 2005, 25(6), pp. 631-645.

[15] Breslow, et al., "Studying learning in the worldwide classroom: Research into edX's first MOOC", 2013.

[16] R.F. Kizilcec et al, "Deconstructing disengagement: analyzing learner subpopulations in massive open online courses", In In Proceedings of the third international conference on learning analytics and knowledge. s.l., ACM, 2013, pp. 170-179.

[17] C. Haythornthwaite, R Andrews, "Theories of Learning Introduction", In: E-Learning Theory and Practice Theories of Learning . London: SAGE Publications Ltd, 2011, pp. 28-45.

[18] A. Pange, J. Pange., "Is E-learning Based on Learning Theories? A Literature Review:, International Journal of Social, Behavioral, 2011, 5(8), pp. 56-60.

[19] A. P. Rovai, "A constructivist approach to online college learning", Internet and Higher Education, 2004, 7(2), pp. 79-93.

[20] R. Säljö, "Learning, Theories of Learning, and Units of Analysis in Research", Educational Psychologist, 2009, 44(3), pp. 202-208.

[21] J.N. Washburne, "The definition of learning", Journal of Educational Psychology, 1936, 27(8), pp. 603-611.

[22] C. Masui, E. De Corte, "Enhancing learning and problem solving skills: orienting and self-judging, two powerful and trainable learning tools", Learning and Instruction, 1999, 9(6), pp. 517-542.

[23] S. Cassidy, "Learning styles: an overview of theories, models and measures", Educational Psychology: An International Journal of Experimental Educational Psychology, 2004, 24(4), pp. 37-41.

[24] D. Wechsler, "Cognitive, conative, and non-intelle" 1950.

[25] W.N. Kellogg, "An eclectic view of some theories of learning", Psychological Review, 1938, 45(2), pp. 165-184.

[26] M. Jemni, O. Nasraoui, "Automatic Recommendations for E-Learning Personalization Based on Web Usage Mining Techniques and Information Retrieval", Education Technology and Soceity, 2009, 12(4), pp. 30-42.

[27] Miller, A. George, "The magical number seven, plus or minus two: some limits on our capacity for processing information", Phsychological review, 1956, 63(2), pp. 81-97.

[28] A. Baddeley, "The magical number seven: still magic after all these years?", American Phsycological Association, 1994, 101(2), pp. 353-356.

[29] H. Clair-Thompson et al., "Improving Children's working memory and classroom performace", Educational Psychology, 2010, 30(2), pp. 203-219.

[30] C. Hoadley, "The SAGE Handbook of E-learning Research Learning Sciences Theories and Methods for E-learning Researchers", In: C. and H. Andrews, ed. The SAGE Handbook of E-Learning Research. s.l.:SAGE Publications Ltd, 2007, pp. 139-157.

 Published by Infonomics Society ISBN 978-1-908320-77-3 

[31] S. Kunen et al., "A levels-of-processing analysis of Bloom's taxonomy", Journal of Educational Psychology, 1981, 73(2), pp. 202-211.
[32] D. Karthwohl, "A Revision of Bloom's Taxonomy: An Overview", Theory into Practice, 2002, 41(4), pp. 212-217.

[33] M. Clarà, E. Barberà, "Learning online: massive open online courses (MOOCs), connectivism, and cultural psychology", Distance Education, 2013, 34(1), pp. 129-136.

[34] C. Milligan et al., "Patterns of Engagement in Connectivist MOOCs", Journal of Online Learning and Teaching, 2013, 9(2), pp. 149-159.

[35] K.P. Joo et al., "Promoting Distance Learners' Cognitive Engagement and Learning Outcomes:Design-Based Research in the Costa Rican National University of Distance Education", The International Review of Research in Open and Distance Learning, 2014, 15(6), pp. 188-210.

[36] B. Samuel et al., "The Import of Knowledge Export: Connecting Findings and Theories of Transfer of Learning", Educational Psychologist, 2012, 47(3), pp. 153-176.

[37] H. P. Phan, "Unifying different theories of learning: theoretical framework and empirical evidence", Educational Psychology, 2008, 28(3), pp. 325-340.

[38] P. J. Guo, J. Kim, R. Rubin, "How video production affects student engagement: an empirical study of MOOC videos. s.l.", ACM, 2014, pp. 41-50.

[39] W.C. Liu et al., "College student's motivation and learning stratefies profiles and academic achievement: a self-determination theory approach", Educational Psychology, 2014, 34(3), pp. 1-16.

[40] B. Zimmerman, "Self-Regulated Learning: Theories, Measures, and Outcomes", In: International Encyclopedia of the Social & Behavioral Sciences (Second Edition). s.l.:s.n., 2015, pp. 541-546.

[41] C. K. Chan., "Co-regulation of learning in computer-supported collaborative learning environments: a discussion", Metacognition and Learning, 2012, 7(1), pp. 63-73.

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# Assessment of Learning Outcomes of Medical Students in First and Second Year MBBS Based on Bloomstaxonomy

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## Abstract

*Bloom taxonomy of learning domain was written by Benjamin S. Bloom in 1956 to classify the learning*

*Objectives of a course based on cognitive, affective and psycho motive domains. The educational objectives of the medical education have been revised many times based on the skills that the students' needs. Blooms provided taxonomy to know how much objectives have been obtained by the students.*

*Objective of this study is:*

*1. To assess the effectiveness and efficiency of the training of the students in medical education.*

*2. To evaluate the difference between learning outcome of medical students in first year MBBS using traditional and modular system.*

*Sampling techniques used for the purpose of this study, 10 medical colleges were chosen throughout Pakistan in the first year course of MBBS.*

*Instrument: A structured questionnaire was used to collect the data. The questionnaire was consisted on 20 items. The questionnaire was based on Msukwa B. K. Martin.*

*For the purpose of analyses, data was collected and tabulated on Microsoft excel. This data was transferred to statistical package for social sciences (SPSS) for finding results.*

*Procedures adopted for collection of data, the students form the 10 different medical colleges using traditional and modular system was chosen. All the students were from first year MBBS. The students were well educated to know the difference between the traditional and modular system. The cognitive domain was well explained to the students as well as to the faculty members. The data was collected and were used to have the results.*

*The results showed a clear cut difference in the learning outcome of the medical students in their first year MBBS class. The traditional education has made them to understand the lower order cognitive skills but when they were being taught using modular integrated system defined by bloom, they were able to learn higher order cognitive skills.*

*From the conclusions of the study, it was found out that the modular system is the need of the time. All the developed countries have left the old traditional system based on big lecture rooms to small learning tutorial rooms. The modular system has produced astonishingly good results of the learning outcome of the medical students where interaction between the students and the faculty is maximum.*

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## Session 14: Global Issues in Education and Research

Title: The Potential Impact of Ergonomics on Learning at CoderDojos
(Authors: Nigel McKelvey, Pamela Cowan)

Title: Job Burnout and Factors Affecting Burnout among Iran's Public University Faculties
(Authors: Nasrin Nourshahi, Shadi Rouhani, Hossein Samiei)

Title: READY – The Project at a Glance
(Author: Graeme Nixon)

Title: A Case Study: Access, Equity, and Outcomes in a Non-traditional Leadership Development Program
(Authors: Thomas Shields, Kate Cassada)

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# The Potential Impact of Ergonomics on Learning at CoderDojos

Nigel McKelvey and Pamela Cowan
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## Abstract

*Promoting full inclusion in educational environments often entails addressing simple physical barriers. Ergonomics is essentially a science that studies work in various environments such as industry or classrooms and the tools used to perform tasks in those environments [1]. The assessment of the learning environment helps with breathing, circulation, attention, concentration and ultimately learning. Various literature [2][3] have outlined that children often require movement to focus during a complicated mental task, especially those with attention deficit/hyperactivity disorder (ADHD). The research also highlights that standing desks can help learners who find sitting still difficult and the use of dynamic footrests can help release energy and improve focus. The overt observational evidence presented in this paper across four locations in one county of Ireland, highlights some potential ergonomic issues in the unique learning context of CoderDojos. Suitable seating, appropriate monitor height and instructions on proper computer use was absent in many instances. While the children were free to walk around in all the CoderDojos observed, it raises the question as to whether movement was as a result of children wanting to be social with each other or because they were uncomfortable in their seats. This data should ignite a sense of responsibility amongst mentors and CoderDojo advocates to protect attendees against known injury risks and to ensure that the learners acquire good lifelong skills based on sound ergonomic practice.*

## 1. Introduction

CoderDojo is a free volunteer-led movement whereby children (Ninjas) of all ages come together to learn about computer programming. The movement was founded in Ireland in 2011 [4] and has grown every year since throughout the world. CoderDojos can take place in youth clubs, family resource centers or industrial settings. Indeed some schools set aside time in their day dedicated to CoderDojo related activities. Generally speaking, CoderDojos are delivered by mentors who are not necessarily educationally trained. Mentors might be computing students studying in Higher Education or computing professionals. There is no prescribed pedagogy and any learning theories used are espoused by the mentors themselves.

One aspect within CoderDojo is that of ergonomics and to what extent various locations are aware of its impact upon learning. This data will prove valuable for educationalists in Ireland now that primary and post-primary education is changing to include coding as part of the curriculum.

## 2. Methodology

Overt observations were used in this study at four CoderDojo locations conducted over two consecutive one hour sessions. Observations were noted every three minutes. Informed consent was gained from the mentors, parents and from the children themselves. The research was conducted in an ethically sound manner.

**Table 1. CoderDojo Profiles**

| CoderDojo ID | Environment | Mentor Profile | Technologies Used |
|---|---|---|---|
| A | Secondary school computer lab. Out of school hours. Primary school children in attendance. Fridays. | Six computer science degree student volunteers. | Scratch, HTML, Minecraft |
| B | Family Resource Centre. Saturdays. | Computer Programmers. | Scratch, HTML, JavaScript, Python |
| C | Primary School classroom – during school time. Fridays. | Usual class teacher with the addition of two computer science degree students volunteering | Scratch |
| D | Secondary school computer lab. Out of school hours. Primary school children in attendance. Mondays. | Computer Programmers. Computer science degree student volunteers. | Scratch, HTML, CSS JavaScript, Python, Mindstorms |

Table 1 above serves to demonstrate the diversity of the various CoderDojo profiles studied. While the sample does not include CoderDojos conducted within an industrial setting, it does encompass a wide range of profiles thus adding validity to the data gathered.

## 3. Ergonomics

Chairs available for children at CoderDojos should be at an appropriate height for the desk and preferably adjustable. Thighs should not be in contact with the front edge of the seat [5]. Adult volunteers might consider the use of firm pillows or

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cushions to reduce seat depth and to adjust the chair so feet are flat on the floor and thighs parallel to the floor. The addition of a foot rest can help the child achieve proper posture.

**Table 2. Ergonomics at Locations A, B and C**

| *CoderDojo Location* | Positive | Negative |
|---|---|---|
| *A* | • Seats are plastic but adjustable and can swivel.<br>• Girls are all turned around in the seats watching.<br>• Five children are now walking around the room. | • One boy is struggling with his seat – adjusting the height.<br>• They are facing each other and not their machines. |
| *B* | • Some signage on the walls about correct posture when sitting at a machine.<br>• Chairs are swivel, adjustable and fabric.<br>• One boy is stood beside his chair with his back to the wall. He starts talking to the boy beside him. | • They all have their coats on.<br>• Some of the children's chairs are touching.<br>• He is sat on the edge of his seat.<br>• He is swivelling in his seat whilst searching online for information about simulators.<br>• He is turned around in his seat.<br>• He has the sushi card on his keyboard, one hand in his pocket and coding by dragging/dropping using the mouse.<br>• Another boy is draped over the table as he searches for images for his Scratch game. |
| *C* | • Most have a laptop each. The children have cushions on their wooden chairs.<br>• Four children are walking around and appear to be admiring other children's' work.<br>• He tells them to sit on a bean bag.<br>• The two boys on the bean bag continue to work on Teacher's machine without Teacher.<br>• Five other children get up to see her game.<br>• Another boy joins the two on the bean bag.<br>• Three girls are walking/skipping around the room. | • Chairs are usual wooden school chairs. |

**Table 3. Ergonomics at Location D**

| | | |
|---|---|---|
| *D* | • An older boy is walking around the room talking to different children.<br>• Two large tables are in the middle of the room with no machines. Lots of chairs around them. Nobody is using them.<br>• A girl gets up and stands beside the boy beside her.<br>• Another girl gets up and gets a new sushi card from the tables in the middle of the room.<br>• Two girls get up and go to the table in the middle to get more sushi cards. | • Seats are simple plastic chairs.<br>• One girl stands and sits multiple times at her machine.<br>• The computer monitors have two hard drives in between. The arrangement is similar to that of an office booth.<br>• One girl has all windows closed on her machine and is turned around in her chair.<br>• He is slumped in his chair.<br>• She is sat with her feet curled underneath her. She still turns around every few seconds.<br>• After his praise, the boy sits forward in his seat and continues working.<br>• One boy is leaned back in his seat trying to see the screen of the girl sat beside him.<br>• One girl is sat sideways in her seat.<br>• One boy is sat turned around in his seat.<br>• A boy is leaned back in his chair (the chair is on two legs) trying to see the code produced by the boy beside him.<br>• He then stands beside the mentor building it.<br>• The group working together look to be having difficulty seeing each other's monitors due to the position of the hard-drives.<br>• The boy beside him has pushed back his chair to watch him work. |

Observational evidence presented in the Tables above highlights some potential ergonomic issues at CoderDojos. Suitable seating, appropriate monitor height and instructions on proper computer use was absent in most instances. While the children were free to walk around in all the Dojos observed, it raises concerns as to whether movement was as a result of children wanting to be social with each other or because they were uncomfortable in their seats. This data should ignite a sense of responsibility amongst mentors and Dojo advocates to protect attendees against known injury risks and to ensure that the learners acquire good lifelong skills based on sound ergonomic practice.

An implicit goal of CoderDojo is to emulate the professional practices of real world computing environments with the children. In the same way as complex computing issues are discussed between adult programmers, CoderDojos emulate this through adult-child discourse, as evidenced in CoderDojo B when the mentor talked to a child about variables:

*The mentor then moves over to another boy. He crouches on the floor beside him – uses technical language to explain variables – such as "complexity", "process and procedures", "iteratively". The boy doesn't appear phased and continues to explain his variables to the mentor.*

It is the author's opinion, that emulating professional practice beyond discourse would also serve the children well. [12] presents that children emulating or modelling their peers are factors necessary for learning in a more independent manner. This emulation can extend to strategies and approaches taken which in turn suggests an extension towards common-sense best practice with regard to the utilisation of appropriate furniture for computer usage. Where risk assessments in the work place often focus on areas of function such as ergonomics, employees are acutely aware of their working environment in how it should be physically constructed to serve each individual's physical and cognitive requirements. Similarly, children could be provided with lifelong skills in ergonomics within the CoderDojo context.

For children to be taught programming, it is important that learning takes place in an appropriate environment. In February 2016, the Hillsborough Primary School in New Zealand announced via its webpage, that it intends updating various classrooms to become "Modern Learning Environments" [6]. It cites the Ministry of Education in New Zealand as its catalyst with the government outlining that they "want all schools to have vibrant, well connected, innovative learning environments (ILE) that encourage and support many different types of learning" [7]. The Ministry provides suggestions for schools to incorporate so that their environments can be modernised. These suggestions include breakout spaces (to encourage independent work as well as collaboration), outdoor learning spaces (climate dependent), large breakout spaces (referred to as āwhina or whānau spaces which acknowledges the country's Aboriginal and cultural heritage), learning streets (corridors that might inspire learning with art, floor coverings and inspirational cabinetry), storage (for efficiency and aesthetics), appropriate furniture (cognisant of ergonomics) as well as defined teacher work spaces (to encourage collaboration and a social environment).The suggestions are all valid but are considered from a pedagogical perspective with

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assessment threaded throughout. It does not consider the validity in content delivery without assessment or indeed content delivery by someone who is not educationally trained (as is common at CoderDojo).

## 4. Evaluation

It is arguable that if /or when combined CoderDojos with learning, the extracurricular activities have the potential to help students raise their self-esteem. Given the nature of CoderDojos, may be further enhanced as the children have opportunity to connect with the adults in the community in a positive manner. However, not all CoderDojos take place in the same environment. Some take place in youth centres or family resource centres, others take place in secondary schools, some in primary schools and others in industrial settings. For the movement to be successful, it raises the question if the learning environment is an important factor, and indirectly the ergonomics of the room.

[8] posit that extracurricular participation can be attributed to positive academic outcomes such as an improvement in academic achievement (grades), improved school engagement and a noted increase in the children's educational aspirations. Conversely, [9] present possible negative consequences with some extracurricular activities particularly where a mentor, for example, uses negative language or if team members exclude others. This idea could be extended to include the impact of ergonomics on learning at a CoderDojo. [10] outlines that positive youth development encompasses five traits or characteristics: (1) competence in academic, social and vocational areas; (2) confidence; (3) connection to family, community and peers; (4) character; (5) caring and compassion.

Where a child participating at a CoderDojo is redirected from these five areas as a result of being physically uncomfortable in a room, then such issues must be addressed. The data presented in this paper showed locations where children had freedom to interact with each other by walking around the room however, in one location (CoderDojo D), children evidently found it difficult to team-up whilst sat at their machines due to the physical location of hard drives. Perhaps a child intent on focusing on a particular task might find the 'booth-like' layout useful for concentration, another child may find the layout to be a barrier to social interaction which may aid them in better understanding a particular task.

## 5. Conclusions

Evidence provided in this paper presented a snap-shot of data pertaining to ergonomics at four CoderDojo locations. The observations revealed interesting data that might suggest that some physical layouts at locations were more conducive to learning than others. Nevertheless, the data does highlight the importance of ergonomic considerations for CoderDojos particularly as the movement endeavors to emulate professional and real-world practices for its learners [11]. Where primary school children are using chairs and monitors ordinarily used by children much older (at secondary school for example), it does raise questions about the suitability of the chairs, desks and monitor heights. While this study did not investigate industrial settings, it is arguable that the same would be true in such instances. In any case, the chairs (as an example) should be adjustable so as to accommodate children of various ages comfortably without the need to sit awkwardly or uncomfortably throughout the session.

While the children, at the locations studied, evidently were happy to walk about the room, it is worth considering the reasons why they were doing this. A future study could build upon the work conducted to date by using focus group interviews to determine the extent to which the children understand the impact of their physical environment on their learning, or indeed if they felt it had any impact at all.

## 6. References

[1] McElroy, R., Ulmer, J. and Ollison, T. (2012). Ergonomic Furniture Design for Improving Academic Achievement in School-Aged Children. *Global Education Journal*. 2012 (2). p147-159.

[2] Shrieves, L. (2009). *ADHD study: Let kids move, tap and spin*. Available: http://articles.orlandosentinel.com /2009-05-25/news/ucf_1_adhd-kids-adhd-study-rapport. (access date 14th April, 2016)

[3] Kofler, M., Rapport, M., and Alderson, R. (2008). Quantifying ADHD classroom inattentiveness, its moderators, and variability: A meta-analytic review. *Journal of Child Psychology and Psychiatry*. 49. p59-69.

[4] CoderDojo. (2015). *CoderDojo*. Available: https:// coderdojo.com/. (Access Date 19th July, 2015)

[5] Kelley, M. and Phillips, C. (2014). Ergonomic Tips and Tricks: Position for Success for Students with Learning Disabilities. *ATIA Conference Orlando*.

[6] Hillsborough Primary School. (2016). *Innovative Learning Environments*. Available: http://hps.school.nz /news/entry/innovative-learning-environments/. (Access date 11th July, 2016)

[7] Ministry of Education (New Zealand). (2016). *Flexible learning spaces in schools*. Available: http://www. education.govt.nz/school/property/state-schools/design-standards/flexible-learning-spaces/. (Access date 11th July, 2016)

[8] Fredricks, J. and Eccles, J. (2006). Is extracurricular participation associated with beneficial outcomes?

Concurrent and longitudinal relations. *Developmental Psychology*. 4 (4). p698-713.

[9] Eccles, J. and Barber, B. (1999). Student council, volunteering, basketball, or marching band: What kind of extracurricular involvement matters? *Journal of Adolescent Research*. 14. p10-43.

[10] Morrissey, K. (2005). The relationship between out-of-school activities and positive youth development: An investigation of the influences of communities and family. *Adolescence*. 40. p67-85.

[11] ECHO (Ethos, Culture, Happiness and Outcomes). (2015). *CoderDojo Foundation*. https://coderdojo.com/wp-content/uploads/2015/07/CoderDojo-ECHO.pdf. (access date 25th January, 2017)

[12] Bandura, A. (1977). *Social Learning Theory*. Engle Cliffs NJ: Prentice Hall.

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# Job Burnout and Factors Affecting Burnout Among Iran's Public University Faculties

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## Abstract

*In recent years Iran`s higher education has been faced irregular growth in number of higher education institutions. However, this increment is not being adapted to avaible educational capacities in Iran. Furthermore, Iran's higher education system has been transformed to a stressful environment due to numerous factors such as inequality, unfair distribution of resources, as well as increasing competition among universities and higher education institutions. While constant change in educational policies, especially in management and student admission, is playing a key role in this transformation. This issue has been affected the faculty member's quality of work, which develops the condition of emerging burnout among faculties.*

*This study investigated the job burnout and affecting factors among full time faculties of public universities in Iran`s higher education which were categorized in three groups, old universities, newly established university and those are in their mid-age. A survey research was employed in order to carry out this research and for this purpose 2061 faculties from public universities were selected as statistical samples. The Maslach Burnout Inventory (MBI) and researcher-made questionnaire were used to collect data for measuring job burnout and identifying the factors affecting burnout, respectively. A quantitative research method was used and a multiple regression model has been applied for analyzing the data. The results indicate that faculties in all universities are experiencing burnout. Meanwhile, the level of burnout is higher in newly established universities faculties. Also investigating three dimensions of burnout according to MBI (emotional exhaustion, depersonalization, and personal accomplishment), highlight that faculties are more having emotional exhaustion in comparison to depersonalization and personal accomplishment. The factors affecting burnout among university faculties were studied according to three category including social factors (including social freedom, job security, organizational adaptability, organizational participation), individual factors (including academic freedom, organizational trust, individual motivation) and work environment factors (including environmental conditions, Administrative bureaucracy, organizational justice, salaries and bonuses, organizational silence). The findings show that there is a significant and negative relation between three mentioned factors and faculty burnout. In conclusion, findings show a significant difference among three groups of universities mentioned above, in which, there is a relation between job burnout and universities age and functions. In a sense, the level of faculty burnout is less among older universities in comparison with the newly established ones. Since, the level of social factors is higher in Iranian old universities, it turns out that these factors have more impact on burnout which needs further studies.*

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# READY – The Project at a Glance

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## Abstract

*This paper outlines the work of the Erasmus Plus funded project READY (Religious Education and Diversity). This three year project involving six educational institutions from five European countries, aims to allow participants to share approaches to teaching Religious Education (RE) at a time where issues relating to diversity, plurality, truth claims, multiculturalism and migration present pressing issues to educators and policy makers. This main focus of the project is to inform approaches to teacher education for RE, and provide a resource for academics, teachers and those who guide educational policy at this time. To date the project has involved a series of study visits and transnational meetings. In addition participants have published a series of materials, yielding a range of reflections, pedagogical approaches and recommendations which Dr Nixon will outline in his presentation.*

## 1. Introduction

In contemporary European societies children grow up and form their identities in a world of diversity and plurality. Together with the increasing number of multi-faith classrooms, this emphasises the need to equip prospective teachers and teacher educators, and thereby also pupils, with adequate interreligious and intercultural skills and competences that allow them to navigate such complex and diverse contexts and cope with the resulting implications for the individual life-styles. Subjects like Religious Education (RE) or Ethics play an important role in facilitating the discussion of these issues and offering answers and explanations.

RE in public schools in Europe is designed in many ways. Each country's respective situation and form of organization differs significantly for mainly historical reasons. Despite the different contexts, an increasingly widespread discussion about the possible future of RE is taking place. These discussions, however, are rarely linked together and have not yet reached the level of teacher education and training. Future religion teachers are normally only rather superficially familiar with the situation of RE (and related subjects) in other European countries and thus insufficiently prepared for a joint European perspective.

In addition, RE is faced with growing religious and ideological diversity of pupils and stakeholders alike across the entire European area. Current changes to the curricula and school structure, as well as wider debates on religion in the public sphere, have produced noticeable controversy about the place of RE in schools, how it should be delivered and what young people should be taught.

## 2. The scope and purpose of the READY project

In the three-year Erasmus Plus project "Religious Education and Diversity – Sharing experiences of and approaches to teacher education in the context of 'Education and Training 2020' (READY)" [1], teacher training institutions in Germany, England, Austria, Scotland and Sweden are exploring the topic 'Religion and Diversity' in two respects: the mutual exchange of diverse forms of Religious Education and the variety of approaches to subject teaching and learning, in which the question of religious heterogeneity is considered and discussed. The results are being examined and proposals for teaching Religion and Diversity in Europe will be published.

The main target group of the project are teacher trainees for Religious Education. The project began with a structured online communication between trainee teachers from different European countries. This process lead to the development of educational modules on 'Religion and Diversity' exchanged between the teacher education institutions.

At the same time, profile descriptions of the situation of religion teacher education in the participating countries were exchanged, an interactive READY website was set up, which begins to unfold the diversity of RE across Europe, and a guideline for one week study visits was developed.

In the second year of the project, groups of teacher educators and trainee teachers observed RE lessons in a European partner country for a week and held discussions with trainee teachers, pupils and stakeholders responsible for RE. These experiences were analysed on the basis of a practical guide to European RE, and processed and documented. In parallel to these exchanges, local model RE lessons on "Religion and Diversity" were systematically

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evaluated and their delivery in the classroom also partly videotaped. The pupils will be encouraged to establish eTwinning contacts with a RE class in a partner country and in this way deepen their knowledge and experience of religious diversity across Europe.

## 3. The Proposed Impact of READY

From the very beginning, the entire project has been designed to achieve broad dissemination and a long-term impact, which is facilitated by the experience, expertise, contacts and structures of the Comenius Institute Münster. This includes, inter alia, a READY Newsletter, an interactive READY website, two national study days in Tübingen and London, a two-day final conference in Vienna and a documentation of key project results in book form. It is also hoped that the project can be disseminated via international education conferences such as the IICE 2017 in Dublin where project findings may inform approaches to RE and diversity for those attending.

READY focuses mainly on issues of didactics and pedagogy. The results of the project can, however, also be used by stakeholders and decision makers of state, churches and other religious communities.

## 4. Who is Involved?

The READY project consortium consists of six institutions, five of them preparing student teachers to teach RE in state funded schools. All these partners have close and permanent working contacts with RE teachers and leaders of secondary schools and established local networks which will continuously accompany the project:

• Karlstad University / Sweden
• Kirchliche Pädagogische Hochschule, Wien-Krems / Austria
• Staatliches Seminar für Didaktik und Lehrerbildung (Gymnasium) Tübingen / Germany (co-ordinating organisation)
• University of Aberdeen, School of Education / Scotland
• University College London, School of Education / EnglandThe sixth partner, the Comenius Institut Münster, an internationally renowned Protestant Centre for Research and Development in education, is responsible for quality management, academic monitoring and dissemination processes.

## 5. Project Outputs

In this IICE presentation Dr Nixon will outline the main work of the project. In particular he hopes to outline that READY has facilitated rich philosophical discussion on the nature, purpose and most effective forms of pedagogy for RE. In addition he will provide exemplification of project dissemination and publications. These will include:

• Study visit reflections
• Reflective vignettes based on classroom observations
• Lesson plans and approaches
• RE case studies for each participating country
• The use of the E-Twinning platform for student teachers to exchange ideas and resources
• READY conference events
• The READY website

## 6. References

[1] Ready project (2016) http://www.readyproject.eu (Access date: 10th April, 2017)

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# A Case Study: Access, Equity, and Outcomes in a Non-traditional Leadership Development Program

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## Abstract

*This presentation will explore the ongoing case study work completed by the authors regarding the development and placement of the "next generation" of educational leaders who have participated in a non-traditional leadership development program in the central Virginia region (United States) since 2005. School districts in the Richmond, Virginia, region face two growing challenges in their schools: the continual threat of leadership shortages and significant changes in student demographics in terms of race and socio-economic status. As a component of succession planning, four school districts have partnered with their local university to prepare new leaders who are ready to successfully serve schools experiencing increased racial and economic diversity among their student populations. The authors analyze the demographic profile of those seeking leadership development through the partnership, the changing demographics of the school communities they serve, and the professional mobility and placement of these aspiring leaders as they move into leadership roles. The authors also explore international literature regarding the development opportunities and placement of school leaders throughout the world, particularly the distribution of school leaders by gender, race, and experience.*

## 1. Introduction

Demographic trends in the United States have revealed a steady shift in the ethnic and racial make-up of the US school age population between the years 2001 and 2011. Projected changes through 2023 continue these rapid trends in diversity. Figure 1 represents the changing enrolments of US white and minority students since 2001. The statistics note that the percentage of white students in the public school population has been decreasing substantially since 2001 and will continue to do so until at least 2023. Black student enrollment will decline only slightly while the enrolment of Hispanic students will continue to show steady gains, almost doubling to 30% of the public school population, over the same time period. The US Department of Education's National Center for Education Statistics (NCES) noted that the 2014–2015 school year marked the first time minority student enrolment in US public schools surpassed that of non-Hispanic white students for the first time, making US public school enrolment minority majority [1].

The demographic changes of student populations throughout developed countries has mirrored that in the United States with growing diversity and heterogeneity [2] [3].

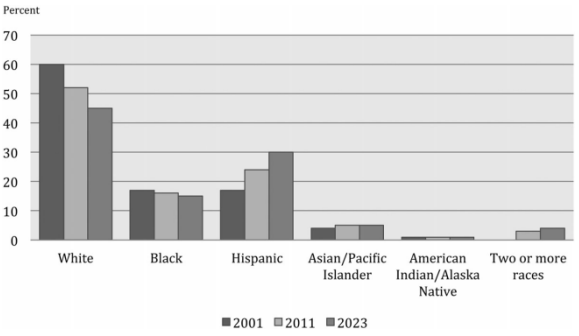


**Figure 1. US national trends in student race and ethnicity 2001–2023 (projected).**

Many studies and articles have documented these changes and their impact on schools. However, the racial make-up of school leaders across the globe are not trending in the same direction. In 2011, 80% of all US public school principals were white while 82% of teachers were white. Ten per cent of school principals were black while 7% of teachers were black. The public school principal population was 7% Hispanic/Latino of any race while 8% of teachers were Hispanic [4].

In the United States, 2011 national statistics show that 51.5% of public school principals were female while 76.3% of teachers were female. Conversely, 23.7% of teachers were male while 48.5% of principals were male [5]. Approximately 8 out of 10 pre-primary and primary teachers are women and figures are similar in lower secondary schools, where 68% of teachers in Teaching and Learning International Survey countries are female yet 49% of principals are female [6].

## 2. Case Study Questions

How are four school divisions in the metropolitan area of Richmond, Virginia, in the United States providing leadership development beyond traditional

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university education preparation programs for promoting and placing school leaders? What is the racial, ethnic and gender make-up of the participants of a regional non-traditional leadership development program and the schools they represent? What are the lessons learned for school leadership development in the United States and in other countries for school divisions that are changing demographically for promoting, and placing school leaders who are reflective of each of the school division's student population?

## 3. Literature Review

International calls for strengthened school leadership development and training recognize the need to make school leadership more attractive to potential leaders and to acknowledge the critical roles school leaders play in effective school change and success [7] [8]. In Improving School Leadership. Volume 1: Policy and Practice, an extensive study of school leadership policy and practice within 22 countries, the Organization for Economic Co-operation and Development (OECD) identified school leadership as an international education policy priority. The report identifies four 'main policy levers' through which school leadership practice and succession planning can be improved; these levers include clearer definition of school leadership responsibilities, distribution of school leadership responsibilities and accountability, development of skills for effective school leadership (including treating leadership development as a continuum), and making school leadership a more attractive profession [9].

Principals carry the bulk of leadership responsibilities in schools yet many countries report concern that principals are not equipped with distributive and collaborative leadership skills necessary to successfully lead today's diverse schools and that training through traditional principal preparation programs has not kept 'pace with the evolving role of principals' [10]. As a result, there is a clear call for countries to better 'prepare and train the next generation of school leaders …' [11].

Principals can play a critical role in cultivating leadership in others [12]. Farley-Ripple, Raffel, and Welch [13] recognize that some educational leadership career decisions emerge from choice and are self-initiated, but many are influenced (in part, if not entirely) by others in the system. The authors identify the influence of recruiting, 'tapping', and requesting on career mobility. Tapping, an informal recruitment strategy utilized by existing school leaders to identify and encourage teachers to seek increased leadership roles in schools [14], is one means of encouraging potential and aspiring leaders to see themselves in leadership roles and seek experiences that may better position them for leadership.

Turner, seminal in the field of career mobility, explored and proposed a distinction between two types of mobility, 'contest' mobility and 'sponsored', noting, "Under the American norm of contest mobility, elite status is the prize in an open contest, with every effort made to keep lagging contestants in the race until the climax. Sponsored mobility, the English norm, involves controlled selection in which the elite or their agents choose recruits early and carefully induct them into elite status [15]."

School organizations must be strategic and purposeful in the development and placement of school leaders in order to attract and retain current and future leaders. In an examination of the principalship in American public schools, The Wallace Foundation [16] noted the importance of considering who is being promoted, the training they are able access beyond traditional higher education degree work, the schools in which leaders enter their first principalships, and how prepared these leaders are to succeed and remain in the role.

Due to space restrictions, this serves as a limited review. A presentation would explore more deeply the emerging role of principals, the need for improvements in training and recruitment, and models of non-traditional leadership training, as well as gender and race related to the professional placement of leaders, leader mobility and career paths, and opportunities for advancement in a global context.

## 4. Need for Improved Training and Recruitment

As school divisions look to secure the future of leadership in their organizations, they must consider the means through which leaders are prepared and promoted. Succession planning is an increasingly critical and visible element in American and international schools and many school divisions realise that they must cultivate leaders found within their organizations [17] [18] [19]. The Wallace Foundation [20] poses the question, 'How do we create a pipeline of leaders who can make a real difference for the better, especially in troubled schools?' [21].

Thoughtful succession planning allows organizations to strategically and purposefully grow their own leaders [22] yet few American school districts have purposeful, systematic promotion processes in place, particularly for school leadership [23]. Districts rarely look outside the traditional state-certified candidate pool and tend to offer in-house recruiting and selection processes that are laissez faire and un-systematic, often resulting in late hiring practices that are drawn out so long that qualified candidates drop out of the process

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completely [24]. The processes do not help elevate qualified candidates.

Professionalizing recruitment would improve the quality and sustainability of leadership, and 'eligibility criteria should be broadened to reduce the weight accorded to seniority and attract younger dynamic candidates with different backgrounds' [25]. Recruitment methods must broaden and recruiters/interviewers need training to properly assess candidates [26]. The aforementioned strategies address leadership development in schools in developed countries, which fare much better than schools in developing countries. In studying school improvement in developing countries, Aga Khan Foundation Canada found that information on school leadership development practices is scarce and there are 'no system-wide provisions for initial preparation of principals, and in-service programs and courses are few and irregular in occurrence and quality' [27].

## 5. NGLA Case Study Background

In 2005, K-12 school divisions in the Richmond, Virginia metro region recognized the regional need for a next generation of promotable, skilled, effective school leaders. Data collected by the four area school division leaders revealed a significant retirement threat to their leadership pipelines: over 50%, and in some cases as high as 75%, of their current school leadership was eligible for retirement in the next five years [28].

This trend of school principals aging and increasingly facing retirement followed a pattern, noted in an OECD report, similar to that in other countries. The OECD report describes how school districts in the countries analyzed 'sought to strengthen succession planning within their organizations and ensure that their "leadership benches" possessed the depth and strength necessary to fill key leadership roles in the near future' [29]. The human resource leaders in the Richmond regional school divisions sought expert training beyond a traditional graduate degree to equip future leaders to cope with the dynamic nature of school leadership, sustaining and enhancing high-quality teaching, and improving student achievement in twenty-first-century schools [30].

Since the 2005– 2006 academic year, the NGLA has served its four partner divisions in the Richmond, Virginia, metro region by creating a leadership program that is communal and is focused on preparing leaders to serve ethically and effectively in a broad spectrum of school environments. For this study, 337 educators from a variety of teaching and leadership roles participated between 2005 and 2012. The participating school divisions comprise one urban, two suburban, and one rural/suburban community.

NGLA currently serves as a regional, collaborative element of each division's selection and succession planning efforts. In NGLA, aspiring and early career school administrators are provided with opportunities to enhance their knowledge and experiences in multiple aspects of effective leadership based on current research in the field. NGLA sessions feature critical leadership theory grounded through practical application. The sessions, delivered by university faculty and regional K-12 leaders, engage the participants through such topics as: what is Leadership, Group Dynamics, Ethics, Equity, Leading and Communicating, and Leading Change. The curriculum is similar to that of the University of Richmond's Jepson School of Leadership Studies, which was one of the first undergraduate schools in the United States to offer coursework leading to a BA degree in leadership studies that focuses on leadership as a service to society.

The study examines data for NGLA participants up to 2011–2012 academic year, while NGLA demographic trend data is examined up to fall 2014. The 2012–2013 and 2013–2014 demographic data on NGLA participants is not included in the study because surveys of participants are administered a year after they exit the program.

A presentation will display additional information regarding methodology and analysis including an examination of NGLA participants and their school divisions.

## 6. Findings

Multiple data points will be shared in presentation including student race and ethnic trends in NGLA school divisions (Figure 2) and NGLA participants' promotions to at-risk schools by gender, race, and ethnicity. Of the 337 total NGLA participants, 174 were promoted in the course of this study. Overall, 35.6% of the promotions went to black leaders and 63.2% to white. Yet, 49.1% of the promoted black candidates were assigned to at-risk schools and 51.1% went to white participants (Figure 3). Black candidates were disproportionately assigned, at a higher rate than white candidates, to at-risk schools. A chi-square statistic suggests that the proportion of promotions to at-risk schools reflected in the race of participants does not match the proportion of black and white participants in the total promotion pool.

There appears to be a disproportionate number of female NGLA participants promoted to at-risk schools based on the number of females and males enrolled in the program (see Figure 4). Analysis suggests the number of females to males promoted does not match the proportion of each gender in the NGLA promoted group. Over 83% of promotions to at-risk schools were female compared to 16.4%

male. Factors such as the number of schools at each level or the number vacancies at the elementary level may have influenced the gender of program participants promoted.

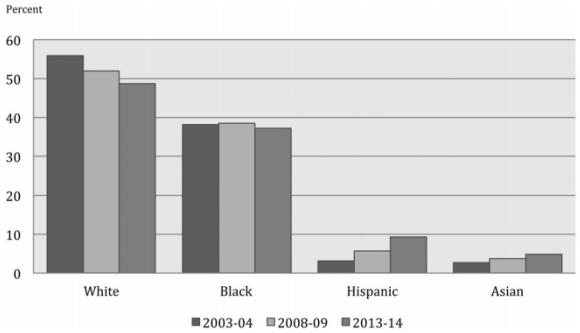


**Figure 2. Student race and ethnic trends in NGLA school divisions 2003/2004–2013/2014**

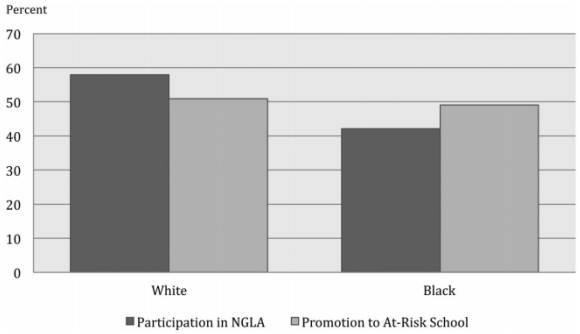


**Figure 3. NGLA promotions to at-risk schools by race 2007/2008–2013/2014**

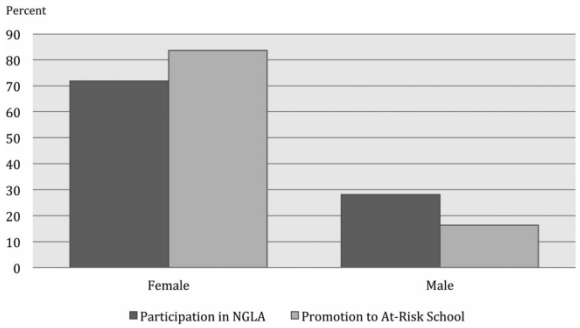


**Figure 4. NGLA promotions to at-risk schools by gender 2007/2008–2013/2014**

## 7. Discussion

According to the Organization for Economic Co-operation and Development 'schools in almost all countries are serving a more heterogeneous population' and pressured to recognize this diversity through policy and programs [31]. In the US and in Virginia school districts, the student population is increasingly racially, ethnically, and economically diverse. In particular, across the United States, all schools are enrolling increasing numbers of economically disadvantaged students and high schools are facing higher dropout rates. The NGLA schools that are part of this case study example in the Richmond, Virginia, metropolitan area are also facing the challenges of an increasingly diverse and at-risk student population. NGLA school divisions and schools serve a cross-section of racial, mirrored the statistics in the United States.

This case study example shows that there is a greater need to adapt school leadership training to effectively serve these diverse and at-risk students. There is a demand to provide professional development training beyond traditional university education that engages aspiring and current school leaders in understanding the diverse school populations and support at-risk students. In any non-traditional program curriculum, particularly those in countries with increasing diversity, there is a need to acknowledge and understand the changing role of the principal [32].

In most developed countries, including the United States, the principal continues to carry the primary burden of school leadership responsibilities. While distributive and collaborative leadership are increasingly emerging, there needs to be curricula that address theories and applications of topics such as diversity, inclusivity, thriving, justice, equity, and opportunity.

Principal 'socialization' is the responsibility of all parties involved: the individual, the preparation program, and school system [33]. NGLA represents an opportunity for individuals and systems (school divisions) to help aspiring leaders attain or advance in leadership roles and to socialize their new leaders. Participation in NGLA touches on a combination of both sponsored and contest mobility. Participants complete an application to the program (contest) and their division leaders select those who will participate. Participation offers potential for a 'sponsored' advantage as participants learn from and interact with numerous leaders throughout their divisions and the region. Participants gain a 'tapping' advantage through NGLA acceptance that is evident in the fact that 48.4% of NGLA participants have been promoted at least once by the 2013–2014 school year. In addition, the authors are anecdotally aware of additional promotions within the group since 2013– 2014.

Overall, NGLA participants are being placed in at-risk schools in all four divisions. The continued participation by divisions with significant at-risk populations is a testament to the value placed on the program. NGLA participants are being promoted, almost half (48.4%) had been promoted during the course of this study. Evident disproportionate promotions of NGLA participants are related to the gender and ethnicity of participants being assigned to at-risk schools. Female participants were disproportionately promoted to at-risk schools compared to male NGLA participant promotions. In addition, black participants were disproportionately promoted to at-risk schools when compared to white

NGLA participant promotions.

In presentation, study limitations and additional actions for further study will also be shared.

The authors would like to thank Dr. Gordon Trump for his assistance in the research for this paper.

## 8. References

[1] U.S. Department of Education, National Center for Education Statistics, Common Core of Data (CCD). "State Nonfiscal Survey of Public Elementary and Secondary Education," 1995-96 through 2011-12; and National Elementary and Secondary Enrollment Projection Model, 1972 through 2023. http://nces.ed.gov/programs/digest/d13/tables/dt13_203.50.asp. (Access date: 10th April, 2017)

[2] Pont, Beatriz, Deborah Nusche, and Hunter Moorman. 2008. *Improving School Leadership. Volume 1: Policy and Practice.* Paris: OECD, P. 25

[3] U.S. Department of Education, National Center for Education Statistics, Common Core of Data (CCD). "State Nonfiscal Survey of Public Elementary and Secondary Education," 1995-96 through 2011-12; and National Elementary and Secondary Enrollment Projection Model, 1972 through 2023. http://nces.ed.gov/programs/digest/d13/tables/dt13_203.50.asp. (Access date: 10th April, 2017)

[4] U. S. Department of Education. National Center for Education Statistics. "Schools and Staffing Survey." 2012-13. https://nces.ed.gov/surveys/sass/tables/PFS1213_2014064_p1n_002.asp. (Access date: 10th April, 2017)

[5] U. S. Department of Education. National Center for Education Statistics. "Schools and Staffing Survey." 2012-13. https://nces.ed.gov/surveys/sass/tables/PFS1213_2014064_p1n_002.asp. (Access date: 10th April, 2017)

[6] OECD. 2015. *Trends Shaping Education Spotlight 7*. Paris. OECD. http://www.oecd.org/edu/ceri/Spotlight7-GenderEquality.pdf (Access date: 10th April, 2017)

[7] Pont, Beatriz, Deborah Nusche, and David Hopkins. 2008. *Improving School Leadership. Volume 2: Case Studies on System Leadership*. Paris: OECD. http://www.oecd.org/edu/school/improvingschoolleadership-home.htm. (Access date: 10th April, 2017)

[8] Pont, Beatriz, Deborah Nusche, and Hunter Moorman. 2008. *Improving School Leadership. Volume 1: Policy and Practice.* Paris: OECD.

[9] OECD. 2015. *Trends Shaping Education Spotlight 7*. Paris. OECD. http://www.oecd.org/edu/ceri/Spotlight7-GenderEquality.pdf, pp. 9-13. (Access Date: 10th April, 2017)

[10] Wallace Foundation. 2012a. *The Making of the Principal: Five Lessons in Leadership Training.* New York. The Wallace Foundation. http://www.wallace foundation.org/knowledge-center/school-leadership /effective-principal-leadership/Documents/The-Making-of-the-Principal-Five-Lessons-in-Leadership-Training.pdf, p. 6. (Access Date: 10th April, 2017)

[11] Pont, Beatriz, Deborah Nusche, and Hunter Moorman. 2008. *Improving School Leadership. Volume 1: Policy and Practice*. Paris: OECD, p. 31.

[12] Wallace Foundation. 2012b. *The School Principal as Leader: Guiding Schools to Better Teaching and Learning*. New York. The Wallace Foundation. http://www.wallace foundation.org/knowledge-center/school-leadership/effective-principal-leadership/Documents/The-School-Principal-as-Leader-Guiding-Schools-to-Better-Teaching-and-Learning.pdf. (Access date: 10th April, 2017)

[13] Farley-Ripple, Elizabeth, Jeffrey Raffel, and Jennie Welch. 2012. "Administrator Career Paths and Decision Processes." *Journal of Educational Administration* 50 (6): 788-816. doi: 10.1108/09578231211264694.
Leithwood, Kenneth, Karen Seashore Louis, Stephen Anderson, and Kyla Wahlstrom. 2004. *How Leadership Influences Student Learning.* The Wallace Foundation. http://www.wallacefoundation.org/. (Access date: 10th April, 2017)

[14] Myung, Jeannie, Susanna Loeb, and Eileen Horng. 2011. "Tapping the Principal Pipeline: Identifying Talent for Future School Leadership in the Absence of Formal Succession Management Programs." *Educational Administration Quarterly*. 47 (5): 695-727. doi:10.1177/0013161X11406112.

[15] Turner, Ralph. 1960. "Sponsored and Contest Mobility." *American Sociological Review*. 25 (6): pp. 855-867. http://www.jstor.org/stable/2089982. P. 855. (Access date: 10th April, 2017)

[16] Wallace Foundation. 2012b. *The School Principal as Leader: Guiding Schools to Better Teaching and Learning.* New York. The Wallace Foundation. http://www.wallace foundation.org/knowledge-center/school-leadership/effective-principal-leadership/Documents/The-School-Principal-as-Leader-Guiding-Schools-to-Better-Teaching-and-Learning.pdf. (Access date: 10th April, 2017)

[17] Cassada, Kate, Risha Berry, Tom Shields and Charol Shakeshaft. 2102. "EduLead: Regional Partnership. Regional Benefit." *Advance online publication. Virginia Association for Supervision and Curriculum Development. h*ttp://publications.catstonepress.com/i/72976/7. (Access date: 10th April, 2017)

[18] Pont, Beatriz, Deborah Nusche, and David Hopkins. 2008. *Improving School Leadership. Volume 2: Case Studies on System Leadership*. Paris: OECD. http://www.oecd.org/edu/school/improvingschoolleadership-home.htm. (Access Date: April 10th, 2017)

[19] Pont, Beatriz, Deborah Nusche, and Hunter Moorman. 2008. *Improving School Leadership. Volume 1: Policy and Practice*. Paris: OECD.

[20] Wallace Foundation. 2012a. *The Making of the Principal: Five Lessons in Leadership Training.* New York. The Wallace Foundation. http://www.wallace foundation.org/knowledge-center/school-leadership/effective-principal-leadership/Documents/The-Making-of-the-Principal-Five-Lessons-in-Leadership-Training.pdf. (Access date: April 10th, 2017)

[21] Wallace Foundation. 2012b. *The School Principal as Leader: Guiding Schools to Better Teaching and Learning.* New York. The Wallace Foundation. http://www.wallacefoundation.org/knowledge-center/school-leadership/effective-principal-leadership/Documents/The-School-Principal-as-Leader-Guiding-Schools-to-Better-Teaching-and-Learning.pdf, p. 16. (Access Date: 10th April, 2017)

[22] Myung, Jeannie, Susanna Loeb, and Eileen Horng. 2011. "Tapping the Principal Pipeline: Identifying Talent for Future School Leadership in the Absence of Formal Succession Management Programs." *Educational Administration Quarterly*. 47 (5): 695-727. doi:10.1177/0013161X11406112.

[23] Myung, Jeannie, Susanna Loeb, and Eileen Horng. 2011. "Tapping the Principal Pipeline: Identifying Talent for Future School Leadership in the Absence of Formal Succession Management Programs." *Educational Administration Quarterly*. 47 (5): 695-727. doi:10.1177/0013161X11406112.

[24] Doyle, Daniella and Gillian Locke. 2014. *Lacking Leaders: The Challenges of Principal Recruitment, Selection, and Placement.* Washington DC: Thomas B. Fordham Institute.

[25] Pont, Beatriz, Deborah Nusche, and Hunter Moorman. 2008. *Improving School Leadership. Volume 1: Policy and Practice.* Paris: OECD, 12.

[26] Pont, Beatriz, Deborah Nusche, and Hunter Moorman. 2008. *Improving School Leadership. Volume 1: Policy and Practice.* Paris: OECD.

[27] Anderson, Stephen and Karen Mundy. 2014. *School Improvement in Developing Countries: Experiences and Lessons Learned.* Aga Khan Foundation Canada. Ottawa.

[28] Cassada, Kate, Risha Berry, Tom Shields and Charol Shakeshaft. 2102. "EduLead: Regional Partnership. Regional Benefit." *Advance online publication. Virginia Association for Supervision and Curriculum Development. h*ttp://publications.catstonepress.com/i/72976/7. (Access Date: 10th April, 2017)

[29] Pont, Beatriz, Deborah Nusche, and Hunter Moorman. 2008. *Improving School Leadership. Volume 1: Policy and Practice.* Paris: OECD, pp. 2-3.

[30] Cassada, Kate, Risha Berry, Tom Shields and Charol Shakeshaft. 2102. "EduLead: Regional Partnership. Regional Benefit." *Advance online publication. Virginia Association for Supervision and Curriculum Development. h*ttp://publications.catstonepress.com/i/72976/7. (Access date: 10th April 2017)

[31] Pont, Beatriz, Deborah Nusche, and Hunter Moorman. 2008. *Improving School Leadership. Volume 1: Policy and Practice.* Paris: OECD, p. 25.

[32] Pont, Beatriz, Deborah Nusche, and Hunter Moorman. 2008. *Improving School Leadership. Volume 1: Policy and Practice.* Paris: OECD, p. 27.

[33] Bengston, Ed. 2014. "Principals' Socialization: Whose Responsibility is It?" *Journal of School Leadership* 24: 725-752, p. 747.

## Session 15: Curriculum, Research and Development

Title: Barriers to Primary School Attendance among Children in North West Nigeria
(Author: Hadiza Korau Shehu)

Title: Combining Cell Biology Education with Communication Design in Public Health
(Authors: Humaira Qureshi, Gulraiz Khan, Javeria Samad)

Title: Integrating Project-based Learning Pedagogy into to a Business Management Program: A Formative Research Study
(Author: Kim Kennedy)

Title: A Critical Discourse Analysis of Ireland's Ready to Learn White Paper
(Author: Natasha O'Donnell)

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# Barriers to Primary School Attendance among Children in North West Nigeria

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## Abstract

*This paper presents a study that investigates the effects of child, household and state factors on primary school nonattendance among children in North West Nigeria. The study uses a nationally representative dataset, the Nigerian Education Data Survey [1] to investigate how children, household and state factors affect primary school nonattendance among children. The data pertaining to the area under study are extracted from the NEDS 2010 dataset [1] and prepared for analysis. The study then uses multilevel analysis [2] to hierarchically examine the effects of children, household and state factors on primary school nonattendance in North West Nigeria. The results of the multilevel analysis show that most of the strong determinants of primary school nonattendance are due to household factors, with parental education and wealth being most important. The results further show that parental education and wealth also affect the influence of other factors across child, household and state levels. The results also show that distance to school has more influence on primary school nonattendance among state factors.*

## References

[1] NPC (National Population Commission). (2010). Nigeria Education Data Survey (NEDS). Abuja, Nigeria.

[2] Snijders, T.A.B., and Bosker, R J. 2012. Multilevel Analysis: An Introduction to Basic and Advanced Multilevel Modeling, second edition. Sage Publishers, London.

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# Combining Cell Biology Education with Communication Design in Public Health

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## Abstract

*In order to reduce the disease burden in developing countries, contribution from all fields of study are required. Therefore, students who are not majoring in biology need to develop a basic understanding about health and disease so they can also play a role in curbing this problem. Habib University is one of its kind liberal arts school in Pakistan that encourages students to increase their breadth of knowledge in various disciplines. An elective course, Cell Biology and Communication Design in Public Health, was designed at Habib University to impart basic information about cell biology and connect it with diseases at an individual and societal level. Students also developed communication design skills to create innovative strategies and communication artefacts. The aim of these communication pieces was to create awareness about the prevalent diseases, avail preventive/treatment options, and remove societal stigmas so treatment could be sought at an earlier stage.*

## 1. Introduction

Global health is one of the top priorities for achieving world economic stability [1]. Despite best efforts, health conditions in developing countries remain subpar, leading to a persistently high disease burden. In 2015, for instance, the infant mortality rate (the number of deaths of children less than one year of age) for Pakistan rested at 65.8 (per 1,000 live births) according to the World Bank. A low-income country with a large and growing population, Pakistan continues to suffer excessively from inadequate public health systems and resources. To curb the public health crisis, it is not enough to create doctors, nurses or technical staff. It is necessary to include members from other disciplines like policy makers, software developers, and communication designers so they can play their part in eradicating disease by raising awareness and contributing to policy decisions about interventions to control diseases.

To that end, this course was designed to provide human health related biological information to students who are not majoring in biology. Students also developed skills to communicate this information to the public without compromising on the underlying scientific knowledge. Bringing together different disciplines to raise public awareness and to disseminate information on handling/preventing disease conditions should help reduce the disease burden in Pakistan.

## 2. Scientific culture

The course followed the principle of scientific culture proposed in Science editorial [2]. Scientific culture includes scientific education and community outreach. It is imperative to incorporate a scientific culture in the developing nations' societies to dispel misinformation about health issues. Often cultural beliefs, bias and unfounded notions lead to the prevention of eradication of diseases such as Polio. There is a misconception among poor Pakistani population that Polio vaccination may lead to sterility in children [3]. Such baseless beliefs can only be dispelled by escalating efforts to expand education and creating a scientific culture.

## 3. Student Assortment in Class

Habib University is Pakistan's first Liberal Arts and Sciences undergraduate university. It offers majors in 4 disciplines: Social Development and Policy (SDP), Communication and Design (CND), Computer Science (CS) and Electrical Engineering (EE). SDP and CND come under School of Arts, Humanities and Social Sciences while CS and EE come under School of Science and Engineering. As a liberal arts institution, Habib encourages students to increase the breadth of their knowledge by offering open electives in various disciplines. This course in Cell Biology and Public Health was one such elective.

A total of 28 students from three different majors attended the course. The following figure shows the class composition by majors, by year of study, and by prior knowledge of biology.

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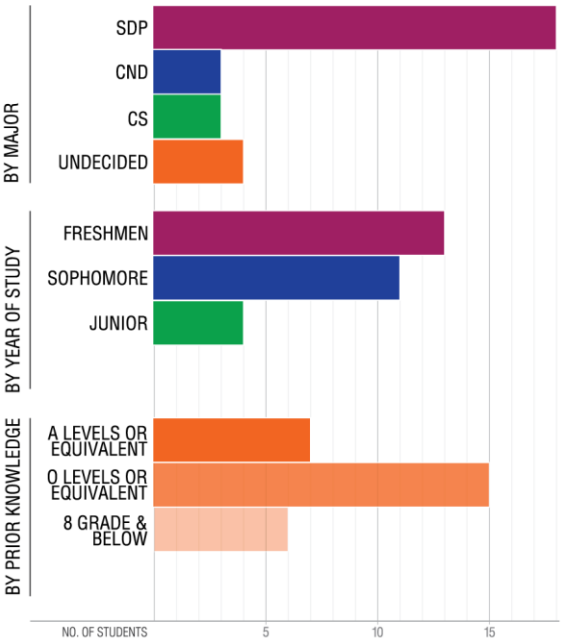


**Figure 1. Composition of class, by majors, year of study, and prior knowledge**

The course was offered as a freshmen-level elective, but had a large number of sophomores and juniors in attendance too. The majority of students came from the Social Development & Policy major, but students from Computer Science and Communication and Design joined in too. At least four students had not declared their majors at the time of attendance. Prior knowledge of biology provided the most diversity and proved to be a challenge to satisfy each category. The students with least exposure to biology found it difficult to cope while those with prior knowledge caught on fast. Best solution was to pair students having limited knowledge of biology with those having some command in the subject so they could help each other.

## 4. Course Content

As a 100-level course with students from a variety of disciplines and varying background in biology at the secondary and high school level, the cell biology component in the course was kept to a basic level [4]. Briefly, it included prokaryotic and eukaryotic cells, cell organelles, cell structure function, mitosis and meiosis and cancer, DNA and genetic mutations, Mendelian genetics and ABO blood grouping system and the immune system. Each component was linked with the final outcome/symptom of disease so students could link the impact from cellular level to the body as a whole. For example, Mendelian genetics was taught in terms of Thalassemia, a disease quite prevalent in Pakistan. Then students were introduced to the basics of public health and epidemiology so they could further link the disease to the society as a whole. Communication design element was introduced with reference to two contextually relevant public health problems – the polio vaccination, and the dengue virus infections. Students looked at the problem across all scales – from the individual cellular level, to the global scale of fighting these persistent health concerns. Students got to develop a better understanding of communication strategies through a final project.

## 5. Final Project

The final project, titled Communication/Design for Public Health, was an investigation, and a proposition, into an existing area of public health concern. Students, either individually or in pairs, had to identify an existing public health issue – a virus, a disease, or any predominant medical condition – relevant to the context of Pakistan. They also had to identify at least one key stakeholder for this topic – a relevant practitioner, a hospital, a medical facility that specializes in this, or a patient. Building their knowledge on relevant desk research, students had to design a questionnaire and interview two stakeholders. After discussing about the gaps in the existing strategy (prevention or cure) and the communication artefacts (pamphlets, ads, radio or television spots, websites, etc.), students had to (re)design a communication strategy and come up with a new artefact. Their final outputs were in three forms:

1. An A-3 poster that contextualized the topic. The poster was constructed in Adobe InDesign. It covered a quick scientific explanation of how the disease works, with an original cellular sketch to show the disease mechanism at the cellular level, the incidence of the disease/virus globally or in Pakistan, how it spreads, and what's the existing communication strategy. The students then proposed a new strategy, mentioning all the components, their tone and the visual language.
2. An artefact that's representative of the new strategy – students had the option to make a new pamphlet/poster/radio ad/30-sec TV ad/website etc. The artefact showed the redesigned components of their new strategy in action.
3. A written, 1000-word report about their process, explaining how they arrived at these outputs, and how they are more effective than existing ones.

Table 1 shows the different diseases that the students chose to work on and the various

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communication artefacts that they adopted for the new strategy.


**Figure 2. Sample poster layout**

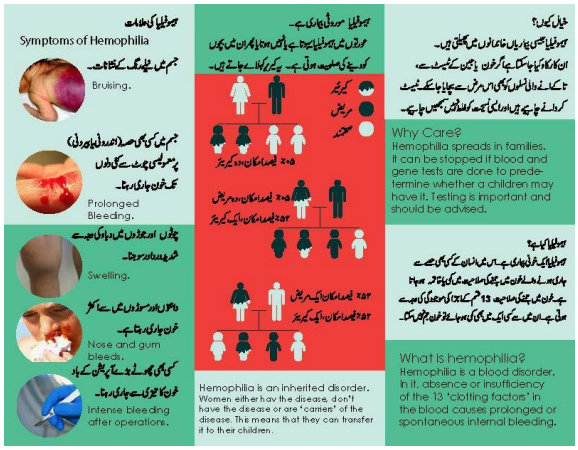


**Figure 3. The inside of a student-designed, bilingual pamphlet on Hemophilia**

**Table 1. Diseases with relevant artefacts designed as part of new communication strategy**

| Disease | Communication Artefact |
|---|---|
| Diabetes Type 1 | Pamphlet for awareness |
| Thalassemia | Facebook page "Students against thalassemia" |
| Chronic Kidney Disease | Phone hotline (interactive voice response) |
| Breast Cancer | Video for breast cancer self-check |
| Tuberculosis | Radio ad in national language |
| Diabetes Type 2 | Meal plan pamphlet |
| Naegleria | Radio ad in national language |
| Oral Cancer | Video for awareness |
| Breast Cancer | Website for awareness with chat room for patient support |
| Emphysema | Poster for awareness in national language |
| Thalassemia | Poster to increase blood donation |
| Hemophilia | Pamphlet for awareness |
| Alzheimer | Video for awareness |
| HIV | Radio ad in local dialect |
| Gastric ulcers | Poster for awareness and treatment options |
| Hepatitis B | Pamphlet for awareness |

## 6. Active Learning Approaches

Extra effort had to be put in to keep the students engaged and motivated since this was an elective class. Class activities, humorous videos and memes were included in the lecture and relevant movies were recommended to keep the students' interest alive. Socrative (a cloud-based student response system that allows students to respond to questions using their smartphones) was employed to gauge understanding from students at the individual level.

Students were provided the opportunity to test their ABO blood groups in class with a short hands-on exercise. While studying about DNA, the students got to isolate cellular DNA from pea extract and thus having visualized the DNA helped to hold the students' interest in all DNA related theoretical work.

Students also received hands on introductory training for Adobe InDesign, a desktop publishing software application used for creating posters, flyers and brochures.

## 7. Student Performance

Students received grades based on the following criteria:

A = 90 or above
B+ = 80 or above
B = 70 or above
C = 60 or above

According to performance based on majors, it was noticed that most students achieved a B+ grade irrespective of the major they were enrolled in (Figure 4).

According to performance based on prior knowledge of biology, students with background in A Level biology (and the local board equivalent) fared better than other students. All students from a background in O levels received a B+ or lower grade. The same was true of students who had last encountered biology in 8$^{th}$ grade or below (Figure 5).

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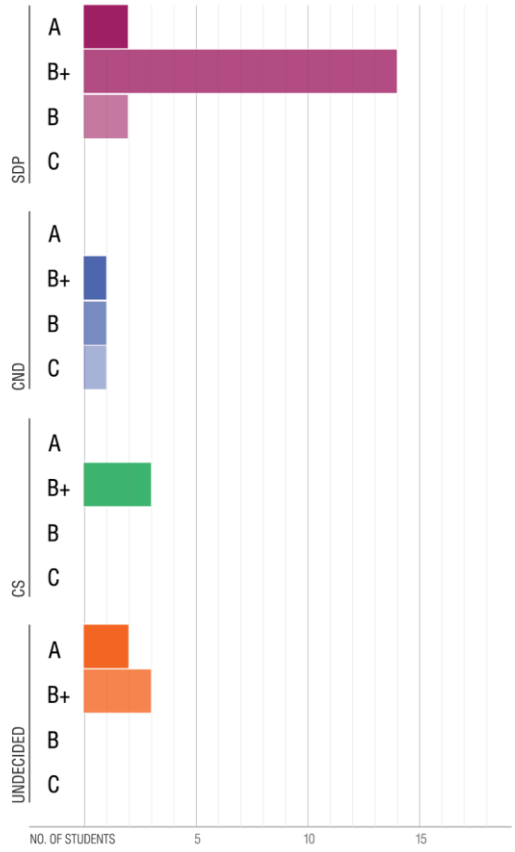


**Figure 4. Number of students with grades achieved, distributed on the basis of enrolled majors**

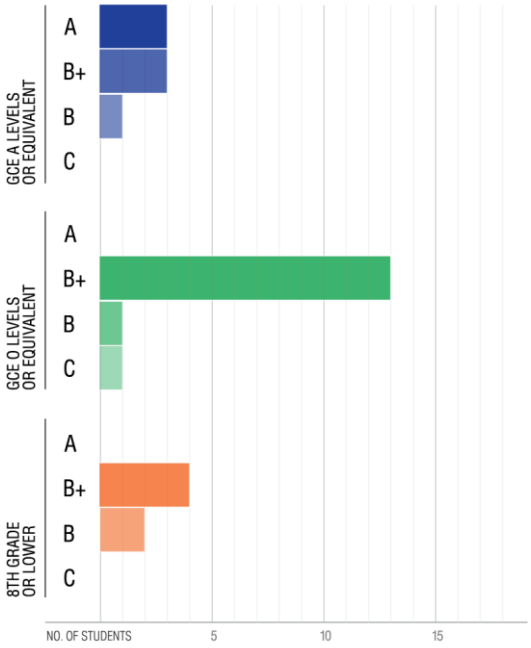


**Figure 5. Number of students with grades, distributed on the basis of prior knowledge**

A majority of students in class came from non-Science or undeclared majors. However, their affiliation did not affect their grades. They performed as well, and better, than their Science counterparts (Figure 6).

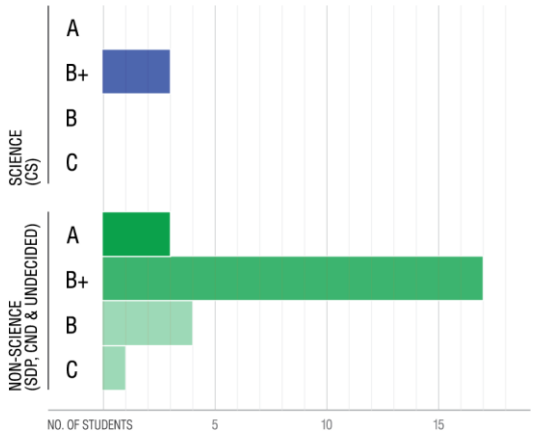


**Figure 6. Number of students with grades, distributed on the basis of prior knowledge**

Freshmen students were anticipated to perform below sophomore and junior students because first year grades do not contribute to their overall GPA according to university policy. However, that was not the case. Both, first year students and advanced students (sophomores and juniors) performed equally well in the class (Figure 7).

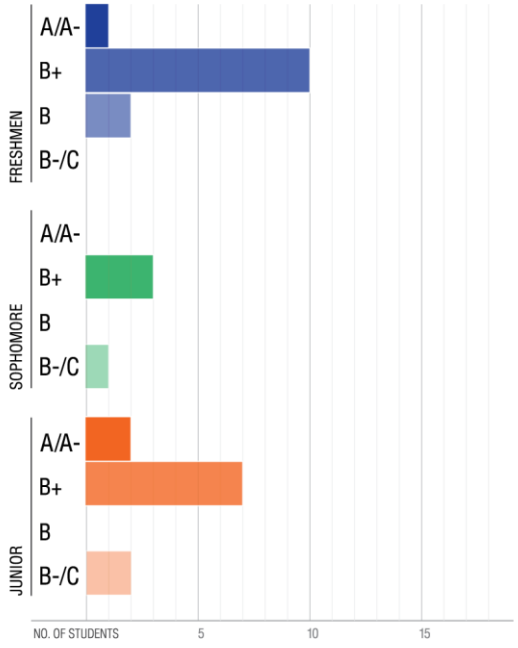


**Figure 7. Number of students with grades achieved, distributed on the basis of year of study**

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## 8. Student learning through field work

For the final project, students had to find relevant stakeholders and interview them. The student group working on Thalassemia encountered two NGOs working on Thalassemia, both of which had lost patients to the disease and that is why they were driven to combat it. Very little work was being done at the government level. Most affected families were unaware of the risk that intermarriages bring for Thalassemia and there were many children in the same family affected with the disease. Hence, our students devised a strategy to get all students at university level to get tested, therefore, they would know their status before marriage and lower the incidence of Thalassemia this way. Their Facebook page, "Students against Thalassemia", is now functional and the drive for Thalassemia testing at the university will start next semester.

Another group working on AIDS interviewed a village woman who had contracted HIV from her husband, and had transmitted it to both her children at birth. After the death of the husband, the family had ostracized her and she was upset that she was completely unaware of the dangers of contracting HIV and the taboo that surrounds it. This group made a radio ad in the village's local dialect, explaining ways to prevent HIV contraction and how unsuspecting housewives were not to be blamed.

A third group working on Breast Cancer learnt about how women are ashamed/embarrassed to talk about lumps in the breast and hence delay seeking treatment leading to advanced stage of the disease. This group made a website where women could communicate with other patients/doctors and read about survivor stories to move past the stigma associated with breast cancer.

## 9. Conclusion

The course intended to educate the basic concepts of human cell biology to the students so they could develop a better understanding of diseases. The students were further trained to generate innovative ways to communicate health-related significant information to the common man without deviating from scientific facts. These communication pieces were intended to create awareness about the prevalent diseases, avail preventive/treatment options, or remove societal stigmas so treatment could be sought at an earlier stage. The analysis of final grade shows that while prior knowledge helped students in class (and reflected in higher grade bands), other factors (major, area of study and year of study) did not appear to have a decisive effect on their grades. The active learning methods, a focus on learning through field work, and contribution of non-biological components towards the final grade all play a role in explaining the outcomes.

## 10. References

[1] Report "Top Ten Global Economic Challenges: An Assessment of Global Risks and Priorities", *Groupings global economic and development,* 2007

[2] B. Alberts, "Policy-making needs science", *Science*, AAAS, (New York, NY), 2010, 3;330(6009), pp. 1287-1287.

[3] A.R. Khowaja, et al. "Parental perceptions surrounding polio and self-reported non-participation in polio supplementary immunization activities in Karachi, Pakistan: a mixed methods study." *Bulletin of the World Health Organization*, 2012, 90.11, pp. 822-830.

[4] L. Arwood, "Teaching cell biology to nonscience majors through forensics, or how to design a killer course", *Cell Biology Education*, ASCB, 2004, 3(2), pp. 131-138.

# Integrating Project-Based Learning Pedagogy into to a Business Management Program: A Formative Research Study

Kimberley Kennedy
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## Abstract

*The use of cross-functional teams in industry is extensive and consistently rising. In response, industry is increasingly looking to hire new employees that are well prepared for this interdisciplinary world. Post-secondary education institutions are taking up the challenge of preparing their students by incorporating new innovative and integrated methods for teaching and learning.*

*This case study's main intent was to examine the effect that the organizational culture had on the overall program decision to change, and the implementation of this change to the business management program. Leadership, instructors and students were interviewed to discover their opinions on the effect that our organizations culture had on the overall program change. Challenges, barriers, and positive support factors that arose due to the organization's culture such as the use of Kotter's dual operating system, level of innovative freedom for instructors, and entrepreneurial attitude were all discussed.*

*This study examined a three year case study and describes the change to a business management program through the use of a collaborative framework, for integrating five courses in a semester into one major real-life project. There were several motivational factors for the change the major one being to better prepare business students to work effectively in industry, while overcoming the challenges of the barriers of functional boundaries. The case study examined the implementation of a pedagogical change to the business diploma program at a rural college. The pedagogy applied was Project-based Learning (PBL) which is an experiential, innovative and student driven approach to teaching and learning driven by the need to provide relevant and practical education in an increasingly demanding world. Students work collaboratively in teams on real-life projects which provide them with 21st century skill learning opportunities. An important component of the successful change and implementation to this pedagogy was effective cross-functional course integration in order to reduce the silo effect of learning and move learners toward a higher and deeper level of understanding. Project work required application of skills and knowledge from many courses which blurred the distinction of different course content within the curriculum.*

*The application of project-based learning pedagogy provided students with a multidisciplinary and real-world learning opportunity as students learned through completing their project work. The role of faculty took a different direction, from the "sage on stage" to that of mentor and facilitator to build industry relationships. It also required faculty to increase their level of collaboration among fellow instructors which included the introduction of team teaching for several of the courses. It is suggested that team teaching is an effective way of providing students and faculty with a holistic perspective (Watkins, 1996). Instructors learned to use a just-in-time approach to the introduction of skills and new concepts as students learning was ongoing and engrained within the projects. This approach to learning using real business client's project work along with the full integration of five courses reinforced how the different disciplines work together. Eighty-five percent of the students stated in the after participation surveys that they learned better using this method and could see a better connection between the concepts learned in the different courses. As new and old knowledge is interlinked within the context of the business project students felt they could better see the connection and relevance. Eighty-six percent of the students surveyed stated that they thought*

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*they would use the skills and knowledge they learned in their projects in the future.*

*The business management program change full implementation is the 2018 academic year, however faculty will continue to monitor the success of project-based learning to insure continuous improvements continue in the program.*

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# A Critical Discourse Analysis of Ireland's Ready to Learn White Paper

Natasha O'Donnell
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## Abstract

*Using Critical Discourse Analysis (CDA), guided by the work of Ball and Fairclough, this paper examines Ready to Learn [13], Ireland's first policy pertaining to the early education sector. Information regarding the economic, social and political backdrop to the paper publication is provided to inform context of publication. Findings are interesting, particularly with regards to the timeframe and state of enactment, as Ready to Learn proposes radical reforms for the early education sector, particularly in relation to topics which remain a priority in global educational policy today, such as inclusion and quality. This paper highlights a lack of clarity regarding implementation planning and recognises the changes in early years, which is responsible for the sector's current state of evolution. CDA proves a useful lens through which to examine Ready to Learn, lending itself to analysis of the language contained in the paper, although it may be worth noting that whilst CDA may be explicit regarding its own position, it leads to open-ended results [8].*

## 1. Introduction

The landscape of early education in Ireland is currently in a state of rapid evolution, with new initiatives and legislation designed to raise standards and establish the key role of early experiences on life-long learning. The roots of this evolution lie within the publication of the Ready to Learn [13] White Paper, the first Irish document pertaining to the education of children under the age of six years. Ready to Learn is a particularly interesting document, in that it does not conform to the traditional policy process. No Green Paper preceded the publication of Ready to Learn, it largely bases its proposals on the 1998 Report of the National Forum for Early Childhood Education, setting out an agenda to overhaul and greatly develop the early years sector. It even differs from tradition in terms of presentation, reading similarly to a book, rather than using the bullet point approach generally found in Irish educational policy documents. It consists of eleven chapters, each with its own cover page to provide readers with a synopsis of the content, and engages in descriptive discourse around each topic prior to setting out guidelines on how best to proceed. It clearly recognises the need to develop policy and provision, and the need to use research to ensure usage of the best strategies to deliver quality experiences, meeting the needs of all children.

The author wishes to examine Ready to Learn as, over 17 years later, it remains influential throughout the early years sector. Particular attention will be paid to five key areas: quality; curriculum; coordination; inclusion and inspection. The author believes these areas are essential in establishing a high quality sector designed to provide education and care for all children prior to them entering Primary School. These areas in particular continue to be topical, with the sector offering a Síolta Standards Award to quality services and extending Visiting Teacher services to promote coordination. In 2016 a new academic inspectorate body was launched and a new training programme designed to enhance inclusion. Underpinning these areas is the provision of a diverse and accessible curriculum for all children, providing them with the opportunity to fulfil their potential. The Ready to Learn paper will be analysed through the lens of Critical Discourse Analysis (CDA), guided by the work of Ball and Fairclough, exploring what and how language is used in this policy, and how said language influences interpretation. It will also explore the care/education legacy it left in its wake.

## 2. Background

Ready to Learn remains influential today although it was published during a time which bears little resemblance to today's social, economic and political landscape in Ireland. Fairclough [8] proposed language is best interpreted in the context in which it is used, therefore the author will briefly describe the Irish backdrop at the time of publication, considering the social, economic and political scene in Ireland during this time. A global change in attitude regarding children emerged, bringing about a considerable volume of policy and legislation regarding children's rights. This culminated in the almost universal ratification of the 1989 UN Convention on the Rights of the Child. This convention was ratified by Ireland in 1992, and led to the National Childcare Strategy which established Ireland's commitment to safeguarding the rights of children in policies and provisions [9]. Ireland also found itself experiencing a growing economy which led to a dramatic shift in family life, with women returning to work and families requiring childcare.

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This demand for childcare revealed a lack of quality and affordability in the early years sector. This coincided with global recognition of school readiness [16] as a strategy to improve equity, giving consideration to all children, especially the disadvantaged and vulnerable [15]. Even now we are in the midst of a cycle where school readiness is strongly linked with human capital, with research indicating improved academic outcomes and positive social competencies enhancing economic development. This notion of school readiness played a significant role in Fianna Fáil's manifesto for the 1997 General Election. The Election saw Fianna Fáil win 39.3% of the votes, resulting in them leading a coalition with the Progressive Democrats and four Independents. Bertie Ahern became Taoiseach, a post which he would hold until 2008. Ireland's membership of the European Union (E.U.) and joining the single currency market served to further Ahern's popularity as prosperity blossomed. Ireland became an attractive European access point for multi-national investors, and low corporation tax ensured investment flow, with the rate of return on American investment averaging 20%, the highest in the E.U. Fianna Fáil intertwined the strands of a booming economy, the need for women to re-join the workforce and the importance of early education, ensuring a cyclical link, the provision of childcare enabling women to return to work to bolster the Irish workforce, meeting the demands of the booming economy and leading to increased prosperity. Their proposed commitment to preschool education, the establishment of a National Forum for Early Childhood Education and a desire to enhance the early education sector status continue to be instrumental in educational practice today.

Once in power the coalition government, under the leadership of Fianna Fáil, set about delivering an early education plan, believing in the long-term advantages to society and the economy. In 1999, the National Childcare Coordinating Agency (NCCA) was established to commence the phased implementation of the National Childcare Strategy.

The main aim of the strategy was to ensure the provision of supports and services relating to all aspects of children's development. In 1999, the National Development Plan allocated over €400m through the Equal Opportunities Childcare Programme (EOCP) to facilitate the development of the childcare sector, particularly for those considered disadvantaged. The National Voluntary Childcare Collaborative (NVCC) was also established, consisting of organisations with an interest in the promotion of Early Childhood Education and Care.

The Department of Education and Science (DES) produced the Ready to Learn White Paper, designed to focus specifically on early education, establishing a comprehensive strategy for the education of children from birth to six years of age. This paper covers a broad range of issues pertaining to early education, including promotion of quality, encouraging parental involvement and a system of inspection. There is also great emphasis placed on education for all, providing provisions to enable the inclusion of children with special educational needs (SEN) and those considered disadvantaged, an area considered to yield great investment return. Indeed, according to Hayes [9] educational equity played a significant role in developments within the early education sector and the direction of research in Ireland in the wake of Ready to Learn. The paper places emphasis on quality, determining the production of a quality framework would set high quality standards. The paper also proposes the production of a framework regarding curriculum, to ensure improved opportunities for learning experiences across services. It suggests an education inspectorate work alongside the Health Service inspectorate, already in place, and a central agency be created to coordinate services. The paper also promises commitment to several measures to enhance inclusion for children with SEN and those considered disadvantaged, and acknowledges uniformity is not necessarily the key to providing equality, recognising the need for appropriate individual support to enable all children to fulfil their potential.

## 3. Methods and Methodology

Critical Discourse Analysis (CDA) considers the use of intertextuality, interdiscursivity, lexico-grammatical construction, along with the attitudes and judgements behind the language used, and attempts to de-construct the reality presented. In discussing CDA, the author acknowledges Bowe and Ball's [4] idea of the policy cycle, which sees governments adopting a somewhat linear approach, focusing on macro-based theoretical analysis, excluding the voices of teachers, students and parents, therefore potentially increasing the gap between policy and practice. CDA concerns itself with exploring language, paying particular attention to how social relations, identity and power are constructed, with the political, economic and social context at the time of publication in mind. Marston [11] also recommends the analysis of the social practices surrounding text production. Ball [1] describes policies as textual interventions into practice, believing the more ideologically abstract the policy the greater the distance from conception to practice.

Discourse is, simply put, the use of language. A person, or agency, can construct a particular understanding based on the use of language. It is also important to note that language is not neutral. It can be used explicitly or implicitly to convey attitude, authority or intention [2]. Discourse can

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"…evaluate…ascribe, purpose…justify…" [18]. Discourse analysis can assist in the understanding of "why people interact with one another the way they do…" [10]. Ball [1] considers most policies to be ramshackle, a bricolage process, taking information and ideas from elsewhere and amending then to suit local needs. They present "truths" to reinforce the ideology presented and, as Ball [2] has stated, they idealise solutions to problems. Richardson and Gill [14] reinforces this idea, believing discourse is organised to be persuasive. In examining some of the key components of Ready to Learn the author will use CDA to explore the meaning behind the language used and attempt to de-mystify the ideologies presented [12], whilst bearing in mind the open- endedness of CDA result [8]. Consideration will be given to intertextuality, used to establish credibility, presuppositions, implications, the use of verbs to construct desired realities, and the use of key words to inscribe attitudes and evoke emotions. An exploration of the lexico-grammatical construction will also be provided, discussing the use of past, present and future tenses. This analysis will be conducted while bearing in mind Ball's [2] notion that we must consider not just whose ideas are being validated, but whose ideas are not being validated, alongside Fairclough's [8] idea that what is absent from a text may be just as significant as what it contains.

## 4. Analysis of Findings

### 4.1. Intertextuality

Ball [2] suggests that policies embody claims to speak with authority. Credibility plays a key role in all aspect of society. Certain newspapers, universities, even people, are considered more credible than others. This credibility influences our thinking, increasing the likelihood of credible institutes and people gaining our support. For the DES to gain support for Ready to Learn they needed to establish credibility, and they set about doing so straight from the document's foreword. While the document author is the DES, a powerful group body, the author of the foreword is Micheál Martin, Minister for Education and Science 1997-2000. He introduced many education initiatives and increased educational spending, helping increase his public popularity. However, Martin does not merely sit on his laurels, he also refers to the Irish Government's 2001 Action Plan for the Millennium and the 1998 Partnership 2000: Childcare. He gains further credence by referring to existing provisions, both nationally and internationally, and extensive research, suggesting "we must take what is best…and incorporate it into our early childhood education system." (pp.6). Also interesting is the placement of these references throughout the foreword, ensuring a sense of credibility is present in both the second and final sentences, along with the central paragraph.

An attempt to establish credibility is present throughout the text. Excluding the foreword and reference list Ready to Learn is a 103-page document, within which there are 95 quotes. The credibility trail doesn't stop there, it also refers to other Departments of the Irish government, Acts and Programmes, and that's before considering international references. This vast volume of information is shown in Table 1. The use of so many references from such a variety of sources, both national and international, and so many texts weaved within the document, suggests that Ready to Learn must deserve credibility and support. That certainly appears to be the point which the DES are attempting to make. They seem determined to highlight the links between this document and existing provisions and research, filling the reader with confidence and belief in Ready to Learn, while failing to address the practicalities of implementation: the investment; the repercussions for those working in the sector; the need for guidelines; the timeframe.

**Table 1. Incidents of intertextuality**

| References | Frequency |
|---|---|
| Departments of the Irish Government | 29 |
| Other Irish Organisations | 112 |
| Government Acts | 29 |
| Pilot Projects/ Schemes | 69 |
| Researcher/Author | 8 |
| International Organisations | 12 |
| International Research | 35 |

Table 1 shows the range of sources and the frequency with which they appear.

### 4.2. Interdiscursivity

Economic status is often influential in educational policy, especially in times of fiscal austerity, with research suggesting links between education and consumerism [3]. When examining the relationship between education and consumerism it is important to remember that Ready to Learn was produced in 1999, a time when Ireland was experiencing an economic boom and budgets were awaited with expectation rather than fear. In their 2001 Action Plan for the Millennium, the Irish Government predicted a budget surplus of £1.7 billion and stated Ireland to have one of the lowest public debt ratios in Europe. Ready to Learn is written with financial promise, even referring to the OECD philosophy of greater educational investment equating to economic merit. The word "cost" is

mentioned only 28 times throughout the entire document and "value" appears on 12 occasions.

An attempt to reaffirm the link between educational expenditure and economic prosperity is present, the word "capital" being used on 6 occasions, 3 of which appear within the term "human capital", placing capital value on the acquired skills of people, a skilled workforce equating to greater capital value. There are also assurances of tangible supports, subsidies for suitable premises payable to providers and a free pre-school year promised to parents. This affirmation of economic value is clearly intended to warrant public endorsement. Interesting then, is Fairclough's [8] suggestion of the importance of what is absent from a text, as there is a significant lack of information regarding funding of proposed provisions throughout the paper. The author also found incidents of policy borrowing, the use of ideas and proposals present in other documents, which may be influenced by an attempt to improve economic competitiveness [7].

## 4.3. Presupposition/Implication

The DES took great care to illustrate an ideological picture through their use of language in Ready to Learn, one in which society would be a willing participant. They created a sense of a wonderful reality being imminent, leaving no doubt that it would happen. The foreword contains phrases such as "seeks to support" and "will be achieved", a trend which continues throughout the document, with phrases such as "can make", "seeks to", and "will ensure" scattered throughout the text. Not only is there the suggestion of these verbs resulting in change, we must also consider the words with which these verbs are partnered, words such as "achieve" and "encourage", creating a sense of the positive change which will occur as a result of enactment. A summary of this information is presented in Table 2.

Table 2 shows the frequency of words combined with future tense verbs, to create a sense of "a change for the better" following enactment.

**Table 2. Terms used to imply positive change**

| Words used with "will"/"will be" to suggest positive change | Frequency |
|---|---|
| Encourage | 9 |
| Provide | 9 |
| Achieve | 8 |
| facilitate | 5 |
| Benefit | 4 |
| Develop | 4 |
| Improve | 3 |
| Promote | 3 |
| Enhance | 2 |

Negativity is ominous by its near absence, with the words "reduced" and "prevented" appearing only once. This is further highlighted by comparing the frequency of "will" (235 occurrences) and "will be" (207 occurrences) with "will not" (5 occurrences). There is also a sense of urgency attached to "is", combining it with "crucial" (6 occurrences), "essential" (6 occurrences) and "vital" (5 occurrences). There is evidence of lexico-grammatical construction in the use of tenses. The words "is" and "are" are used frequently, placing us in the present, making us part of what is occurring right now. There is also significantly greater use of future tense over past tense, providing a sense of looking forward. This information is presented in Table 3.

**Table 3. The appearance of positive versus negative terms combined with verb tense**

| Positive | Frequency | Negative | Frequency |
|---|---|---|---|
| Will or will be | 442 | will not | 5 |
| Was or were | 80 | was not or were not | 4 |
| Is or are | 819 | is not or are not | 22 |

Table 3 shows the frequency of positive versus negative terms and the use of verb tenses.

## 4.4. Provoking Positivity

Language is rarely neutral and this fact plays an important role in policy writing. Weaved throughout Ready to Learn we find incredibly powerful language which impacts on the reader simply by being present. It leads us to look at the document in a particular way, creating a sense of what can be achieved, presenting a picture of positivity. It is difficult to read the document without becoming excited by the proposals to achieve "education for all", firmly believing in the recognition of the importance of consultation with all involved parties. As early as the foreword, Martin refers to the publishing of the document itself as a "milestone" and it is a paper which is embedded with optimism, from improving standards of professional competency to providing a comprehensive strategy for enactment, the language taking on a life of its own. Table 4 below helps identify the language present and frequency of use, in order to assess the implications created. The word "quality" is one of the most frequently used words in the document, appearing on 191 occasions. It offers assurances, being instantly associated with positive experiences, assurances of quality services for early education and quality standards to be upheld through inspection. Clearly the aim of this paper is to provide the very best services. The word "standards" appears on 93 occasions, "expert" appears on 55 occasions and "qualifications" appears on 53 occasions. There is

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the question of how the promises of this policy will be achieved, but the reader's mind is put at ease by the use of words such as "support" (141 occurrences) and "consultation" (33 occurrences). The reader's sense of ease is furthered by the addition of the words "effective" (75 occurrences), "benefits" (72 occurrences) and "enhance" (44 occurrences), ensuring the future of early education looks positively bright for all concerned. Positivity outweighs negativity, which is highlighted by the use of "fail"/"failure" a mere 7 times compared to "succeed"/"success" 13 times, almost double the frequency.

**Table 4. Words used to evoke positivity**

| Words | Frequency |
|---|---|
| Quality | 191 |
| Support | 141 |
| Standards | 93 |
| Effective | 75 |
| Benefits | 72 |
| Expert | 55 |
| Qualifications | 53 |
| Enhance | 44 |
| Consultation | 33 |

Table 4 shows the most frequently used words within words which evoke positive connotations.

### 4.5. Care/Education

Fairclough [8] suggested looking for gaps in discourse in order to identify areas for potential change. Despite suggesting they are intertwined, the gap between care and education presented throughout Ready to Learn certainly suggests a need for change. There is an intimation that care and education form a continuum and should not be separated. However, the paper also suggested that the balance between care and education shifts, with the age of the child indicating the balance required.

Furthermore, the paper insists on an integrated approach to care and education, yet discusses them separately on many occasions. This is particularly apparent in discussing the area of inspection, where a dual inspection is suggested, the current health and safety inspector, generally a public health nurse, being accompanied by an educational inspector. There is also a sense that early education is essential as an intervention for children with SEN and those considered disadvantaged, with children outside of these categories requiring childcare simply to facilitate working parents. Whilst the combination of "care and education" appears on 12 occasions, the combination of "education and care" appears on 18 occasions, creating a 2:3 ratio. Upon further examination, the individual word "care" appears on 136 occasions, whilst the word "education" appears on 476 occasions, creating a 2:7 ratio. This information is presented in Table 5. This seems a staggering difference for terms supposedly being given equal weight with regards the role they each play in early years services.

**Table 5. Care/Education**

| Words | Frequency | Ratio |
|---|---|---|
| Care and Education | 12 | 2:3 |
| Education and Care | 18 | |
| Care | 136 | 2:7 |
| Education | 476 | |

Table 5 shows the frequency of the words care and education, individually and in combined formats. These terms played a significant role in the 2016 pre-election manifestos of many Irish political parties.

## 5. Discussions

This paper set out to analyse the language present throughout the Ready to Learn White Paper, and its influence on interpretation and enactment, using CDA. The author identified the use of references, quotes and citations to establish credibility, key words to express attitudes and evoke judgements, presupposition/implication using factive verbs to construct convincing realities, lexico-grammatical construction through the use of verbs, and even a hint of interdiscursivity pertaining to the early years sector and consumerism [1], most noteworthy in the areas of quality and inclusion of those considered disadvantaged. This link between consumerism and those considered disadvantaged is particularly interesting, as this area is considered to yield great investment return. Ready to Learn certainly goes to great lengths to ensure it is viewed as a credible and innovative document, full of promise for the future. It outlines proposals for change in quality; curriculum; coordination; inclusion and inspection, and suggests the co- existence of care and education will enhance the early years sector. It establishes the foundation for enactment but, as stated in the foreword, change "cannot occur overnight" and a "phased approach will be necessary".

## 6. Conclusions

Ready to Learn certainly establishes its intent to create a high quality early years sector in Ireland and, through clever use of language and reference to

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other documents, it proposes an ideal reality. The road to enactment starts slowly and, in 2002, the DES invite the OECD Directorate for Education to conduct a review of early childhood policies and services. The OECD recommendations echo those of Ready to Learn: establish a quality framework; centralise policy under one department; train and recruit teachers and assistants specifically for Traveller children. The review also suggests free pre-school education for all four year old children. Now, let's examine enactment in the areas of quality; curriculum; coordination; inclusion and inspection. The first step taken pertains to coordination, specifically the allocation of a lead role to a single organisation. In 2002, the Centre for Early Childhood Development and Education (CECDE) was established, to coordinate and implement recommendations from Ready to Learn.

Unfortunately, due to an economic collapse felt globally, the CECDE could not be funded and ceased operating in 2008. Despite a short tenure, the CECDE legacy remains evident in the Early Years sector today particularly its involvement in the consultation process and drafting of a quality framework for the sector, published as Síolta in 2006. The difficulty remains, Síolta is a framework and therefore open to interpretation which may reflect a personal agenda. In 2009, the National Council for Curriculum and Assessment (NCCA) published Aistear, a curriculum framework. Again, this framework leaves room for interpretation and, as schools are complex and internally different, therefore interpretation may differ greatly. Also worth considering is Colebatch's [5] notion that enactment practices may be based on pedagogy, yet to facilitate the use of Aistear nationally in all preschool services, there is an absence of any reference to particular pedagogies.

Parallel to the work of the CECDE there were other legal initiatives, such as the 2001 Children's Act, which centred on the legal rights of children, and the 2004 Education of Persons with Special Educational Needs (EPSEN) Act. Whilst the EPSEN Act supports many of the recommendations of Ready to Learn, much like CECDE, it suffered greatly due to the economic crisis, resulting in implementation being placed on hold. Indeed, even today, something as basic as an Individual Education Plan (IEP) is not a mandatory entitlement for children with SEN, so there is no stipulation for providing a modified curriculum. As for Ready to Learn recognising the importance of trained and experienced staff, the government launched a training programme, Access and Inclusion (AIM) in June 2016, over 16 years since the publication of Ready to Learn, and teacher access to training is restricted to one teacher per early years setting. An element of contradiction was found in Ready to Learn, regarding provision for those considered disadvantaged, with recommendations to encourage the establishment of community preschool programmes whilst offering inclusion in preschool services to avoiding stigmatism.

Hayes [9] believed concerns regarding equality played a significant role in developments in the Early Years sector and 2009 saw the launch of the Early Childhood Care and Education (ECCE) programme, offering one year free preschool placement to all children, based solely on age. September 2016 sees the extension of this programme, offering two free years of pre-school to all children based solely on age. It is worth noting that a decade passed between the publication of the Ready to Learn and the initiation of the free preschool year programme. Similarly, 2016 saw the launch of an Education Inspectorate, operating from the DES, separately from the pre-existing Health Service Inspectorate.

Once again, having waited over 16 years for enactment, a division between care and education continues to exist. This is sadly not the only apparent division, for there remains numerous agencies involved in the Early Years sector, such as the Department of Education and Skills, the Department of Children and Youth Affairs, the Department of Health, Tusla and the National Council for Curriculum and Assessment. So, if we revisit the areas of quality; curriculum; coordination; inclusion and inspection, and examine the aims within Ready to Learn, we can see the state of enactment, and the timeframe. This information is presented in Table 6.

Table 6 shows the proposed aims stated in Ready to Learn (1999) and the current status of these aims, including the time span, ranging from 3 to 17 years.

**Table 6. The implementation status of proposed aims of Ready to Learn**

| Key Area | Aim stated in *Ready to Learn (1999)* | Status |
|---|---|---|
| Quality | To create a Quality framework, encompassing curriculum, methodologies, staff qualifications and training. | Síolta Quality Framework, 2006 (7 years post *Ready to Learn*) |
| Curriculum | To create a curriculum framework, ensuring structure, high quality and a readiness to learn. | Aistear Curriculum Framework, 2009 (10 years post *Ready to Learn*) |
| Coordination | To allocate a lead role to a single organisation | CECDE 2002-2008<br>Numerous agencies are currently involved in the early years sector (3 years post *Ready to Learn*) |
| Inclusion SEN | To ensure trained and experienced staff are positioned to provide support.<br>To ensure a modified education plan is in place to assist each child in fulfilling their potential. | EPSEN Act, 2004 (5 years post *Ready to Learn*)<br>Phased implementation is on-going<br><br>AIM training programme, 2016 (17 years post *Ready to Learn*) |
| Inclusion Disadvantaged | To encourage and support disadvantaged communities to establish their own pre-school programmes.<br>To avoid stigmatism. | ECCE, 2010 (1 free pre-school year) (11 years post *Ready to Learn*)<br>ECCE, 2016 (2 free pre-school years) (17 years post *Ready to Learn*)<br>AIM (as for SEN) |
| Inspection | To develop a dual inspection system (education alongside health and safety) | Education Inspectorate, 2016 to work separately of the pre-existing Health Service Inspectorate (17 years post *Ready to Learn*) |

### 6.1. The Great Divide

There remains the issue of the care/education debate, the status of which is most definitely on-going and the source of much literature. This split is not only unhelpful but somewhat illogical, as effective education will include care, and care should include education. Hayes [9] intimated care and education continue to be discussed as separate entities, and further suggested that should care be reconceptualised as nurture, this may strengthen the perceived value assigned to care. In 2001, the OECD's Start Strong [17] identified care and education as inseparable, insisting both are required to create a quality early years sector. They also proposed the use of the term Early Childhood Education and Care (ECEC) may provide a more balanced representation of care and education.

Indeed, as recently as the 2016 Irish General Election, the care/education issue played a significant role in the manifestos of many of the key political parties. Returning to Fairclough's [8] notion of the significance of what is absent from text, when discussing the early years sector the word "teacher" was ominously absent amidst a plethora of alternative words and terms: child care workers; staff; childminders; early years professionals; crèche workers; workers in the childcare sector; workforce in early education and care, ECCE workforce and those who provide childcare services. It would seem 2017 finds many teacher experiencing an identity crisis, thanks to the power of language. Naming is a powerful tool and may even play in part in how we interact. Indeed, the author is reminded of Ball's [1] suggestion that rather than us speaking discourse, it is discourse which speaks us.

Ready to Learn provides some interesting reading, especially with the advantage of hindsight. It relied heavily of references to research which has since been updated, and attempted to deal with so many agendas it left much ambiguity, proving Bowe and Ball's [4] suggestion that interpretation can be increasingly difficult when several agendas are being covered. The author finds particularly fascinating, the sense of urgency created throughout the paper, knowing that over 17 years later there remain components of this policy yet to be enacted, reminiscent of Ball's [1] suggestion that policies are textual interventions into practice. It once again raises his belief that the more ideologically abstract the policy the greater the distance from conception to practice. Corsaro [6] suggested quality early education enriches childhood. This author suggests quality early education holds the key to an enriched society, if we can all read from the same script and interpret it in the same way.

## 7. References

[1] Ball, S. (1994). Education reform: A critical and post-structural approach. Philadelphia: Open University Press.

[2] Ball, S. (2011). Politics and policy making in education: Explorations in sociology. London: Routledge.

[3] Ball, S. and Vincent, C. (2007). `Making up' the middle-class child: Families, activities and class dispositions. Sociology, 41(6), pp.1061-1077.

[4] Bowe, R. and Ball, S. (1992). Education, markets and professionalism: Some reflections on recent policy developments in England and wales. Melbourne Studies in Education, 33(1), pp.56-62.

[5] Colebatch, H. (2006). Beyond the policy cycle: The policy process in Australia. Sydney: Allen and Unwin.

[6] Corsaro, W. (2000). Early childhood education, children's peer cultures, and the future of childhood. European Early Childhood Education Research Journal, 8(2), pp.89-102.

[7] Edwards, T. and Whitty, G. (1998). School Choice Policies in England and the United States: An Exploration of Their Origins and Significance. Comparative Education, 34(2), pp.211-227.

[8] Fairclough, N. (1995). Critical discourse analysis: The critical study of language. 5th ed. New York: Longman.

[9] Hayes, N. (2010). Childcare? Early childhood education and care? Towards an integrated early years policy for young children in Ireland. Early Years, 30(1), pp.67-78.

[10] Jones, R. (2012). Discourse analysis: A resource book for students. New York, NY: Taylor & Francis.

[11] Marston, G. (2004). Social policy and discourse analysis: Policy change in public housing. Aldershot, England: Ashgate Publishing.

[12] Meyer, M. and Wodak, R. (2001). Methods of critical discourse analysis. London: Sage.

[13] Ready to learn: white paper on early childhood education. (1999). Dublin: The Stationery Office.

[14] Richardson, J. and Gill, R. (1996). Discourse Analysis: Practical Implementation. Leicester: British Psychological Society.

[15] Schweinhart, L., Barnett, W., Belfield, C. and Nores, M. (2005). Updating the economic impacts of the high/scope Perry preschool program. Educational Evaluation and Policy Analysis, 27(3), pp.245-261.

[16] Snow, K. (2006). Measuring school readiness: Conceptual and practical considerations. Early Education & Development, 17(1), pp.7-41.

 Published by Infonomics Society ISBN 978-1-908320-77-3 

[17] Starting strong: Early childhood education and care. (2001). [online] Available at: http://www.oecd.org/education/school/2535215.pdf [Accessed 27 Aug. 2016].

[18] Van Leeuwen, T. (2008). Discourse and practice: New tools for critical discourse analysis. Oxford: Oxford University Press.

## Session 16: Teacher Education

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(Authors: Myrtle Erasmus, Elsabé Wessels)

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(Authors: Iva Buchberger, Vesna Kovač)

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# Teaching Music to Foundation Phase Student Teachers from Diverse Backgrounds

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## Abstract

*Teaching music to a large group of 70 student teachers from diverse backgrounds in the B.Ed Foundation Phase programme, was the focus of this study. The majority of the student teachers had no prior knowledge of or exposure to music theory. In addition they lacked experience of playing a musical instrument. The purpose of the study was to find out if a cooperative approach would help students to master the study material unknown to most of them. A secondary aim was to motivate students to utilise music, as an important tool to integrate Languages, Mathematics and Life Skills in the Foundation Phase. A qualitative design was employed for this study. Data was collected from the students through focus group interviews and reflections on teaching and learning activities, while the lecturer did self-observation and kept reflective notes. Data analysis was done using AtlasTI and emerging themes were determined. The findings indicate that cooperative teaching yielded success and improved progress in the module. The findings are significant, because it suggest that the contectualisation of the traditional cooperative learning improved the outcomes for the module, but in addition it enhanced social integration between the student teachers from diverse backgrounds.*

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# Pre-service Teachers' Beliefs about Teaching Science

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## Abstract

*Given the widening achievement gap for minorities in science, there is a critical need to increase the numbers of highly qualified teachers from underrepresented groups to nurture the nation's diverse populations. Therefore, VSU's College of Education designed field-based experiences incorporating applied knowledge, practices, and hands-on learning by exposing preservice teachers to the application of science concepts. To measure preservice teacher self-efficacy, the Teaching Science as Inquiry instrument was administered at the beginning and end of the semester in which preservice teachers participated in field-based experiences. Significant results were found in areas relating to the constructs of personal self-efficacy (creating explanations from data, construct explanations from observations, and confidence in their skills to obtain scientific evidence) and outcome expectancy (defend newly acquired knowledge, make results of investigations public, and creating investigations for students). Significant improvement in some self-ratings suggests preservice teachers were successful in incorporating applied knowledge and hands-on learning experiences. The study's broader impact is that minority elementary preservice teachers, who are likely to teach minority children, are better prepared to face the challenges of teaching science. Ultimately, this will contribute to the "grade school" pipeline to increase the number of minority students who pursue science careers.*

## 1. Introduction

Research shows that social, psychological and cultural factors greatly influence students' motivation and ability to learn [12, 14]. Student performance and achievement, especially in STEM areas, are tied to their motivational beliefs (e.g., self-efficacy) and availability of positive racial/ethnic role models [3, 7]. Negative attitudes of students can be changed by exposing elementary students of either gender to positive experiences in science [8]. Information that could enrich the traditional curriculum could be extremely beneficial to teacher preparation programs, departments of education, and professionals in the field of science education that seek to enhance minority student performance.

## 2. Science Teaching and Confidence

Wenner [17] found that low levels of science content knowledge correlated with a lack of confidence towards teaching science among preservice teachers. This study recommended integration of science content and methods courses, increased science requirements in the curriculum, and an emphasis of hands-on laboratory procedures. According to Watters and Ginns [16], negative feelings and attitudes about science may relate to preservice teachers' own K-12 experiences. Teachers disinterested in science tend to pass that attitude on to the students. Interest is tied to motivation, which in turn determines how much effort a person will devote to learning a topic [4].

It is critical that teacher preparation programs address preservice teachers' negative dispositions toward science. Student performance and achievement, especially in STEM areas, are also often found to be related to motivational beliefs (such as self-efficacy) and accessibility to positive role models [3, 7]. Further, Jarrett [10] found that the best predictor of interest and confidence in teaching science for preservice teachers is a positive experience with science in elementary school.

Jarrett's study underscores the importance of a positive experience with science for elementary school children. Research also shows that teacher quality has an impact on student learning; if teachers do not know the STEM content or how to teach it, then most students will not learn it [11]. Future teachers who were taught "little and poorly" as children become teachers who teach "little and poorly" [9].

### 2.1. Science Teaching and Underrepresented Populations

*Expanding Underrepresented Minority Participation*, a 2011 publication developed jointly by the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine, upheld that by the time children reach kindergarten, they have already developed the necessary "habits of mind" to be successful in science [13]. However, the study also maintains that as these students progress through K-12, their confidence and interest in science tended to decrease.

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For minority students in particular, the problem is amplified:

> "Even if students are prepared, have adequate information, and are ambitious and talented enough to succeed in science, success may also hinge on the extent to which students feel socially and intellectually integrated into their academic program" [13].

Schools must combat false impressions of science as a foreign, unwelcoming entity. This attention to helping students develop positive attitudes toward science needs to start in the early grades. In an elementary school workforce where the typical science teacher is female, white, and over the age of 40 [5], it can be easy for minority students to feel isolated.

Therefore, programs intended to address the widening achievement gap for minorities must focus not only on preparing aspiring scientists, but also on preparing qualified minority preservice K-6 teachers. Research demonstrates that teachers exposed to a two-year professional development program to design, implement, and revise problem-based, interdisciplinary curricula demonstrated enhanced self-efficacy and use of reform-based classroom practices [6]. Reform-based practices include inquiry-based, hands-on, cooperative, and problem-based teaching for depth of student understanding. Interdisciplinary team projects can also enhance students' personal growth, including confidence, independence, tolerance, leadership, collaborative skills, and sense of belonging [2].

### 2.2. Science Teaching and Experiences

Appleton and Kindt [1] found that beginning teachers are often prone to undertake safe activities first (e.g., activities with predictable outcomes and/or drawn from personal experience or that of colleagues). Therefore, if such individuals have experienced science largely in the forms of book research and memorization in their own schooling, they will tend to see these activities as safe and effective. In comparison, those individuals exposed to the excitement of hands-on inquiry-based science activities would likely see these activities as safe and effective. A recommendation from the Appleton and Kindt study [1] is that preservice teacher education preparation should focus on providing students with a repertoire of activity ideas that develop science pedagogical content knowledge.

Thus, this study sought to examine the interest and confidence of preservice K-6 teachers in teaching science content as a result of the integration of instructional best practices in teaching and research in their curriculum methods courses to enhance their content knowledge, pedagogical skills and positive dispositions.

## 3. Methodology

This paper identifies one component of a larger research project (funded through the National Science Foundation HBCU-UP Targeted Infusion Project) which sought to expand pre-service teacher's science pedagogical knowledge and expertise. During the fall 2015 semester, pre-service teachers participated in coordinated field experiences implemented by a team of interdisciplinary faculty across three methods courses (English/literacy, science, and curriculum methods). These field experiences, intended to instruct education students as 'true' biology students, included an Appomattox River research project, a fall science exploration day, and membership and attendance in VAST (Virginia Association of Science Teachers).

### 3.1. Embedded Experiences

The intent of the Appomattox River Project was to analyze water quality and evaluate its impact on a variety of organisms that live in the environment surrounding the river. Students monitored changes in chemical properties of the water and the impact on a variety of organisms that live in the environment, physical properties of the water, and the subsequent effects on the local microorganisms, invertebrates, plants and animals. Non-science majors at Virginia State University (VSU), including preservice elementary education teachers, do not typically enroll in the BIOL 121 course; this course is specific to biology majors. Instead, the non-science majors were enrolled in the BIOL 427 Science Process Skills methods course. In addition to the Appomattox River Project, preservice teachers participated in Science Exploration Day during the fall 2015 semester. This activity was provided for local fourth and fifth grade elementary students. Preservice elementary education teachers, supervised by Biology and Education faculty, led students in inquiry-based, hands-on science lessons developed during their enrollment in the three methods classes.

Finally, while professional development is important in any field, it is especially essential for teachers to keep up-to-date on new research on how children learn, emerging technology tools for the classroom, and new curriculum resources. Preservice teachers enrolled in the BIOL 427 methods course were provided with information on how to get started in a career as a science educator and improve professionally over time. One mandatory requirement for the BIOL 427 students was membership in the Virginia Association of Science Teachers (VAST).

For most VSU students, this was their first opportunity to network with other science educators and preservice teachers from across the state and country. Our preservice teachers benefited from

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learning how in-service teachers plan, implement and assess the Virginia Standards of Learning with innovative teaching strategies. Participation in this (and other) professional development conferences allowed students to disseminate the project results, including effective lesson plans and teaching strategies. All preservice teachers that participated in the activities were also required to present at VAST.

Additional professional development activities for preservice teachers included field experiences such as area museums and institutes (the Virginia Science Museum and the Virginia Mathematics and Science Coalition) to learn how to effectively incorporate such resources into an interdisciplinary science education unit. These experiences were intended to ensure the pre-service teachers were engaged in 'real-life' science activities.

### 3.2. Teaching Science as Inquiry Instrument

This presentation focuses on one aspect of the overall project: an examination of the pre-services teachers' self-efficacy through use of the *Teaching Science as Inquiry* (*TSI*) instrument [15]. The *Teaching Science as Inquiry* (*TSI*) instrument is a validated tool intended to measure teacher interest and confidence [15]. The *TSI* instrument is a 69 item Likert-scale survey using ratings from 1 (Strongly Disagree) to 5 (Strongly Agree).

The *TSI* instrument was designed to focus on "the two dimensions of self-efficacy described by Bandura (1977), personal self-efficacy and outcome expectancy" [15]. For the purpose of the TSI, personal self-efficacy was defined as one owns conclusion about their ability to perform in a specified situation. Outcome expectancy was defined as one owns conclusion about the potential outcomes of the specified actions. The instrument consisted of 34 personal self-efficacy items and 35 outcome expectancy items. Internal consistency measures were reported by the instrument developers as meeting an acceptable level for a first generation instrument (cite).

Therefore, *TSI* survey was selected to assist in determining if preservice teachers enrolled in a science methods courses experienced any changes in their beliefs about their science teaching after participating in problem-based learning activities and field experiences.

The survey was administered as a pre-test (August) and post-test (December) during the fall 2015 semester in which the pre-service teachers participated in the integrated science activities. The over-arching question to be answered by this component of the grant project was: *Does pre-service teacher self-efficacy and knowledge for teaching science change as a result of participating in integrated science field experiences?* The findings could provide further information as to whether a change in the way in which science is taught influences pre-service teachers' self-efficacy. Participants were asked to complete the *TSI* survey through Qualtrics, an online survey management system, in August 2015 and December 2015 of the fall methods course. Data was then downloaded from Qualtrics to SPSS for analysis. Analyses included frequencies, descriptive statistics, and a paired samples t-test to examine the differences in score means from the pre-test to the post-test.

## 4. Results

Frequency analyses and descriptive statistics were first calculated for the *TSI* results from the fall 2015 semester. All pre-service teachers were invited and provided consent to participate in the survey administration (n = 10, pretest; n = 9, posttest). In general, preservice teachers' responses from the pre-test to the post-test administration of the *Teaching Science as Inquiry* (*TSI*) survey did slightly vary; however, not enough to be significantly different in most areas. Responses for the pre-test ranged from disagree to agree, although for the post-test, their responses ranged more frequently in the "agree" category which included responses of 'agree' and strongly agree'. A comparison of means test was then conducted to determine if any statistical differences were indicated for the preservice teachers' responses from the pre- to the post-test. An independent samples t-test was conducted since responses were from the same pool of participants (one group) and contained two means (pre-test scores and post-test scores).

Results of the independent samples t-test were significant for 6 of the 69 survey items (Table 1): #1 - ($t$ (19) = -2.248, $p$ = .037); #2 - ($t$ (19) = -2.192, $p$ = .041); #5 - ($t$ (19) = -2.676 $p$ = .015); #6 - ($t$ (19) = -3.839, $p$ = .001); #9 - ($t$ (19) = -4.28, $p$ = .000); and #13 - ($t$ (19) = 2.125, $p$ = .047) (see Table 1). The remaining 63 survey items provided non-significant results. Of interest is Item #13 in which there was a sharp decrease from the pretest (M = 4.40, SD = .52) to posttest (M = 3.91, SD = .54) administration.

**Table 1. Results of Independent Samples *t*-test**

| # | Survey Item Statement | *t* | df | Sig. |
|---|---|---|---|---|
| 1 | I will be able to offer multiple suggestions for creating explanations from data. | -2.25 | 19 | 0.037 |
| 2 | I will be able to provide students with the opportunity to construct alternative explanations for the same observations. | -2.19 | 19 | 0.041 |

| | | | | |
|---|---|---|---|---|
| 5 | I have the necessary skills to determine the best manner through which children can obtain scientific evidence. | -2.68 | 19 | 0.015 |
| 6 | I will require students to defend their newly acquired knowledge during large and/or small group discussions. | -3.84 | 19 | 0.001 |
| 9 | I will expect my students to make the results of their investigations public. | -4.28 | 19 | 0.000 |
| 13 | I will create (plan) investigations through which students will be expected to gather particular evidence. | 2.13 | 19 | 0.047 |

For the same six significant items, effect sizes (*r*) were also calculated (Table 2). Typical thresholds for interpreting effect size for r ranges from .10 for small, .30 for medium, .50 for large, and .70 for a very large effect. For significant items 1, 2, and 13, the effect size calculations demonstrate a medium to large effect. Item 9 approaches an effect size of medium. The final two significant items, 5 and 6, demonstrate effect sizes approaching very large.

**Table 2. Effect Size Calculations**

| # | Survey Item Statement | *r* |
|---|---|---|
| **1** | I will be able to offer multiple suggestions for creating explanations from data. | 0.44 |
| **2** | I will be able to provide students with the opportunity to construct alternative explanations for the same observations. | 0.42 |
| **5** | I have the necessary skills to determine the best manner through which children can obtain scientific evidence. | 0.65 |
| **6** | I will require students to defend their newly acquired knowledge during large and/or small group discussions. | 0.65 |
| **9** | I will expect my students to make the results of their investigations public. | 0.29 |
| **13** | I will create (plan) investigations through which students will be expected to gather particular evidence. | 0.42 |

## 5. Discussion

Overall, pre-service teachers' perceptions about their ability to teach science varied slightly over 69 survey items. However, these slight variations only proved to be statistically significant for six of the Likert items (#1, 2, 5, 6, 9, and 13). Three of these items (1, 2, and 5) were developed to be related to the construct of personal self-efficacy. The original development of the TSI instrument intended items 1 and 2 further related to the preservice teacher's confidence for formulating explanations from evidence. Item 5 was developed to identify the preservice teacher's ability to give priority to evidence in responding to questions.

The statistically significant differences in these three items from the pre-test to the post-test administration of the instrument indicate increases in the preservice teachers' personal self-efficacy. These differences offer that participation in the integrated methods coursework activities, including embedded field experiences, helped the preservice teacher to become additionally self-assured of: 1) being able to offer multiple suggestions for creating explanations from data; 2) providing students with alternate explanations for observations; and 3) having the necessary skills to determine how to best manner in which to demonstrate to their students how to obtain scientific evidence.

The three significant items for outcome expectancy were for #6, 9, and 13. Items 6 and 9 focused on the concept of the learner being able to effectively communicate and justify explanations to their students. Item 13 focused on the learner giving priority to evidence when responding to questions from students. These statistically significant items specifically asked the preservice teacher to identify to what degree they would require their students to either present or defend their findings or data in small or large group or discussion, or make their results public. Of specific interest is item #13 in which there was a marked decrease in level of agreement from the pretest to posttest. This particular item identified that at the beginning of the semester, the preservice teachers felt more confident in their ability to carry out or plan investigations for students to gather specific evidence than they did by the end of the semester methods courses.

## 6. Recommendations

Recommendations for further research in this area should focus on explorations of the individual embedded field experiences in relation to self-efficacy and outcome expectancy in order to identify specific components in the field experiences that may have more of an impact. Further examination of the potential impacts on teacher preparation programs' ability to adequately prepare and increase the number of underrepresented science teachers is needed.

Disparities in educational opportunities pose a clear challenge to the American educational system; despite sporadic improvements in certain areas, the outlook for minority students in STEM areas remains grim. Research that could help reverse this problem

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is of critical importance. In addition, preservice teachers should be provided opportunities for inclusion in 'real-life' science experiences in order to potentially increase confidence for teaching science. It is critical, therefore, to not only familiarize minority students with the sciences and impart pertinent information, but also to root out false impressions of STEM subjects as foreign entities.

## 7. Conclusion

The focus of this project was to better understand preservice teachers' perceptions of science teaching. Embedded field experiences were included in the fall 2015 semester in which the Teaching Science as Inquiry instruction was administered to determine any relationship between interactive science activities and personal self-efficacy and outcome expectancy.

The research question guiding this project asked *Does pre-service teacher self-efficacy and knowledge for teaching science change as a result of participating in integrated science field experiences?* Overall, an examination of responses to the 69 Likert item instrument demonstrated some minor variation from pre- to post-test responses; however, only six survey items demonstrating a difference large enough to be statistically significant. Three of the significant items were related to the concept of personal self-efficacy and the other three were related to outcome expectancy. Effect size estimates for the same six significant items range from medium to very large.

## 8. References


[1] Appleton, K and Kindt, I. (2002). Beginning elementary teachers' development as teachers of science. *Journal of Science Teacher Education. 13*(*1*), 43 – 61.

[2] Boyer, S., and Bishop, P. (2004). Young adolescent voices: Students' perceptions of interdisciplinary teaming. *Research in Middle Level Education Online*, *28*(1), 73-76.

[3] Cokley, K. (2003). What do we know about the academic motivation of African American college students? Challenging the "anti-intellectual myth" *Harvard Educational Review 73*, 524-558.

[4] Dewey, J. (1979). Interest and effort in education. In J.A. Boydston (Ed.), *The middle works, 1899-1924: Vol. 7. 1912-1914* (pp. 153-197). Carbondale, IL: Southern Illinois University Press (Original work published 1913)

[5] Fulp, S. L. (2002). 2000 National survey of science and mathematics education, National Science Foundation. *Status of Elementary School Science Teaching*. Chapel Hill, NC: Horizon Research, Inc.

[6] Haney, J. J., Wang, J., Keil, C., and Zoffel, J. (2007). Enhancing teachers' beliefs and practices through problem-based learning focused on pertinent issues of environmental health sciences. *The Journal of Environmental Education, 38*(4), 25-33.

[7] Harris, A. L., and Marsh, K. (2010). Is a raceless identity an effective strategy for academic success among Blacks. *Social Science Quarterly, 91,* 1242-1263.

[8] Harty, H., Beall, D., and Scharmann, L. (1985). Relationships between elementary students' science achievement and their attitudes toward science, interest in science, reactive curiosity, and scholastic aptitude. *School Science and Mathematics, 85(*6), 472-479.

[9] Hawkins, D. (1990). Defining and bridging the gap. In E. Duckworth, J. Easley, D. Hawkins, and A. Henriques (Eds.), *Science education: A minds-on approach for the elementary years* (pp. 97-139). Hillsdale, NJ: Lawrence Erlbaum Associates.

[10] Jarrett, Olga S. (1999). Science interest and confidence among preservice elementary teachers. *Journal of Elementary Science Education, 11*(1), 47-57.

[11] Jolly, E. J., Campbell, P. B., and Perlmann, Lesley. (2004). *Engagement, capacity and continuity: A trilogy for student success*. GE Foundation. http://www.campbell-kibler.com/trilogy.pdf. (Access Date: 5 March, 2012).

[12] Kim, M., and Conrad, C. F. (2006). The impact of historically black colleges and universities on the academic success of African American students. *Research in Higher Education 47*, 399-427.

[13] National Academy of Sciences, National Academy of Engineering, and Institute of Medicine. (2011). *Expanding underrepresented minority participation: America's science and technology talent at the crossroads*. Washington, DC: National Academies Press. https://grants.nih.gov/training/minority_participation.pdf. (Access Date: 27 December, 2016).

[14] Palmer, R., and Gasman, M. (2008). "It takes a village to raise a child": The role of social capital in promoting academic success for African American men at a Black college. *Journal of College Student Development, 49*, 52-70.

[15] Smollock, L.D., Zembal-Saul, and Yoder, E.P. (2006). The development and validation of an instrument to measure preservice teachers' self-efficacy in regard to the teaching of science as inquiry. *Journal of Science Teacher Education, 17*, 137 – 163. DOI: 10.1007/s10972-006-9015-6.

[16] Watters, J. J. and Ginns, I. S. (2000b). Developing motivation to teach elementary science: Effect of collaborative and authentic learning practices in preservice education. *Journal of Science Teacher Education, 11(*4), 301-321.

[17] Wenner, G. (1993). Relationship between science knowledge levels and beliefs toward science instruction held by preservice elementary teachers. *Journal of Science Education and Technology, 2*(3), 461-468.

# Play-based Activities to Teach Phonological Awareness with Progression in Grade R

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## Abstract

*The purpose of this study was to determine how instructional practices relevant to phonological awareness were implemented in practice in schools. Phonological awareness, one of the five components of reading, is crucial to the acquisition of reading. This component of reading is a primary factor underlying early reading achievement. In fact, phonological awareness skills are considered to be one of the most important indicators of early reading skills. In grade R, phonological awareness should be taught explicitly and systematically to ease children into reading. Teachers need to connect these skills with the joy of reading and writing. A qualitative study was conducted utilizing a case study with thirteen grade R teachers in the North West Province of South Africa. The results indicated that if teachers received explicit training about phonological awareness and were provided with relevant learning and teaching support material, they were able to implement phonological awareness activities in grade R classrooms.*

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# Is School Leadership in Croatian Schools Distributed Among Teachers?

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## Abstract

*The broader aim of this research (supported by Croatian Science Foundation) is to identify the characteristics of the school leadership practice in Croatian primary schools with the special emphasize on indicators of distributive leadership. The majority of empirical studies showed that features of distributive school leadership are moderately to strongly associated with the better school and student achievements. Fundamental feature of distributive school leadership is about spreading functions and roles of leadership from the school principal to the different stakeholders inside and outside the school. The specific focus of this paper is given on characteristics and effects of the distributed school leadership from the perspective of school teachers.*

*The presence of certain characteristics of distributive school leadership practice has been investigated in this research: a) the degree of teachers' participation in decision-making on the different types of decisions, b) the type of teachers' participation and influence in the decision making process; c) social interactions between various participants in the decision making process in schools. At the same time, the presence of basic preconditions (facilitators) for distributed leadership in schools has been investigated: a) organisational and material preconditions (i.e. sufficient time and information for teachers' participation in school leadership activities); b) personal characteristic of teachers (i.e. motivation and interest for participation in school leadership activities) and characteristics of school principals (i.e. encouraging teachers to participate in school leadership activities).*

*Data have been collected in September 2016 by originally structured and validated questionnaire for investigating features of school leadership consisted of 50 items covering all three dimensions of distributive school leadership and 22 items covering all three groups of preconditions for distributive school leadership practice. Since the unit of analysis are schools and their particular characteristics (leadership and efficiency), the basic population in this study consists of all primary schools in Croatia. From the population of schools, stratified random sample of 100 schools has been selected, taking into account their size, equitable geographical distribution of schools (counties) and position of schools in rural and urban areas. For the population of teachers of the selected schools, an additional procedure has been used to determine random sample of an adequate proportion: gender, length of work experience as school teacher and current status in teacher career.*

*To highlight some of the research results, it can be pointed that teachers in Croatian schools make relatively low estimates of the degree of their participation in key decisions of education policy and have moderately low motivation to participate in the creation and implementation of key school related decisions. These results indicated to the assumption that teachers were not sufficiently encouraged to actively participate in decision-making, which required examination of a number of other features of their current roles and ways of participation in the school leadership.*

*The practical goal of the research is focused on creating recommendations for strengthening the management capacity of the school leadership team. Special attention is given to strengthening the role of teachers in decision-making on key issues of school work, but also to modes of establishing desirable cooperation between principal and teachers.*

*Data processing has been performed by standard statistical methods of descriptive and inferential statistics. Statistical program IBM SPSS 20.0 has been used for data processing.*

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## Session 17: Inclusive Education

Title: The Relationship between School Size, Location and Configuration to Bullying Victimization in Schools
(Authors: Tim Seifert, Gerald White)

Title: Spatial Ability and Dyslexia
(Authors: Donna Kotsopoulos, Samantha Makosz, Joanna Zambrzycka, Emma Asdrubolini, Jovana Babic, Olivia Best, Tara Bines, Samantha Cook, Nathalie Farrell, Victoria Gisondi, Meghan Scott, Christina Siderius, Dyoni Smith, Brendan Riggin)

Title: Doing Justice to History – The Push Toward Making Both the U.S and U.K. Curricula More Inclusive
(Author: Robert Fitzgerald)

Title: Integrating Students in Research under the Supervision of Faculty Members
(Authors: Ghadah Al Murshidi, Ahmed Al Zaabi, Assma Abdeljalil, Mughair Abdel Aziz, Mohamed Cheikhi)

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# The Relationship between School Size, Location and Configuration to Bullying Victimization in Schools

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## Abstract

*There is limited research examining the relationship between school characteristics and bully victimization, and existing studies are inconclusive. To contribute to the literature on the relationship between school characteristics and victimization, we examined the relationship between school size, location and configuration and bully victimization using a large scale data set. Data from the 2013 and 2014 provincial wide administrations of a questionnaire and corresponding principals' school reports were analyzed. Bully victimization items were analyzed using latent class analysis to identify patterns of victimization. Multi-level logistic regression was used to regress victimization on school size, location and configuration. School size was not related to victimization but location was. Students in rural schools were more likely to experience bullying than those in urban areas. Certain configurations were more likely to be associated with victimization. Students in junior high school were more likely to be victims than those in high school. Students in K-12 schools were as likely or more likely to be victims of bullying than those in junior high school. Although statistically detectable effects were found, the magnitude of the effects was small. These results suggest that, although bullying victimization seems to be more common in junior high schools, victimization is a generally ubiquitous phenomenon that is not restricted to certain types of schools.*

## 1. Introduction

School bullying has been a concern for educators for decades [1] [2]. An individual is considered to be bullied "when he or she is exposed, repeatedly and over time, to negative actions on the part of one or more other students" [3]. Forms of bullying include physical, verbal, social, and cyber bullying [4] [5]. Some research has been undertaken to examine the effect of school characteristics on bullying and victimization. One school characteristic that has received attention is grade level. A number of studies have shown that bullying tends to peak in junior high and then decrease as students proceed through high school [6]. Craig et al. found that rates of victimization decreased by age, which may be the result of factors such as maturation, an increased capacity for empathy and less tolerance for aggression [7].

Limited research exists on the effect of school location on bullying and victimization. Attempts to establish whether students in schools in urban settings are more prone to bullying than those in rural schools have been inconclusive [8]. Dulmus, Theriot, and Sowers, found that 82% of the students in rural schools they studied reported being bullied at least once during the past three months, a rate they described as being significantly higher that rates reported in other U.S. studies [9], a conclusion similar to that reported by Isernhagen & Harris [10]. Stockdale, Hangaduambo, Duys, Larson and Sarvela found that 34% of students in grades 4 to 6 in rural schools had been victimized [11]. Lehman also reported finding statistically detectable differences in bully victimization between students in rural and suburban schools in a U.S. sample [12]. Recent Canadian research has shown that rural youth are more likely than their urban counterparts to be victims of bullying [13]. However, research by White did not find any significant difference between rural and urban schools on rates of bullying victimization, a finding reported in several other studies [14] [15] [16] [5].
School size has been suggested as a factor influencing bullying, with large schools being more conducive to bullying for several reasons. Large impersonal classes, social comparison and competition, and teacher attitudes toward bullying may create an environment that tends to be isolating and alienating which fosters bullying. On the other hand, small schools create an atmosphere of belonging, and allows for greater adult supervision, which should deter bullying [17]. A few studies have been conducted on the role of school size and bullying victimization, with mixed conclusions [18]. Some studies have found no relationship between school size and bullying victimization [19] [20] [21]. One longitudinal study did however, did find a link between school size and being a victim of bullying [22].

Although we are not aware of any studies that have directly examined school configuration and rates of bullying and victimization, several studies

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have examined bullying in the context of school transitions. Some researchers have reported that rural schools which had a transition to middle school seemed less conducive to bullying that those which did not have the transition [17], and students who were victimized and affiliated with victims prior to a transition to middle school were likely to be a victim after the transition [18]. These two findings, coupled with the findings that bullying tends to peak around middle or junior high school [19] suggest the possibility that some school configurations, such as junior high schools (grades 7-9), might be more conducive to bullying than others, such as all grade schools. This may particularly true if a transition into a large middle school occurs [20].

Our study extends current research on bullying victimization in two ways. First, our study contributes to existing research by adding further evidence as to whether school characteristics are associated with the prevalence of bullying victimization. Second, we employed different statistical modeling techniques than previous studies. Multilevel logistic regression was employed to take into account the school context effects on individual perceptions. Further, because response distributions to bullying questions are often skewed, we adopted categorical data modeling procedures including latent class analysis. These techniques should give better insight into questions of whether school characteristics have an influence on being bullied. Are students in urban schools, large schools or rural schools more likely to be bullied? Do school size, location and configuration influence the likelihood of being bullied?

## 2. Method

A large-scale survey was used to collect data from junior high and high school students. These data were supplemented with school reports from principals submitted to the Provincial Department of Education. The study was cross-sectional in design and data from two years of assessment was used.

### 2.1. Participants

Data about victimization were provided by students in grades 7 to 12 in the public school system of an eastern Canadian province in each of the years 2013 and 2014. Of the 24,665 children who completed the Department of Education's school climate survey in 2013, 49.6% were female. The number of participants ranged from 3735 in Grade 12 to 4297 in Grade 7 with an average of 4110.6 students per grade. Likewise, of the 24,171 students completing the 2014 version of the school climate survey, 49.5% were female. Data about school characteristics were provided by school principals as part of their annual school report for the Department of Education. A description of schools is provided in Table 1, as is the number students participating.

### 2.2 Measures

From the data collected, four variables were used in our analyses. Victimization was used as an outcome variable in the statistical modeling, while school location, size and configuration were used to predict victimization.

**2.2.1. Victimization.** Bully victimization was assessed using five items from the annual assessment of school climate administered by the Provincial Department of Education. Students responded to five items in Likert format which asked students whether, in the last month, they had been bullied: 1) physically, 2) verbally, 3) socially, 4) electronically, and 5) sexually. Students' responses to these items were subjected to a latent class analysis. For both the 2013 and 2014 data, four patterns of victimization were identified. Students were categorized as having been: never bullied; verbally and socially bullied; physically, verbally and socially bullied; or physically, verbally, socially, electronically and sexually bullied [27]. For the purposes of this study, these classes were collapsed into a dichotomy: never bullied or having been bullied in some way.

**2.2.2. School characteristics.** Information provided by school principals as part their annual school report for the Department of Education was used to determine characteristics of the school. School configuration was determined from the reported number of students enrolled in each grade in the school. An examination of the tabulation of the unique patterns of grade enrollments yielded five basic configurations of schools: Grades 10-12, Grades 7-12, Grades 7-9, Grades K-12 and Grades K-9. The total number of student in enrolled in all grades within a school was used as the index of school size. Inspection of the probability of being bullied by school size scatterplots led to the school size variable being transformed to a natural logarithm scale. School location was categorized as either urban or rural based upon criteria used by the Provincial Government. Schools located in communities of fewer than 5000 people were considered to be rural schools.

## 3. Results

Analyses were performed using a combination of MPlus, version 7.11 [28] and SAS software,

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version 9.3 [29]. Data from each year (2013 and 2014) were analyzed separately using multilevel logistic regression. Logistic regression is a statistical procedure used to predict the probability of membership in a category, such as being bullied or not being bullied. Because students are grouped into schools and school characteristics may have an effect on being bullied, a multilevel analysis was performed. In this analysis, school characteristics were used to predict the probability of being bullied, but in a way that accounted for the fact that students are grouped into schools, and that a characteristic of that school may exert an influence on a number of students. School size, location (urban/rural) and configuration were used to predict the likelihood of being bullied. Because school configuration was a categorical variable, a set of effects coded vectors was created using the Grade 7-9 configuration as the reference group.

For each year of data (2013 and 2014) a number of models were tested, and in each case intercept-only models were estimated. In other words, no within level predictors were included. The reason for these models was that between level models estimate both intercepts and slopes for regression lines at the within level. However, since we are only interested in estimating the probability of being bullied as a function of school characteristics, no within level characteristics were included allowing only the intercepts to be estimated.

The initial plan called for testing a fully saturated model containing school size, location and configuration. This baseline model would be contrasted against a series of nested models in which various parameters were constrained to be zero. However, because location and configuration are inherently intertwined (2013: $\chi^2(4)=81.55$, $p<.0001$, $\phi=.55$; 2014 $\chi^2(4)=79.66$, $p<.0001$, $\phi=.55$; see Table 1 for descriptive statistics), two separate sets of models were tested on the data from each year. In the first set of models (Models 1, 2, and 3), size and location were entered as predictors into the model. In the second set (Models 1, 4 and 5), size and configuration were entered into the model. Parameter estimates for the different models are presented in Table 2.

Fit statistics and parameter estimates from the analyses of the 2013 data are presented in Table 2. In Model 1, school size was entered into the model as a predictor of the likelihood of victimization. The results showed that the parameter estimate was not statistically different from zero, meaning school size did not have had an effect. In Model 2, school location was used as a predictor of victimization with a similar result. The parameter estimate was not statistically different from zero suggesting that school location did not influence the likelihood of victimization. When school size was added to Model 2, the difference in the loglikelihood statistic was not statistically detectable ($\Delta\chi^2=1.30$, $p=.10$) yet the parameter estimate for location increased to become a statistically detectable effect (Model 3). This suggests that school size is not, in-and-of itself a predictor of the likelihood of bully victimization, but might have a suppression effect on school location [30, 31].

The parameter estimates for Model 4 indicate differences in school configuration on the likelihood of victimization. Students in a high school (grades 10-12) were less likely to report being victimized than students in a junior high school (grade 7-9). Students in an all grade school (grade K-12) or a multi-grade school (grades K-9) were more likely to be victims of bullying than students in junior high (grades 7-9). Student in a grade 7-12 school were no more likely to be bullied than students in a junior high school.

When school size was added to Model 4 the change in fit to the data was not statistically detectable (Model 5; $\Delta\chi^2=1.15$, $p=.26$). The parameter estimate for the school size effect remained statistically undetectable while the parameter estimates for school configuration were essentially unchanged. This suggests that school size is not related to the likelihood of victimization, but school configuration does matter.

It is important to note that while there are statistically detectable effects, these effects are due in part, to the statistical power resulting from the large sample size. The actual changes in probability of outcome are small. That is, the actual increase or decrease in the likelihood of victimization that is a result of school size, location or configuration is small; the largest odds ratio was 1.02, which is considered to be a small effect [32].

Although the pattern of results arising from the analyses of the 2014 data were similar to those of the 2013 data, there were some differences. School size had a statistically detectable effect on the probability of being bullied, with students in larger schools being more likely to be bullied (Model 6). Consistent with the 2013 data, school location was not associated with the likelihood of being bullied (Model 7); students in rural schools were no more or less likely to be bullied than students in urban schools. However, when school size was added to the model (Model 8), a statistically detectable effect was found for school location. This suggests that students in large, rural schools have a higher likelihood of being victims of bullying. However, the size of the effect is small.

As in 2013, the results from the 2014 data suggested that school configuration was related to the likelihood of being bullied (Model 9). Students in high school (Gr. 10-12) were less likely to be bullied than students in junior high (Gr. 7-9). Likewise, students in a 7-12 school were no more

likely to a victim of bullying than students in junior high (Gr. 7-9). Unlike the 2013 results, though,

**Table 1. Numbers of schools and students surveyed by school configuration and location.**

| | | BIC | -LL | Size | Location | Gr. 10-12 vs Gr. 7-9 | Gr. 7-12 vs Gr. 7-9 | Gr. K-12 vs Gr. 7-9 | Gr. K-9 vs Gr. 7-9 |
|---|---|---|---|---|---|---|---|---|---|
| 2013 | Model 1 | 3274.75 | -1635.25 | .02(.04) | -- | -- | -- | -- | -- |
| | Model 2 | 3273.75 | -1635.25 | -- | .11 (.07) | | | | |
| | Model 3 | 3274.21 | -1635.44 | .10 (.06) | .22 (.11)* | | | | |
| | Model 4 | 3272.26 | -1633.38 | -- | -- | -.41 (.07)** | -.05 (.05) | .27 (.06)** | .21 (.05)** |
| | Model 5 | 3273.88 | -1633.65 | .05 (.05) | -- | -.44 (.08)** | -.05 (.06) | .25 (.06)** | .23 (.05)** |
| 2014 | Model 6 | 2997.89 | -1497.38 | .19 (.04)** | -- | -- | -- | -- | -- |
| | Model 7 | 2999.39 | -1498.63 | -- | -.05 (.06) | -- | -- | -- | -- |
| | Model 8 | 2996.77 | -1496.78 | .30 (.05)** | .28 (.08)** | | | | |
| | Model 9 | 2999.78 | -1496.25 | -- | -- | -.22 (.06)** | .08 (.05) | -.13 (.05)* | .05 (.06) |
| | Model 10 | 2998.66 | -1495.67 | .20 (.05) | -- | -.33 (.07)** | .06 (.05) | -.02 (.06) | .13 (.06)* |

students in an all grade school (Gr. K-12) were statistically less likely to be a victim of bullying than students in junior high (Gr. 7-9). Students in a grade K-9 school were no more likely to be bullied than students in a Grade 7-9 school.

When school size was added to the regression model (Model 10) the results were somewhat similar to that of the 2013 data (Model 5). School size no longer had an effect on victimization when configuration was taken into account. In addition, the difference between all grade schools and junior high schools was no longer detectable, while the difference between student in grade K-9 and junior high become detectable; students in a K-9 school were slightly more likely to report be victims of bullying than those in a junior high school.

It must be kept in mind, though, that although some of the effects are statistically detectable, the size of the effects is small. The largest odds ratio from the 2013 models was 1.5; the largest odds ratio from the 2014 models was 1.4. This translates into small differences in the probabilities of likelihood of bully victimization.

## 4. Discussion

The results of our analyses lead us to the conclusion that school size, location and configuration have minimal influence on the likelihood of bully victimization. Although some statistically detectable effects were found, the overall magnitude of the differences was small.

Across the two years of data, it appears that school size did not have an effect (Model 5 and Model 10) on the likelihood of bullying. Although some authors have suggested that large schools might impersonal and alienating, thereby facilitating bullying, our results are not consistent with that argument. Students in large schools were not any more likely to be victims of bullying than those in small schools.

When school size and location are considered together, location was associated with victimization. Students in rural schools were more likely to be victims of bullying than those in urban schools. While this result is consistent with that reported elsewhere [11], the size of the difference was small. That is, students in rural schools were only slightly more likely to be victims than those in urban schools.

Likewise, students in high school (Gr. 10-12) were less likely to be victimized by bullying than students in junior high (Gr. 7-9). This finding is consistent with previous research that has suggested that bullying is most extensive at around grade seven and diminishes through high school [22]. Interestingly, though, students in all grade schools (Gr. K-12) were as likely or more likely to be victims of bullying than students in junior high (Gr. 7-9). On the one hand, this finding is surprising because bullying is thought to peak in junior high school. On the other hand, most K-12 schools are located in rural areas, where the likelihood of victimization is greater. Students in multi-grade school (Gr. 7-12) were as likely to report being victimized as students in junior high.

**Table 2. Fit statistics and parameter estimates for models predicting bullying from school size, location and configuration.**

| | | Schools (Number and enrollments) | | | | | | Students | |
|---|---|---|---|---|---|---|---|---|---|
| Configuration | Location | 2013 | | | 2014 | | | 2013 | 2014 |
| | | Num. | Mean (sd) | Range | Num. | Mean (sd) | Range | | |
| 10-12 | Rural | 3 | 186.3 (86.9) | 89-256 | 4 | 148.5 (125.2) | 2-275 | 242 | 416 |
| | Urban | 17 | 517.2 (246.3) | 23-922 | 15 | 521.9 (254.8) | 21-982 | 5718 | 4543 |
| 7-12 | Rural | 22 | 219.5 (135.0) | 2-561 | 21 | 226.9 (132.0) | 2-563 | 3531 | 3562 |
| | Urban | 7 | 492.7 (265.6) | 36-837 | 9 | 525.6 (272.6) | 35-898 | 2633 | 3365 |
| 7-9 | Rural | 2 | 190.0 (48.1) | 156-224 | 4 | 171.3 (126.9) | 2-290 | 357 | 475 |
| | Urban | 14 | 425.6 (149.4) | 137-669 | 22 | 450.5 (167.5) | 123-705 | 4527 | 4658 |
| K-12 | Rural | 85 | 121.8 (98.2) | 8-441 | 83 | 115.2 (92.8) | 5-408 | 3910 | 5136 |
| | Urban | 7 | 202.7 (167.2) | 23-489 | 6 | 228.7 (165.7) | 30-498 | 173 | 302 |
| K-9 | Rural | 56 | 165.7 (115.9) | 1-452 | 54 | 165.0 (114.3) | 4-473 | 1172 | 747 |
| | Urban | 59 | 404.6 (212.9) | 28-931 | 50 | 401.1 (216.6) | 18-920 | 1746 | 2306 |

Although there are some statistically detectable effects reported here, it is important to recognize that the size of the differences is small. However, we suggest that researchers continue to explore the role of school characteristics. This should be

expanded to examine the influence of school climate and leadership characteristics and their association to bullying victimization.

## 5. Conclusion

The results of our analyses lead us to the conclusion that school size, location and configuration have minimal effects on the likelihood of being bullied. Bully victimization is a ubiquitous phenomenon and can occur anywhere. This suggests that a closer examination of factors such as the psychological environment of schools rather than general demographic variables may lead to better insights into bully victimization.

## 6. References

[1] Dake, J. A., Price, J. H., & Telljohann, S. K. (2003). The nature and extent of bullying at school. Journal of School Health, 73(5), 173-80.

[2] Nesbit, W. (1999). Black eyes and bruised souls: A portrait of bullying. St. John's, NL: Newfoundland Council for Exceptional Children.

[3] Olweus, D. (1993). Bullying at school: What we know and what we can do. Cambridge, MA: Blackwell.

[4] Canadian Public Health Association. (2007). CPHA safe school study. Retrieved from Canadian Public Health Agency website: http://www.cpha.ca/ uploads/progs/_/safe_school_st udy_e.pdf (Access date: April 12, 2017).

[5] Pellegrini, A. (2002). Bullying, victimization , and sexual harassment during the transition to middle school. Educational Psychologist, 37, 151-163.

[6] White, G. (2014). The impact of individual and school characteristics on types and levels of bullying in Newfoundland and Labradors schools. Unpublished Doctoral Thesis. Memorial University of Newfoundland. St. John's, Newfoundland and Labrador.

[7] Craig, W., Harel-Fisch, Y., Fogel-Grinvald, H., Dostaler, S. Hetland, J., Simons-Morton, B., Pickett, W. (2009). A cross-national profile of bullying and victimization among adolescents in 40 countries. International Journal of Public Health, 54 (Supplement 2), 225-234. doi: 10.1007/s00038-009-5413-9

[8] Evans, C. B. R., Smokoski, P. R. & Cotter, K. L. (2014). Cumulative bullying victimization: An investigation of the dose-response relationship between victimization and associated mental health outcomes, social supports, and school experiences of rural adolescents. Children and Youth Services Review, 44, pp. 256-264.

[9] Dulmus, C. N., Theriot, M. T., Sowers, K. M. (2004). Student reports of peer bullying victimization in a rural school. Stress, Trauma, and Crisis, 7 (2004), pp. 1–16.

[10] Isernhagen, J. & Harris, S. (2004). A comparison of bullying in four rural middle and high schools. The Rural Educator, 25(3), 5-13.

[11] Stockdale, M.S, Hangaduambo, S., Duys, D., Larson, K., Sarvela, P. D. (2002). Rural elementary students', parents', and teachers' perceptions of bullying. American Journal of Health Behavior, 26 (2002), pp. 266–277.

[12]. Lehman, B. (2014). Gender differences in bully victimization: The role of academics and school context. Sociological Spectrum, 34, 549-570.

[13] Leadbeater, B. J., Sukhawathanakul, P., Smith, A., Yeung Thompson, R. S., Gladstone, E. J., & Sklar, N. (2013). Bullying and victimization in rural schools: risks, reasons, and responses. Journal of Rural and Community Development, 8(1), 31-47.

[14] White, G. (2014). The impact of individual and school characteristics on types and levels of bullying in Newfoundland and Labradors schools. Unpublished Doctoral Thesis. Memorial University of Newfoundland. St. John's, Newfoundland and Labrador.

[15] Delfabbro, P., Winefield, T., Trainor, S., Dollar, M., Anderson, S., Metzer, J. and Hammarstrom, A. (2006). Peer and teacher bullying/victimization of South Australian secondary school students: Prevalence and psychosocial profiles. British Journal of Educational Psychology, 76, 71-90.

[16] Nansel, Tonja R., Mary Overpeck, Ramani S. Pilla, W. June Ruan, Bruce Simons-Morton, and Peter Scheidt. (2001). Bullying Behaviors Among US Youth: Prevalence and Association With Psychosocial Adjustment. Journal of the American Medical Association, 285, 2094–2100.

[17] Pellegrini, A. (2002). Bullying, victimization , and sexual harassment during the transition to middle school. Educational Psychologist, 37, 151-163.

[18] Bradshaw, Catherine P. ; Sawyer, Anne L. ; O' Brennan, Lindsey M. (2009). A social disorganization perspective on bullying-related attitudes and behaviours: The influence of school context. American Journal of Community Psychology, 43, pp.204-220.

[19] Klein, J. & Cornell, D. (2010). Is the link between large high schools and student victimization an illusion? Journal of Educational Psychology, 102, 933-946.

[20] Gottfredson, G. D. & Gottfredson, D. C. (1985). Victimization in schools. New York: Plenum Press.

[21] Gottfredson, G. D. Gottfredson, D.C. Payne, A. A., & Gottfredson, N. C. (2005). School climate predictors of school disorder. Results from a national study of delinquency prevention in schools. Journal of Research in Crime and Delinquency, 42, 412-444.

[22] O'Moore, M., & Kirkham, C., & Smith, M. (1997). Bullying behavior in Irish schools: A nationwide study. The Irish Journal of Psychology, 18, 141-169.

[23] Bowes, L., Arseneault, L., Maughan, B., Taylor, A., Caspi, A., & Moffitt, T. E. (2009). School, neighborhood, and family factors are associated with children's bullying involvement: A nationally representative longitudinal study. Journal of American Academy of Child and Adolescent Psychiatry, 48, 545-553.

[24] Farmer, T., Hamm, J., Leung, M., Lambert, K. & Gravelle, M. (2011). Early adolescent peer ecologies in rural communities: Bullying in schools that do and do not have a transition during the middle grades. Journal of Youth and Adolescence, 40, 1106-1117.

[25] Farmer, T., Irvin, M., Motoca, L., Leung, M., Hutchins, B., Brooks, D. & Hall, C. (2015). Externalizing and internalizing behaviour problems, peer affiliations and bullying involvement across the transition to middle school. Journal of Emotional and Behavioral Disorders, 23, 3-16.

[26]. Seifert, T. & White, G. (2016). Bullying in the schools: A brief report. Cyberbullying; gender and grade differences in victimization. Report for the Department of Education, Government of Newfoundland and Labrador.

[27] Muthén, L.K. and Muthén, B.O. 1998-2013. Mplus User's Guide. Seventh Edition. Los Angeles, CA: Muthen & Muthen.

[28] SAS Institute (2012). SAS/ETS(R) 9.3 User's Guide Sas Institute Inc. Cary, NC, USA. Retrieved from SAS Institute Inc. website: http://support.sas.com/documentation/cdl/en/ statug/63962/HTML/default viewer.htm#titlepage.htm (Access date: April 12, 2017).

[29] Tabachnick, B & Fidell, L. (2007). Using multivariate statistics, 5th ed. Toronto: Pearson.

[30] Kline, R. (2011). Principles and practices of structural equation modeling, 3rd ed. New York: The Guilford Press.

[31] Chen, H., Cohen, P. & Chen, S. (2010). How big is a big odds ratio? Interpreting the magnitude of odds ratios in epidemiological studies. Communication in statistics – Simulation and computation, 39, 860-864.

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# Spatial Ability and Dyslexia

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## Abstract

*Visual-spatial ability is important for mathematics learning but also for future STEM participation. Some studies report children with dyslexia have superior visual-spatial skills and other studies report a deficit. Consequently, we sought to explore this relationship amongst children formally identified with dyslexia. Participants showed some evidence of malleability of spatial-ability suggesting improvement over time. An unexpected outcome was found in that few students were formally identified. Ethical implications of this result are discussed.*

## 1. Introduction

Visual-spatial ability is comprised of the following subcomponents: spatial visualization, mental rotation, and spatial perception [7]. It involves the ability to perform movements of various two- or three-dimensional figures and to mentally combine, transform, and move these figures to produce a new design [4]. The research demonstrating the importance of visual-spatial ability in children is compelling. Numerous studies support the notion that visual-spatial ability promotes and is linked to mathematics learning and enhances the possibility of an individual participating in science, technology, engineering, and mathematics (STEM) careers [15]. Noteworthy in this growing body of research is the finding that visual-spatial ability is malleable; that is, it can be taught and children can show improvement over time [13].

Our aim in this research was to explore the relationship between visual-spatial ability and children formally identified with "dyslexia." Approximately 4 to 10% of the population is estimated to have dyslexia [8]. Dyslexia is defined as "a pattern of learning difficulties characterized by problems with accurate or fluent word recognition, poor decoding, and poor spelling abilities"[2]. Aleci and colleagues (2010) have proposed that individuals with dyslexia may also have a general impairment of spatial perception whereby a crowding effect occurs in the reading of texts.

## 2. Dyslexia and visual-spatial ability

Wang and Yang looked at visual-spatial abilities in students aged 10-12 with dyslexia against a control group. Participants were asked to rotate a computer 3D model of a field of columns hiding a ball and were then asked to pick the correct location of the ball from the plan. Their results showed no significant difference between the groups with dyslexia and the control on accuracy, except in answering speed with the participants with dyslexia answering more quickly than the controls. This suggests that individuals with dyslexia have improved visual-spatial abilities based on faster response times without an increase in error rates. Brunswick, Martin, and Marzano found no task in which university-aged students with dyslexia outperformed a control group when using a virtual reality test and a paper-and-pencil test. A sex effect was noted, however. Males with dyslexia outperformed females with dyslexia and unimpaired individuals on a variety of measures. This finding further suggests that superior visual-spatial ability in those with dyslexia may be sex-specific [16] [3].

Duranovic, Dedeic, and Gavrić used multiple visual-spatial tasks, including the Vandenberg Test of Mental Rotation, and found no significant differences between children with dyslexia and unimpaired children. In contrast, Winner et al. found that high school students with dyslexia compared to a non-dyslexic group did not have enhanced visual-spatial skills but rather deficits on many visual-spatial tasks. Russeler. Scholz, Jordan, and Quaiser-Pohl, aimed to determine the significance of mental rotation ability in children with developmental dyslexia. These researchers compared the mental rotation abilities among children with dyslexia to children without dyslexia. They compared the results from three tests in which letters, three-dimensional figures, and coloured pictures, tested the children's mental rotation abilities. Results suggested that children with dyslexia, when compared to the control group, showed a deficit in mental rotation and spatial abilities [5] [10] [9].

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# 3. Method

## 3.1. Participants

Students were recruited from 10 elementary schools from a mid-sized urban center. Only students "formally" identified with dyslexia through psychometric assessments and a recommendation by the Identification, Placement and Review Committee (IPRC) were invited to participate in our research. Only 25 students were formally identified across the 10 schools, of which 13 parents agreed to allow their child to participate in the study (boys n = 8, girls n = 5). Participants ranged from the third to eighth grade.

Parents or the school principal can initiate the formal identification of a student and this occurs through a review and recommendation by the *Identification, Placement and Review Committee* (IPRC). This committee is legislated to identify and determine an action plan for meeting the needs of students with exceptionalities. The IPRC typical involves various education professionals. For the formal identification to occur it involves significant psychometric assessment, usually at the expense of the school board. All psychoeducational assessments of children aged 18 and younger require informed consent from parents.

## 3.2. Materials and Procedure

A variety of measures were collected for the students that agreed to participate. These included official school-level achievement data, psychometric assessment, and a demographic questionnaire completed by the parents. The children were then tested individually on different days and in different locations as they were tested at their respective schools. Students were tested on spatial transformations [6], the Piagetian Water-Level-Task [9], the Rod-and-Frame Test, and the Vandenberg Mental Rotations Task (MRT) [11] [14].

For the Spatial Transformation task students were first presented with 32 spatial transformation problems developed by Levine [6]. All problems contained one stimulus card with a target image divided into two halves and 2 X 2 choice array containing four possible choices, one choice being the completed target image that is formed by putting together the two halves. Sixteen target images were bilaterally symmetrical while the other sixteen target images were unilaterally symmetrical; all images were divided along the vertical axis. The target images were presented in four different forms. The 2 X 2 choice array was placed closest to the participant and the stimulus card containing an image split in half along its vertical axis was placed directly above the array. The objective was to have the participant select the whole image out of the 2 X 2 array that is formed when the two halves of an image on the stimulus card are joined together. The four choices in the 2 X 2 array were always labeled A to D. For the first trial, the experimenter pointed at the stimulus card and then to the array, stating the same sequence as by Levine [6]"Look at these pieces. Look at these pictures. If you put the pieces together, they will make one of the pictures. Point to the picture the pieces make." Then for the following 31 trials, the participants were told to "point to the picture the pieces make". The experimenter recorded the participants' answers and no feedback was given for the trials. All answers were scored out of 32.

The Piagetian Water-Level-Task is a paper pencil task consisting of 12 closed drawing of bottles tilted to the left and right at 30, 45, 60, 120, 135, or 150 degrees [9]. Under each drawing of the bottle, there is a thick black line that runs parallel to the top and bottom of the paper. The participants were told to imagine that there is water within the closed drawings of the bottle and then draw the position of the water line. The water line needs to be parallel (180°) to the line that the drawing of the bottles sits on to determine the degree of tilt. The water line drawn by the participant needed to measure no greater than eight degrees to be marked as correct. This task was scored out of 12.

The Rod-and-Frame Test is also a paper- pencil test contains eight drawing of rectangular objects tilted to the left and right at 30, 60, 120, or 150 degrees [9]. Each rectangular object stands on a line and are used as a point of reference, allowing one to determine to what degree the image is titled. The participants were presented with eight rectangular objects and were instructed to draw a rod that hangs inside each. The rod needed to hang perpendicular to the line the rectangular object sits on. To be considered correct, the rod needed to be no greater than eight degrees from the correct position. This task was scored out of eight.

The Mental Rotations Task (MRT) consisted of one example and 10 problems, with all images printed in black and presented on white paper. In each problem, there was a pair of figures that were either the same figure rotated or a completely different figure, five figures were the same and five figures were different. The participants were instructed to identify whether the 10 pairs of images were the same image or different images. In order for the participant to determine whether or not the images were the same, they would have to use mental rotation to imagine how teach image would look from various rotations. This task was scored out of 10.

# 4. Results

The students were assessed on four different measures. The average percent scores for each task

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were as follows: 40% for the Water-Level Task, 47% for the Rod-and Frame Test, 57% for the MRT, and 88% for the spatial transformations. This indicates that on average, students performed the best on the spatial transformations and the lowest on the Water-Level Task. Correlation analysis revealed that the Water-Level Task ($r = .78$ $p = .002$) and Rod-and-Frame Test ($r = .79$ $p < .001$) were correlated with grade, thus students in higher grades were more likely to do better on those tasks. However, the MRT ($r = .30$ $p = .30$) was not correlated with grade, thus, this ability varied by grade.

On the demographic questionnaire, parents were asked in which grade they noticed that their child had a reading difficulty and also the grade that their child was formally diagnosed. The number of years between the onset of reading difficulties and formal diagnosis was as follows: 15% 0 years, 8% 1 year, 23% 2 years, 38% 3 years, 8% 4 years, and 8% 5 years.

## 5. Discussion

Our intent in this research was to examine the visual-spatial abilities of elementary students with dyslexia. Our results show a general trend towards improved results for older children suggesting at the very least some malleability in visual-spatial ability. Given the mixed research in this area, the importance of visual-spatial reasoning, and its highly malleable nature, this goal is still laudable – and more research is still needed.

## 6. Conclusion

One obvious limitation, and also an unexpected result, of this research is the small sample size and the reason for this is worthy of discourse. Using conservative population estimates of the prevalence of dyslexia (approximately 4%), based on the population of students ($n = 4138$) at the 10 elementary schools participating in the study, we anticipated approximately 165 potential participants. Instead, only 25 students were formally identified across the 10 schools, and thus eligible to participate. Our unexpected results raise important ethical questions about who gets tested, who gets identified formally, and to what extent are instances of comorbidity of other learning challenges missed because formal testing and IPRC review is not occurring?

## 7. References

[1] Aleci, C., Piana, G., Piccoli, M., & Bertolini, M. (2010). Developmental dyslexia and spatial relationship perception. *Cortex, 48*(4), 466-476.

[2] American Psychiatric Association. (2013). *The Diagnostic and Statistical Manual of Mental Disorders, DSM-V (Fourth ed.).* Washington: Author.

[3] Brunswick, N., Martin, G. N., & Marzano, L. (2010). Visuospatial superiority in developmental dyslexia: Myth or reality? *Learning and Individual Differences, 20*(5), 421-426.

[4] Casey, B. M., Andrews, N., Schindler, H., Kersh, J. E., Samper, A., & Copley, J. (2008). The development of spatial skills through interventions involving block building activities. *Cognition and Instruction, 26*(3), 269-309.

[5] Duranovic, M., Dedeic, M., & Gavrić, M. (2015). Dyslexia and visual-spatial talents. *Current Psychology, 34*(2), 207-222.

[6] Levine, S. C., Huttenlocher, J., Taylor, A., & Langrock, A. (1999). Early sex differences in spatial skill. *Developmental psychology, 35*(4), 940.

[7] Linn, M. C., & Peterson, A. C. (1985). Emergence and characterization of sex differences in spatial ability: A metaanalysis. *Child Development, 56,* 1479-1498.

[8] Osisanya, A., Lazarus, K., & Adewunmi, A. (2013). Manifestations of dyslexia and dyscalculia. *Journal of International Special Needs Education, 16*(1), 40-52.

[9] Quaiser-Pohl, C., Lehmann, W., & Eid, M. (2004). The relationship between spatial abilities and representations of large-scale space in children--a structural equation modeling analysis. *Personality and Individual Differences, 36*(1), 95- 107.

[10]Rüsseler, J., Scholz, J., Jordan, K., & Quaiser-Pohl, C. (2005). Mental rotation of letters, pictures, and three-dimensional objects in German dyslexic children. *Child Neuropsychology, 11*(6), 497-512.

[11]Shepard, R. N., & Metzler, J. (1971). Mental rotation of three-dimensional objects. *Science, 171,* 701-703.

[12] Snowling, M. J., & Melby-Lervåg, M. (2016). Oral language deficits in familial dyslexia: A meta-analysis and review. *Psychological Bulletin,* 1-48.

[13]Uttal, D. H., Meadow, N. G., Tipton, E., Hand, L. L., Alden, A. R., Warren, C., et al. (2013). The malleability of spatial skills: A meta-analysis of training studies. *Psychological Bulletin, 139*(2), 352- 402.

[14] Vandenberg, S. G., & Kuse, A. R. (1978). Mental rotations. A group test of threedimensional spatial visualization. *Perceptual and Motor Skills, 47,* 599-604.

[15] Wai, J., Lubinski, D., & Benbow, C. P. (2009). Spatial ability for STEM domains: Aligning over 50 years of cumulative psychological knowledge solidifies its importance. Journal for Educational *Psychology, 101*(4), 817-835.

[16] Wang, L., & Yang, H. (2011). The comparison of the visuo-spatial abilities of dyslexic and normal students in

Taiwan and Hong Kong. *Research in developmental disabilities*, *32*(3), 1052-1057.

[17] Winner, E., von Karolyi, C., Malinsky, D., French, L., Seliger, C., & Ross, E. (2011). Dyslexia and visual-spatial talents: C*ompensation vs deficit model. Brain and Language, 76*(2), 81-110.

# Doing Justice to History – The Push Toward Making the U.S. and U.K. Curricula More Inclusive

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## Abstract

*Both the U.S. and U.K. are becoming increasingly more diverse in terms of their populations with cities such as Los Angeles and London considered among the most multicultural in the World. This has a profound impact on education at various levels as teachers now more than ever need to be aware of the diversity that confronts them daily. One thing in definite need of change is the history curricula in both countries. As the history traditionally taught in both has been relatively limited in terms of the stories emphasized and past events focused on, marginalization and exclusion have occurred. Essentially, white American and British history have been and continue to be the norm. This talk reflects my experiences as a Fulbright Distinguished Teacher/Honorary Research Fellow at University College London's Institute of Education where I am studying how some U.K. secondary level teachers are beginning to make their history lessons more inclusive and reflective of Britain's multicultural population. Centered around the work of Dr. Robin Whitburn and Abdul Mohamud, this approach is referred to as Doing Justice to History.*

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# Integrating Students in Research under the Supervision of Faculty Members

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## Abstract

*Students who conduct research display developments in thinking individualistically, thoughtful critically, putting ideas composed, solving problems, examining data, analyzing literature, interpreting study findings, showing moral research, and giving presentations. Participation in academic research will help student to learn more about himself through discovering his good habits and strengths, and perhaps some non-appropriate habits or weaknesses, which will be needed to be changed or developed, such as the development of self-confidence, the ability to cooperate with others, accept constructive criticism and thinking out of the box. There are many challenges which affect in student research such as: absence from work by supervisors and too few meetings with students; student-related challenges-lack of time, lack of cash and family problems; and institution-related challenges-lack of internet facilities, lack of library resources, lack of computer literacy, and lack of workshops as some of the overarching challenges that the students experience in conducting their research. It can be concluded that time like money is an economic resource.*

*This study examines the major benefits and challenges of UAE University students who were integrated in different research projects under the supervision of their faculty members. Based on surveys and interviews conducted with nearly 400 students, a mixed methods approach was used to analyze responses from participants who responded to some closed ended and open ended questions, especially in terms of their experience in working with faculty members and the benefits they gained from them and from the research. The results of these methods revealed that, the majority of students found that, their opportunities in the job market widened and they were able to cope up with deadlines when under pressure. Apart from this, studies showed that, students faced some difficulties in terms of duration of the work due to their other course works that conflicted with their research work. The survey indicated that, the majority of students faced challenges like, communicating with other research assistants, especially due to lack of meetings with one another and to know about the work of each one and the way they were proceeding in the research work. Majority of the students preferred to participate in future researches if they had an opportunity to work with some faculty members. However, the interviews results indicated that, the language challenges prevented the students to participate in the research work due to the fear of being wrong in some tasks. The interview of students revealed that, writing was one of the most difficult aspects faced while working under the research, specifically in terms of scientific research writing style, in order to counter this challenge, most preferred certain courses that would enable them to become familiarized with such writing styles. Furthermore, analysis revealed the major goal for the students in the research work was either to gain experience for a career in the research field or to gain the required experience necessary for the job market. The students were judged in different areas in terms of academic as well as co-curricular benefits. In general, results showed that the majority of the students had more or less similar advantages and challenges of working in a research, some students differed in terms of the preferred research environment.*

*Future studies would consider students from different disciplines to capture challenges related to different areas of study. Therefore, research needs to consider university's initiation of best practices to begin significant improvements of the students doing the researches and nurture the chances their skills. A limitation of the study was that the researchers faced difficulties in having a sufficient number of male students in the interviews*

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**Many thanks for your participation and we hope to see you in October…!**

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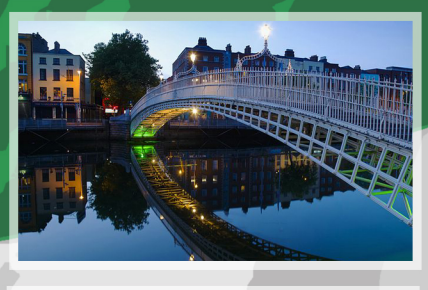

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