

Education Applications & Developments V



Edited by Mafalda Carmo

Advances in Education and Educational Trends

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Advances in Education and Educational Trends Series

Edited by: Mafalda Carmo



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FOREWORD

InScience Press is delighted to publish this book entitled *Education Applications & Developments V* as part of the Advances in Education and Educational Trends books series. These series comprise authors' and editors' work to address global research, although focused in specific sections, in the Education area.

In this fifth volume, a dedicated set of authors explore the Education field, contributing to the frontlines of knowledge. Success depends on the participation of those who wish to find creative solutions and believe their potential to change the world, altogether to increase public engagement and cooperation from communities. Part of our mission is to serve society with these initiatives and promote knowledge, therefore it requires the reinforcement of research efforts, education and science and cooperation between the most diverse studies and backgrounds.

The contents of this 5th edition show us how to navigate in the most broadening issues in contemporary education and research. In particular, this book explores four major topics within the broad theme of Education, corresponding to four sections: "Teachers and Learning", "Organizational Issues", "Teachers and Students" and "Projects and Trends". Each section comprises chapters that have emerged from extended and peer reviewed selected papers, originally published last year in the proceedings of the International Conference on Education and New Developments (END) conference series (<http://end-educationconference.org/>). This meeting occurs annually with successful outcomes. Original papers have been selected and the authors were invited to extend them. The extended versions were submitted to a new evaluation's process, afterwards the authors of the accepted chapters were requested to make the necessary corrections and improve the final submitted chapters. This process has resulted in the final publication of 23 high quality chapters organized into 4 sections. The following sections' and chapters' abstracts provide some information on this book's contents.

Section 1, entitled "Teaching and Learning", offers research about foundations in the education process itself, in various contexts, both for tutors and students.

Chapter 1: *Human Being Development: A Holistic and Complex Extensive Review on the Social Dimension*; by Bertrand Dupuy, Roger Boileau, & Tegwen Gadais. A previous paper focuses on the research protocol used to conduct a holistic and complex review on the social dimension of the human being. This theoretical chapter focuses on created a model about the constituent elements of social development of human beings evolving into a contemporary democratic society. From a cross-reading of the thoughts of ancient and contemporary authors, a number of structural, conceptual and dynamic elements related to this subject emerged. The linkage and articulation of these elements gave birth to an integrative model reflecting the complexity of the different components of the social dimension of

human beings and their development. This chapter, based on Bronfenbrenner's ecological approach, unveils the process of developing this grid as well as the justification of the constituent elements that it comprises. It establishes a first foundation of knowledge synthesis on the social dimension of human beings.

Chapter 2: Creating Contemporary Picture Short Stories Using Intertextual Heroes and Plot Subversion - An empirical research; by Christina Kalaitzi. The objective of the present research is to explore the extent to which preschoolers are able to recognize intertextual connections and schemata and build upon them by subverting the plot of classic tales. According to previous findings, children in preschool age are able to acknowledge familiar plots and reproduce the basic narrative structure using pictures as a source. Providing that during preschool age, narrative skill establishes the grounds for narrative comprehension and literacy emergence, it is highly important to examine the potential of the narrative skill. For the purposes of this empirical research, a teaching intervention is conducted with a sample composed of preschoolers from two public Greek kindergartens. The preschoolers' performance is evaluated through context analysis. The interpretation of expression patterns identified in preschoolers' produced narrative speech shows that they are able to introduce familiar fairytale characters into their posterior narratives attributing to them distinctive roles. Furthermore, they are able not only to distinguish fairytale patterns, but also to subvert them by narrating a different sequence of events. The present research contributes to the discussion regarding the extent to which narrative skill could be developed during early childhood. Based on the results, narrative skill can be enriched through the combined use of intertextual connections and patterns subversion.

Chapter 3: French Immersion Teacher and Student Perceptions about Learning Science in a Second Language; by Yovita Gwekwerere & Ginette Roberge. In Ontario, students enrolled in English language schools have the option to learn academic subjects in both French and English (French Immersion). In response to requests for instructional support from French Immersion (FI) Science teachers, representatives from the Council of Ontario Directors of Education approached Laurentian University researchers to embark on a project that would contribute to building the capacity of teachers who teach Science in French in the Junior and Intermediate grades (7-10). This study utilized a mixed methods approach to investigate teacher perceptions about teaching science to second language learners, their science efficacy beliefs, and students' engagement. A total of 37 grade 7-10 FI teachers and their respective 324 students participated in the study. Findings show that most teacher participants were generally confident about their knowledge of science, felt that they taught the subject effectively, and were continually striving to engage their students in science classes. However, these teachers faced unique challenges concerning limited language proficiency among students, and lack of suitable instructional resources. Student surveys show mixed results in terms of their self-efficacy and self-regulation, those with genuine interest in science, were more likely to be confident in their ability to succeed in FI science classes.

Chapter 4: *The Lifestyles and Health Habits of Students from a Quebec University*; by Marie-Claude Rivard, Paule Miquelon, Émilie Pérusse-Lachance, Alexandre Busque, Sylvie Ngopya Djiki, Élisabeth Lavallée, François Trudeau, & François Boudreau. Despite the physical and psychological benefits associated with healthy lifestyle habits, approximately 50% of Canadians fail to adopt an active lifestyle and a healthy diet (Statistics Canada, 2014). University students are no exception to this tendency, even though the literature acknowledges the benefits of healthy lifestyles for academic success (La Cascia et al., 2019). In this context, the objectives of this study were to: 1) examine the lifestyles and health habits of a sample of Quebec university students and 2) explore this sample's needs with respect to strategies that can be used to promote healthy habits on campus. A cross-sectional design, a web-based survey (n = 1,980 students), and three focus groups (n = 22 students, ~7/group) were used to reach these objectives. The results showed that: 1) 55.2% of students were considered sedentary and 81.2% did not meet the Canadian recommendations regarding vegetable and fruit consumption and 2) lack of time and excessive workload were the main barriers to physical activity practice and maintaining a healthy diet. Future research should focus on maintaining a balance between offline (e.g., workshops) and online (e.g., computer tailoring) interventions to promote physical activity and healthy diet maintenance throughout the academic year.

Section 2, entitled “Organizational Issues”, gives a glance on tools for implementing organizational learning and change in the education context.

Chapter 5: *A Humanising Pedagogy: Being a Conscious Presence in the World*; by Leila Kajee. Many consider education an arena designed to eliminate structures of oppression, by equipping learners with the necessary abilities to change repressive structures that exist in society. This is significant in the context of South Africa given its history of segregation and apartheid. Also in the context of South Africa's linguistically and culturally diverse classrooms, it is inevitable that teaching and learning from a social justice perspective be prioritised to address injustices and inequities. This chapter draws on conversations with teachers, in which their understandings of a humanising pedagogy, and what this requires of us in the context of teaching and learning environments, are explored. The chapter concludes that a humanizing pedagogy is crucial for both teacher and student success and critical for the academic and social resilience of students. The work emanates from a project between universities in South Africa and Brazil.

Chapter 6: *Principals' Entrepreneurial Leadership Empowering Parents of Marginalized Populations*; by Devorah Eden. The aim of this study is to explore principals' entrepreneurial leadership in a school of a socially marginalized population over a period of eighteen years. The school serves the children of undocumented work migrants and refugees in Israel. These people are perceived by the law as temporary, with no possibility of becoming citizens. However, their

children are eligible for an education, as specified in the Law of Compulsory Education. Principals as entrepreneurs have a vision, seize opportunities and engage in innovations, and use networking to pursue their goals. This qualitative study used a 'critical event' inquiry method to reveal the events that triggered the principals' entrepreneurship towards the parents. Principals' acts and perceptions were retrieved from different sources. The different sources include interviews with teachers, interviews with the principals and their interviews on the media and the internet, and school observation, over a period of eighteen years. It was found that the principals applied entrepreneurial leadership to facilitate the parents in accumulating social and cultural capital that would enable them to become part of society by mobilizing funding, volunteers and projects. This study contributes to our knowledge, since it discusses the possibilities and scope of principals' entrepreneurial leadership.

Chapter 7: The Screeners Project - The age of new communication; by Petra Pětiletá. Nowadays, daily-use of a computer, notebook, tablet, and other display is natural. Thanks to the development of new technologies, we are gradually moving from textual-cultural to hypertextual expression. The Internet is a relatively new data medium and requires a new method of reading and working with information. New media, coupled with technical advances (in addition to art), brings about a cultural transformation of mass society through a wealth of easily accessible visual data with different purposes and content. Contemporary life in our global society manifests itself in two ways: everyday life in the real world without a connection and a digital platform through which one is connected via a screen. The rapid development of the Internet and digital technologies is also reflected in art education as well as the creations of students without the use of computers.

Section 3, entitled “Teachers and Students”, provides studies within educational programs and pedagogy for both teachers and students.

Chapter 8: Self-Assessment through the Metacognitive Awareness Process in Reading Comprehension; by Katerina Kasimatis & Theodora Papageorgiou. This study aims to investigate the relationship between adult self-assessment and the level of metacognitive awareness in reading comprehension. The sample of the research was adults who were participating in a training programme in order to obtain a certification of pedagogical competence during the year 2017-2018. MARSİ (Mokhtari & Reichard, 2002) was used as a research tool and open - ended questions were distributed to the trainees. The study focused on the overall index and the metacognitive development of the trainees. Both quantitative and qualitative analysis of the data was conducted. The analysis of the data revealed high level of awareness of metacognitive reading strategies ($M > 3.5$), which is also in relevance to high quality educational level of the trainees and their age ($M = 35$). With regard to the effect of the training on their metacognitive awareness, there has been a statistically significant increase in the overall average of MARSİ, which indicates the positive impact of the training on a population of high educational level and older than the

normal trainee population. The qualitative analysis of the data revealed the enhancement of self-assessment among trainees and the development of reading skills through the use of digital technologies etc. The positive contribution of the training to the participants' metacognitive awareness seems to be focused only on those with pre-existing teaching experience and have been more highly self-assessed.

Chapter 9: *Legal Case vs Legal Text - How to teach law in teacher training*; by Zoltán Rónay. Both scholars and educators agree on the importance of law education for future teachers. However, the predominant majority of methodological literature deals only with the K12 level. Law is complex, it has its own challenging terminology. The novelty of this chapter lies in offering methods for the implementation of these elements and presenting an example of how it is possible to ensure the basic legal and ethics preparedness of students in a teacher training programme. Our institute (Eötvös Loránd University, Faculty of Education and Psychology, Institute of Education), which is responsible for the pedagogical content of teacher training, recognised the lack of these elements in teacher training curricula. To this end we designed a course on legal and ethics knowledge. This course did not have antecedents, thus the author of this chapter, as the responsible professor, had the freedom to compose the methodology and content. The title of the course is "The Legal and Ethics Framework of the Teaching Profession." This chapter presents the challenges during the first two semesters, the experiences of which involved modifications, and the students' opinions about the course. Furthermore, the chapter offers best practices and tools for teacher educators in other countries.

Chapter 10: *A Model for Modified Music Standards in Professional Music Training: A Case Study*; by Hua Hui Tseng. Music standards equip music educators with abilities to translate music education verbiage to administrators and policymakers so that the latter may more readily comprehend standard instructional vocabulary. One of the realities of music education is its teachers work as professional musicians whose administrators have little training in music education and knowledge of the 2014 National Coalition for Core Arts Standards' educational standards for fine arts disciplines, including music. The purpose of this paper is to use the National Association for Music Education's three artistic processes of creating, performing, and responding (CPR) guidelines for music teachers to analyze and explore evaluation measures and the process of giving students tools in instructional programs. The focus is the guidelines' areas and practices across a range of standards representative of the quality of learning outcomes and balanced music curriculum, including responding to and creating and performing music. Insight into some of the implications of students' results is gained through the Music Department in the Tainan University of Technology, Taiwan. The findings demonstrate that accurate assessment of music performance in authentic contexts is realized by raising the quality of practice, defined as meeting learning objectives in performance, that conform to academic and performance requirements' criteria.

Chapter 11: *The Introduction of Programming in K-12 Technology and Mathematics - Teacher choice of programming tools and their perceptions of challenges and opportunities*; by Niklas Humble, Peter Mozelius, & Lisa Sällvin. Many countries have started the process of involving programming in K-12 education. Most experts agree that this will be a positive change, but there are no concrete guidelines on which tools to use, and how to address challenges for the involved teachers. The aim of this study was to describe and analyse teachers' perceptions of integrating programming in technology and mathematics, and their view on programming tools. A case study strategy was used, with two versions of an introductory programming course as the case study units. For both course versions, technology and mathematics teachers taking the course could choose between textual programming in Python and block programming in Scratch. Data have been collected in a mix of submitted essays, programming solutions and researchers' observations. Findings show that a challenge in learning and integrating programming is the perceived time trouble, while an opportunity is that programming is perceived to be fun. Regarding the choice of tools, the majority of the teachers used Python themselves and mentioned that they could see a greater potential for it as a tool in education. However, many of them stated that they still will start off with Scratch, due to the lower threshold for novice programmers.

Chapter 12: *Does it Add up? Designing Elementary and Preschool Teacher Professional Development to Improve Student Achievement*; by Ken Newbury, Deborah G. Wooldridge, Susan Peet, & Cynthia D. Bertelsen. The quest for effective teacher math professional development that positively influences student achievement is the genesis of this two-year, mixed methods quasi-experimental design research study. The research evaluated the impact of a comprehensive embedded 120-hour professional development initiative on preschool and elementary math teachers' knowledge, beliefs and behaviors and changes in their student's math achievement. An external evaluation from year 1 and year 2 revealed statistically significant changes on measures of teacher math content knowledge for Treatment group vs matched Control group who completed the Teacher Knowledge Assessment System (TKAS), an online system for administering the Learning Mathematics for Teaching (LMT) assessment. The LMT measures teachers' basic mathematical knowledge and teachers' pedagogical content knowledge in mathematics (Hill, Schilling, & Ball, 2004; Phelps, 2011). Student achievement changes from Treatment teacher classrooms increased in year 1 with significant changes found in year two compared with matched Control teacher classrooms on a variety of grade aligned student achievement measures. Findings from this study demonstrate the potential of effective teacher math professional development on both teacher math content knowledge and on student achievement. Implications for future research that result from this study are presented.

Chapter 13: *Reading Competency and Summarizing Skills in Primary School Children: An Explorative Survey*; by Antonella Valenti & Lorena Montesano. In the present society, one of the fundamental objectives of school is learning to read a text. "Learning to read" is a complex process, implying not only the ability to associate the corresponding phoneme to each grapheme, but also the ability to understand the meaning of a text. It is a crucial achievement, fundament of the more general study skills, on which largely depends the educational and academic future of each student. In the recent years, learning to read has become the subject of systematic international and national evaluations, associated with recurrent requests to carry out initiatives aimed at the reduction of the poor comprehenders. Summarizing is one of the key strategies for a good reading comprehension, since learning from long texts result difficult for many students. Starting from these considerations, we evaluated the summarizing skills in a group of primary school children. We also measured the skills of text comprehension, referring to the ability of semantic and lexical inference, to the vocabulary skills and to the metacognitive skills. The aim was to investigate the relations between summarizing and students' general reading competency.

Chapter 14: *Understanding why some Future Teachers Find it so Difficult to Follow Written Instructions*; by Janaina da Silva Cardoso. A difficulty in following simple written instructions has been identified amongst university students of teacher education in Brazil. This Exploratory Practice (EP) study, conducted as part of a TEFL Practicum course at the State University of Rio de Janeiro, Brazil, aimed to understand what lies behind this difficulty. The research project was divided into two phases: an online questionnaire, answered by 16 students, and an EP activity, involving another 14 learners, all aged between 20 and 35. This specific "work of understanding" was important for them because their success at university depended partly on their ability to follow instructions. Moreover, as the learners in question were teachers-to-be, their ability to give their own students clear instructions was also a consideration. The study was initially designed as a participatory action research project with the main focus on finding solutions to the problem at hand, but it was subsequently transformed into an EP project with the main aim of simply understanding the situation and familiarizing the participating learners with the principles of EP. The participants' and respondents' difficulties in following instructions were found to be related to the learners themselves (e.g., lack of attention) the teachers (e.g., unclear instructions), and other factors.

Chapter 15: *Gender Differences Between the Perceptions of Physics and Science in General Amongst Senior and Junior Students at a South African University*; by Leelakrishna Reddy. It is widely accepted from literature that male students outperform their female counterparts in science, and in particular physics. Accordingly, gender differences stem from their prior backgrounds in mathematics, physics and differences about their attitudes and beliefs about the subject. To measure students' differences in perceptions regarding physics and science, use is made of a questionnaire that is comprised of two sections; A (four questions) and

B (fifteen questions). In section A students were required to respond to questions that relates to their relationship between life and physics, chemistry and mathematics, while in section B, a probe is made regarding their confidence in physics and chemistry. 101 students participated in this study. Results are presented in both numeric and in percentage form. The fundamental difference between the genders is that in both groups there appears to be a strong affinity for chemistry for the female students, and even a stronger liking for chemistry by the senior analytical chemistry students. The males on the other hand shown an average liking for chemistry in both cohorts, but a slightly better liking for physics as a subject. From this anecdotal study, it appears that females show more preferences for science and chemistry than their male counterparts do.

Chapter 16: *Gender Differences in Physics Anxiety at a South African University*; by Leelakrishna Reddy. From literature, it is known that anxiety for physics amongst female students appears to be higher than for male students. This study is carried out to determine the role that gender plays in their preference to physics and the anxiety they experience in the subject. To measure the anxiety that students experience in physics, use is made of a modified physics anxiety questionnaire. This questionnaire has a rating scale from +1 (minimal anxiety) to + 5 (very high anxiety). 64 students participated in this study. Results for this study is presented both in numeric and in percentage form. From this study, it was revealed that female students have a significantly higher level of physics anxiety compared to their male counterparts. Besides the females having a higher level of anxiety in the thought of seeing their physics assessment marks, both males and females have a similar level of anxiety for the item relating to fear of failing their physics tests or examinations. The anxiety experienced by male students is their desire to excel in the subject and thus they appear to be more focused in their physics studies, while female students are overcome by the complexity of the subject and present a higher level of anxiety in the subject.

Section 4, entitled “Projects and Trends”, presents chapters concerning, as the title indicates, education viewed as the center for innovation, technology and projects, concerning new learning and teaching models.

Chapter 17: *Flipped for Critical Thinking: Evaluating the Effectiveness of a Novel Teaching Approach in Postgraduate Law Modules*; by Margaret Liu. Flipped classroom is a novel model that can help students develop their learning skills of critical thinking by students’ engagement to enhance their learning experience through team working and pre-designed class activities with tailor-made questions. However, the literature about flipped teaching reveals that it is still underutilized and underexplored in the higher education law teaching. This study aims to fill in this gap by developing a flipped learning model that can provide a foundation in practice for higher legal education. This chapter presents a new flipped classroom model and information about how this model promotes greater critical thinking in a flipped classroom environment that was evaluated based on Module Evaluation Questionnaires and final module grades for the test of effective learning

and teaching quality. Research was conducted using eleven-week-long postgraduate law modules of ‘international trade law’, ‘international criminal law’ and ‘international human rights’. Data was collected from students who completed module survey and submitted summative assessment for their final module grades. Result shows that over 90% post graduate law students found the flipped classroom model to be either effective or very effective to promote critical thinking. Students were satisfied their learning experience with their counterparts and interaction with lecturers.

Chapter 18: *Development of Interdisciplinary Instruction Using Inquiry Based Science Education*; by Eva Trnova. The task of the current educational system is to give all pupils competences they will need to prosper in the global economic competition. However, pupils very often consider learning content to be useless for their everyday life. In the context of natural sciences, this is not only about the choice of learning content but also about how science subjects are taught. Pupils are not usually able to connect knowledge from individual natural science subjects and to solve interdisciplinary problems so typical for everyday life. This could be one of the essential reasons for the lack of pupil interest in the study of natural sciences. An interdisciplinary approach to teaching could be the way to solve this situation. However, teachers usually lack training in interdisciplinary instruction, and they do not know the appropriate educational methods supporting interdisciplinarity. It is vital to educate them on how to carry out interdisciplinary instruction to satisfy pupil requirements. This study introduces inquiry-based science education as a suitable educational strategy for efficient interdisciplinary instruction. Research findings confirming the effectiveness of pre-service teacher education in interdisciplinary instruction using inquiry-based science education are presented.

Chapter 19: *Challenge Based Learning (CBL)*; by Mariano Sánchez Cuevas. A new education for the 21st century requires comprehensive training by students. An education focused on the development of cognitive skills, abilities, and attitudes that allow them to approach and design solutions for the main social challenges. This change in the educational paradigm demands the incorporation of new teaching and learning methodologies. In this chapter, Challenge-Based Learning (CBL) is presented as a pedagogical proposal to favor the development of transversal and disciplinary skills, collaborative work, leadership, research, critical and reflective thinking. CBL allows students to be involved in real teaching contexts so that through the design and implementation of projects, they generate proposals for solutions to the main social challenges. This paper describes the background, the characteristics, the teaching process, and the methodology, in its different stages for developing CBL, as well as its main differences with other active methodologies that are used to develop problem-solving skills. Finally, the CBL stages are exemplified within a university experience and its implementation through the project called Social Reconstruction. This project allowed the participation of students and teachers in a multidisciplinary and collaborative way for the social transformation of two Mexican communities affected by the earthquake of September 19, 2017.

Chapter 20: *Development and Effectiveness of “Content-Focused Accessible E-Learning Materials” for English Learning Targeting Visually Impaired University Students*; by Chikako Ota. Visually impaired students need to have printed learning materials converted into media such as enlarged print and braille, and they need enhanced ICT environments such as sound and screen magnification. These modifications are known as “technical” accessibility to information. However, these enhanced learning materials are not always sufficient. This study presents pioneering attempts to modify printed learning materials into content-focused accessible e-learning materials that help visually impaired students to learn English independently. The original materials used in this study are self-learning exercise books for remedial English grammar study. The students used the modified e-learning materials and provided feedback from the following perspectives: 1) effectiveness of the materials, 2) suggestions for improving/revising materials, and 3) suggestions to further develop the materials for student autonomy. The study then analyzed students’ grades before and after using the modified materials. Study results revealed that the modified materials were more effective, especially for students with severe visual impairment. This finding is significant as it provides new insights that will help facilitate visually impaired students’ self-learning.

Chapter 21: *Positive and Negative Feelings of Learning with Digital Technologies Among Higher Education Students in Ghana*; by Justice Kofi Armah & Duan Van der Westhuizen. A scan of research literature that targets the experiences of students in Ghana when they use digital technologies for learning, shows that little is known about student experiences of learning with technologies, or how negative they feel when doing this. The Joint Information Systems Committee’s (JISC) digital experience insight survey offers insight into how students are using technology in the higher education learning environment. The survey has four dimensions, “digital life of students”, “digital at the university”, “digital at course level” and “student attitudes to digital”. Therefore, in this study, students in three dual-mode HEIs were targeted to complete the survey instrument. The responses of 1937 students were captured by means of an online questionnaire, and the data were disaggregated by mode of study. While these data confirmed that students have positive feeling towards the use of digital technologies in their subject discipline, they also suggested that fulltime (residential) students are more positive towards digital technologies for learning than distance learners. They also have less negative feelings toward digital learning than distance learners in managing online information. Therefore, it becomes clear that dual-mode institutions need to take additional measures to scaffold distance learners appropriation of digital technologies (tools and skills) for learning.

Chapter 22: *Students’ and Teachers’ View on School-Dependent Factors that Affect Students’ Assessment Performance*; by Marcin Fojcik, Martyna Katarzyna Fojcik, June Audsdotter Stafnes, & Bjarte Pollen. The paper attempts to name, define and evaluate various factors that may influence the assessment of students. The idea behind an exam for students is to determine to what extent students have learned

(assimilated) the course content. The exam is also a type of summative assessment that is designed to determine whether students can select and apply effective study strategies and whether they know how to prepare for and perform during the exam. Both scientific publications and the authors' experience show that in many situations, students do not achieve an exam result that matches OR is in line with their skills. In this chapter, the authors focus only on factors that may depend on the strategy of the university, such as stress management, examination techniques, understanding of tasks etc. The authors collected data to investigate what kinds of study and examination strategies students use and how these strategies satisfy student assessment results using qualitative and quantitative methods. The results were used to identify which factors have the greatest impact on student performance. The chapter presents some suggestions on how schools and universities can support students to be more prepared and more aware of themselves in such situations.

Chapter 23: Cultural Heritage as Built Environment Education Resource: Pupils and teachers evaluating learning within Lost Traces project; by Marta Brković Dodig, Sarah Klepp, & Angela Million. Monuments as facets of our material culture can be focal points of built environment education. Cultural heritage can enhance teaching of curricular subjects and can provide par excellence cross-curricular opportunities. Yet, studies evaluating educational experiences involving cultural heritage sites are scant. Therefore, this chapter presents results of an evaluation of learning experience with pupils and teachers participating in a 'Lost Traces' project. Questionnaires and group interview with card sorting task revealed educational methods the pupils selected as helpful for developing a myriad of competencies – from perceiving and feeling, analysing and communicating monuments related themes, to artistically intervening on sites and developing designs for the future use. LT projects promote diverse competences and highly enrich learning experiences. Pupils appreciated the ability to independently assemble teams spanning across generations, bring in their own ideas, work directly with experts, engage with interesting topics on-site. Yet, future project should allow for joined-up planning and careful programming of project phases and educational tools jointly with pupils; include more intensely social negotiation of what heritage is with different stakeholders to facilitate the process of monuments interpretation, thus, further broaden pupil's understanding of heritage.

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May, 2020

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Section 1
Teaching and Learning

Chapter #1

HUMAN BEING DEVELOPMENT: A HOLISTIC AND COMPLEX EXTENSIVE REVIEW ON THE SOCIAL DIMENSION

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ABSTRACT

A previous paper focuses on the research protocol used to conduct a holistic and complex review on the social dimension of the human being. This theoretical chapter focuses on created a model about the constituent elements of social development of human beings evolving into a contemporary democratic society. From a cross-reading of the thoughts of ancient and contemporary authors, a number of structural, conceptual and dynamic elements related to this subject emerged. The linkage and articulation of these elements gave birth to an integrative model reflecting the complexity of the different components of the social dimension of human beings and their development. This chapter, based on Bronfenbrenner's ecological approach, unveils the process of developing this grid as well as the justification of the constituent elements that it comprises. It establishes a first foundation of knowledge synthesis on the social dimension of human beings.

Initial Warnings

Current knowledge of the requirements of good development and good functioning of human beings allows for the definition of new guidelines to redirect our education systems towards the implementation of education and training programs that allow every human to better know oneself and to realize optimally their potential. We want to put into perspective the knowledge generated by several authors to synthesize their approaches and draw the guidelines for this new orientation that is necessary and more respectful of human development. This article is a proposal for the basis of work on which the experts of different fields mentioned in the text will be able to continue the reflection and co-build this holistic framework with us. More than ever, we believe in the importance of this exercise to redefine humanism and education that truly places human beings in what they are, and is most fundamental and in the optimal conditions for them to succeed.

Keywords: human being, human development, social dimension, Bronfenbrenner, ecological model.

1. INTRODUCTION

1.1. The social development of human beings: A neglected and fragmented concept

At present, many school programs promote on paper the development of individuals in all their dimensions (Ministère de l'Éducation du Loisir et du Sport, 2004; Raveaud, 2006), and in particular their social dimension. Social interactions and citizenship seem to be the watchwords in this area. Although courses in civic education, history and citizenship education, among others, exist, these centres of interest take shape transversally in other disciplines. These concepts, widely used in school educational programs (France, England,

Spain, Quebec) thus have a status with sometimes diffuse outlines. "Rules, values and dominant principles of a given era of life in society" for some, "civism" and "living together" for others, the definitions given to these elements seem limited and incomplete.

In England, students' social development has a slightly more precise definition: it must enable students to "understand the rights and responsibilities of belonging to families and communities (local, national, global), working with others for the common good, show a sense of belonging and willingness to participate, actively contribute to the democratic process in their home communities" (Raveaud, 2006).

The school prides itself on being the propitious place within which the processes enabling the development of the different dimensions of human beings are applied, including the social dimension. However, the latter and its foundations do not seem to be based on any consensus or synthesis of the most up-to-date knowledge at the time of writing.

1.2. The social development of human beings - An exploded concept

Beyond the school environment alone, a lot of information can be found about the social development of human beings in various fields of research. From the processes of "socialization" and "citizenship" to "interactional behaviors," the human sciences have given themselves words and expressions that emphasize, depending on the point of view, the presence of this social dimension. Researchers in sociology, psychology, philosophy and others have worked, on the one hand, to make this concept intelligible and, on the other hand, to develop means to initiate the developmental process that underlies this dimension of human beings.

If no synthesis seems to make it possible to transcend the research discipline or disciplines, a statement is still to be made; research in this area considers the importance of the social environment and the mechanisms involved in the interactions between humans and their environment. Depending on the point of view taken, the description of the environment - or even of the social universe - sometimes seems restrictive or, conversely, extremely vast. What are the main structural, conceptual and dynamic aspects that underlie the social universe of the person in a democratic society? What are the dynamics involved in the construction of its social dimension? The goal here is to propose a first division of this social universe in social contexts gravitating around the human being and participate dynamically in its development, and particularly in its social dimension.

1.3. Human beings in relation: At the heart of the system

It also seems important to clarify what the expression person in relation or human being in relation can mean. This work focuses on the social dimension of human beings, placing them at the centre of a reference system: the ontosystem. Parmentier gives this definition of the person: "to be thinking, reasonable, capable of reflection and to consider oneself as a thinking being in different times and places" (Parmentier, 2002, p.39). Therefore, the present research takes for reference any being who is part of the process of thinking about the world in which he lives, as well as his history and his future, and to think in this world.

This human being is able to endorse a number of statutes, including that of worker or citizen, which O'shea (2003) defines as "a person who has skills related to understanding and knowledge related to a given society and culture, but also skills that relate to living well with the family and in the local environment." (p.7). Therefore, it is not limited to one or the other of these statutes, but uses the associated skills according to the context in which it is located and the will that animates it. To achieve these statuses, the human being is characterized by a set of functional structures. The external characteristic peculiar to our reference must be related to a modern democratic environment since such a regime helps to construct the "social

being" (Huchon, 2002). In this context of democratic application, the person possessing the internal characteristics related to the affective, cognitive and behavioural structures necessary for the proper functioning of each of the systems that result from it could be able to develop its social dimension in the best possible way. Recall, in this respect, that research in psychology and social psychology, in particular, has demonstrated that social competence was directly derived from "the ability to integrate emotional, cognitive and behavioral elements" (Consortium on the School-based Promotion of Social Competence, 1994).

1.4. Aims of this research

The purpose of this chapter is to lay the foundation for the building blocks of the social development of human beings in a contemporary democratic society; more broadly, it focuses on the dynamic development of educational programs aimed at the overall development of human beings, in all their complexity. It follows the article by Gadais, Rioux, & Boileau (2019) that lays the foundations for an ambitious project to put forward "the theoretical and multidimensional foundations for the implementation of a holistic curriculum." The curriculum becomes the possible general framework for equitable, inclusive and quality education for all. Therefore, this article proposes a foundation on which could be anchored programs of social development of human beings, whatever its age, its degree of maturity, its environment and context of life, its culture, its history.

More specifically, this study aims to produce a first synthesis of current knowledge on the social dimension of human beings through the construction of an integrative model of the different concepts put forward by the works of the authors from antiquity to the present day.

2. METHODS

The realization of this work was orchestrated in four steps (Dupuy, 2010): 1) review of key authors of the Western tradition; 2) systematic review of contemporary authors; 3) organization and data collection; and 4) categorization data analysis. While the emergence of different social contexts was the result of cross-readings by ancient authors belonging to a Western literary tradition and more contemporary researchers, their arrangement was made, among other things, around the conceptions of Bronfenbrenner's ecological approach (1979); an approach widely used in developmental psychology syntheses (Bee & Boyd, 2003; Berger, 2000; Papalia & Olds, 1989). Research protocol has been described in details within others studies (Dupuy, 2010; Dupuy, Boileau, & Gadais, 2019).

3. RESULTS

3.1. Interpersonal relationships: Heart of the social dimension

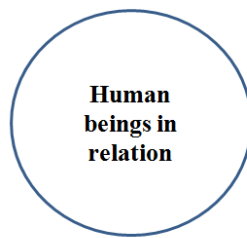
Human beings, which we have voluntarily placed at the centre of our model (Figure 1), are characterized by the cognitive, affective and behavioral profile peculiar to each. They can optimally develop their social dimension through these systems and the use it makes of them. This development is inevitably made in direct or indirect contact with the other elements of their social universe that we develop later in this text. In sum, the social development of the person begins here.

By respecting what Comte-Sponville (1995) calls "the codes of social life," the person practises healthy relationships with others and thus maintains the functional framework of interpersonal relationships. Comte-Sponville introduces the notion of the virtue of man in these terms: "it is what makes him human, or rather it is the specific power he has to assert

his own excellence, that is, to say [...] his humanity. [...] Virtue is a way of being, Aristotle explained, but acquired and sustainable: it is what we are (therefore what we can do), because we have become it" (Comte-Sponville, 1995).

It seems relevant to address the importance of communication associated with interpersonal relationships. We want to emphasize its scope within relationships (that the person weaves daily with others) and this, regardless of the degree of intimacy that characterizes them. Indeed, this topic is widely used in many studies that deal with social skills (McHugh, 1995; Rinn & Markle, 1979; Royer, 1982). Talking about oneself, accepting a compliment, recognizing and expressing one's feelings or solving an interpersonal problem are all elements of these studies that testify to the importance of communication within interpersonal relationships. This communication-related social skill, which refers both to expressing personal opinions or feelings and to receiving and understanding those of others, provides the guarantee of a "profitable social life" (Royer, 1982).

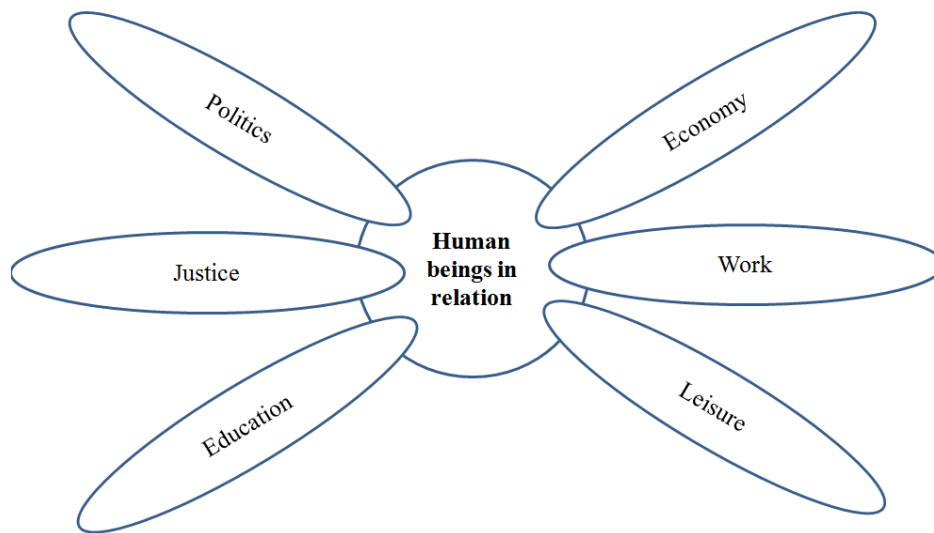
*Figure 1.
Towards the development of social dimension of the human being
in democratic society- The basis of the model.*



3.2. The six poles of interaction of the social dimension of the human being

The six poles education, leisure, work, economics, politics and justice are seen as building blocks of the social development of the human being (Figure 2). The six poles that the person will face more or less directly during his life have been treated separately, they are not however the result of a strict delimitation in our understanding but more holistic and dynamic approach.

Figure 2.
Towards the development of social dimension of the human being in democratic society- The identification of the main interaction poles.



3.2.1. Pole of education

Education is based both on an institutional and non-institutional contingent, formal, informal and even non-formal, and is thought throughout the life of the human being: "training, [...] education cannot be completed after school and professional studies, that it is marked irreducibly by incompleteness" (Colin & Le Grand, 2008, p.1). It aims in a more or less conscious way the development of one or more dimensions of the person, the formation of oneself through learning (i.e., academic, psychomotor, books), updating of school skills, professional or simply personal. Education is considered as a preponderant element, not only to the development of the human being, and its social aspect, as mentioned above, but also as an essential factor of good living. Rousseau testifies to education as bringing the person not only to "live" in a functional way in any society whatsoever, but to live "happy" (Rousseau, 1762). Education makes it possible to develop, on the one hand, the consideration of the citizen towards his colleagues and, on the other hand, the privileged contact, which is possible for him to maintain with the institutions (in the most general sense of the word) of the company to which he belongs.

3.2.2. Pole of leisure

Leisure is perceived not as a necessity induced by our inability to work constantly (Durkheim, 1925). Free time is defined here, outside the boundaries of work and training, daily activities, personal and social obligations, and any activity of pure rest where only the action of doing nothing is sought. Foundations of access to leisure are rooted in the Declaration of Human Rights. Recalling that every human being has the right to rest and leisure, Dumazedier reminds us that society, as well as human beings, evolve constantly and often at a great speed and that, as a result, the leisure activity "allows to freely develop the skills acquired at school, but constantly overwhelmed by the continuous and complex evolution of society" (Dumazedier, 1962).

3.2.3. Pole of work

The concept of work can be perceived in different forms. The first, and the oldest, is the one that associates it with an activity that "mobilizes pain, effort, in a word work," (Deleule, 2001). The second, supported by Marx, among others, emphasizes, not on painful and harassing activity, but on developmental virtues. He also puts it forward in his analysis of the German theoretician: "Through work and the transformations it brings to the natural and social environment, man creates himself and creates the world" (Lê, 1991, p.43). The more contemporary conception of work is largely influenced by the gains, other than that of the final product, to which the worker has access. Participating in this system represents a social commitment, and allows everyone to live enjoying the fruits of everyone's work.

3.2.4. Pole of economy

The mechanisms that come into play in the field of economics have undergone significant changes over the ages. The pole of the economy can be defined at present in its simplest form as that of "the production, the distribution and the circulation of wealth" (Dictionnaire d'économie et de sciences sociales, 2006) and, therefore, as a system that affects all citizens of a society and societies in general. Through the distribution and circulation of goods, the economy participates in providing for the primary needs of the members of society, an exchange that is a prerequisite to social life. From housing to food and clothing, goods circulate and help to ensure the livelihoods of people.

3.2.5. Pole of politics

The political pole describes a time and a place in which human beings must take part in the management of the society in which he evolves since "without political participation of the citizen democratic institutions are only skeleton" (Dubois, 2003). Participating in the establishment and, above all, updating this general way of conceiving the functioning of society gives the citizen political power. This power can be expressed in various forms: from thought to action, from awareness to dissemination, among others. The general framework in which we think of this type of power is that of democracy. The choice to refer to this type of regime represents, in our view and at the moment, the societal framework most suitable for every human being anxious to develop its social dimension by the favorable conditions it offers.

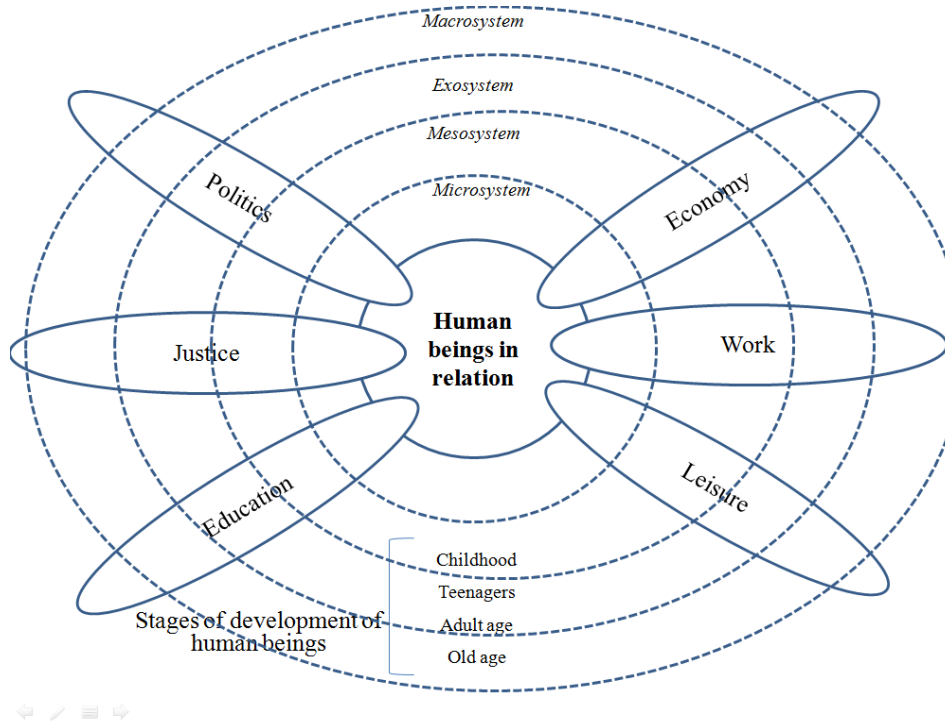
3.2.6. Pole of justice

Justice cluster offers the space for the elaboration of legislation, the framework of application legal acts and, finally, the place of interpretation and respect for these laws. The latter are of major importance because they represent the rights and thus necessarily the duties of all entities present in society: natural persons, legal entities, joint ventures and others. Whether described as civil, natural, moral or legal, these laws are designed to respect, in a democratic regime, respect for human dignity, private property and social participation. Laws are tested in the functioning and development of the different entities present in society, but also in the relations they can maintain between them and, therefore, in the consequences that underlie them. Thus laws can be interpreted, modified and adjusted in these contexts in order to preserve a space favorable to the optimal development of the person, whether they intervene directly or not on the latter.

3.3. Anchoring the ecological approach of Bronfenbrenner

The constitutive elements of our research emergent categories of our readings crystallized from contemporary authors and took shape within a dynamic structure: Bronfenbrenner's ecological approach (1979). This conceptual framework makes it possible to arrange the elements related to the development of the person, as much as to reveal the links and the reciprocal influences (Figure 3). The ecological environment to which Bronfenbrenner refers is detailed in four systems: microsystem, mesosystem, exosystem and macrosystem. These systems make it possible to consider a way of structuring the various social contexts in which the developing person lives the ontosystem both in their content and in the links that unite them. 1) Microsystem: "is a dynamic of activities, roles and interpersonal relationships experienced by the developing person in a setting with particular physical and material characteristics" (Bronfenbrenner, 1979, p. 22). 2) Mesosystem: is the "set of [links] and processes that take place between two or more microsystems" (Bronfenbrenner, 1977, p.515). 3) Exosystem: is the "place or context in which the individual is not directly involved, but which nevertheless influences his life" (Bronfenbrenner, 1977, p. 515). 4) Macrosystem: is the set of "contexts of development [...] composed of traditions, values, beliefs of society" (Berger, 2000, p.5). Also, 5) Bronfenbrenner talks about an additional system in his model, the chronosystem, linked to the passage of time. All these systems, linked to the environment or the individual, are the object of reciprocal interactions that influence the development of the person: "Development is the result of continual and reciprocal interactions between the individual organism and its environment" (Bronfenbrenner, 1979).

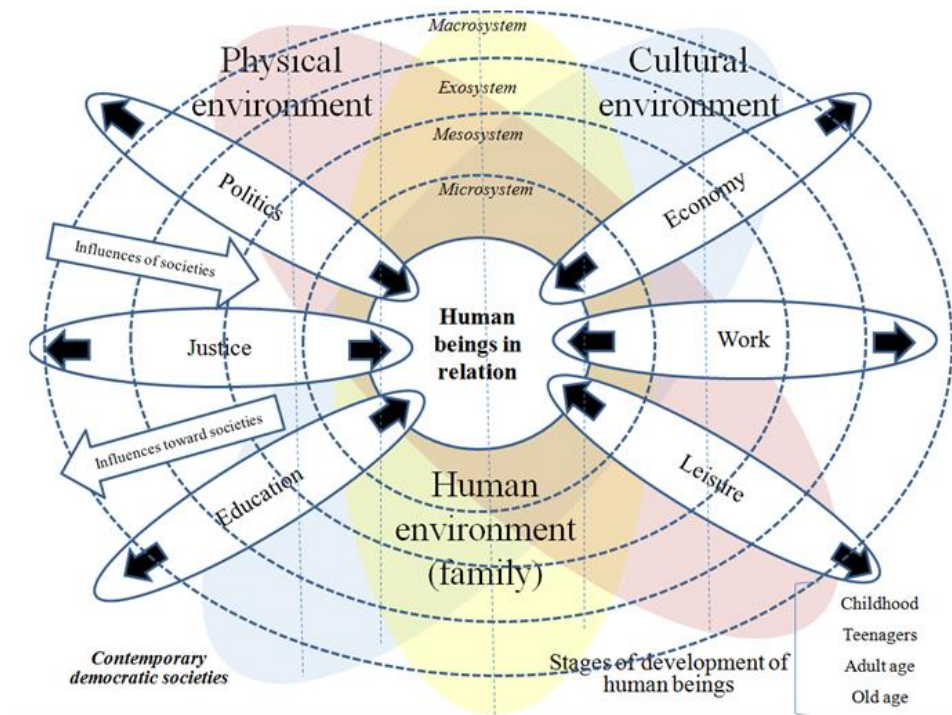
*Figure 3.
Towards the development of social dimension of the human being
in democratic society- Bronfenbrenner's ecological environment.*



3.4. Environments: Permanence and transversality within the social dimension of human beings

The work of modeling the concepts of the social dimension of human beings leads us to relate them to different environments immanent to any society (Figure 4). These become the spaces of unavoidable experimentation in which the individual will develop his social dimension in contact with the specific elements of these environments.

Figure 4.
Towards the development of social dimension of the human being
in democratic society- The model and its dynamics.



3.4.1. A human environment: The family

Whether it is part of a religious or secular, monarchical or democratic context, the family seems to be a cornerstone of establishing the foundations of these contextual dynamics. Whatever the period of history in which the family system developed, it was always used as a place of vectorization of the dominant values of contemporary societies, their customs and traditions. In addition, the dynamics between the different actors of the family tend to be transformed. Godard also tells us that by "introducing the idea of the relationship between generations we go beyond the somewhat mechanistic model of transmission, understood as a continuous flow of goods, values or knowledge going one way from the oldest to the youngest, donors to recipients and introduce the dynamics of historical relationships between generations" (Godard, 1992, p. 89). In other words, within the family system, each member can exert influence on others by way of apprehending their history, to live their contemporaneity and to project themselves into the future.

3.4.2. A physical environment: Natural and artificial

The presence of a physical environment is essential to the human being at all times and in all places. Therefore, this context accompanies the individual throughout his life and spreads in other social contexts. To consider the physical environment is to conceive of contexts of a natural order; that is to say, which do not belong to what the human being could have built, but also of an artificial order to say what he could build, transform, shape. The physical environment is, first and foremost, an indisputable base for the survival of human beings. The primary functions of our organization are largely ensured through the resources of our environment: air quality, water quality, access to food, etc. Moreover, and beyond survival, the well-being of human beings also depends on it. In the social development grid, the physical environment must be considered as a major element for which the person should be able to recognize his responsibilities, the actions that he can take, as well as the rights he has to his respect.

3.4.3. A cultural environment

UNESCO has drafted a definition of culture and thus considers it, "in its broadest sense, as the set of distinctive, spiritual and material, intellectual and emotional traits that characterize a society or social group. It includes, besides the arts and letters, lifestyles, the fundamental rights of the human being, value systems, traditions and beliefs" (Stanley, 2006, p. 13). In this research, the importance is given to a culture in motion in which the elements form a "complex and interactive" whole (Stanley) that gives it a permanent development. Moreover, what confers this movement on the cultural environment is, in addition to a so-called general, dominant or dominant culture, the minor cultures that are also called subcultures (Bernier & Laflamme, 1994).

4. DISCUSSION

This model of social dimension of the human being describes the elements that emerged from our research, and their interrelationships, taking up the dynamics of Bronfenbrenner's ecological approach: A) In the centre of the figure is placed "the human being in relation" so as to recall that the anchor point of this research is the human being with its affective, cognitive and behavioural characteristics, that the latter is in relation with a social universe, both personal and shared with others, ultimately bringing together personal relationships, poles and social environments. Therefore, this "human being in relation" is, first and foremost, in a more or less direct way, with the other people they meet, whom they meet, or simply knows they exist. B) The human being evolves within a particular social universe and permanent and transversal environments. These three environments family, physical and cultural unfold in one form or another in the daily life of the individual from the first to the last moments of their existence. They offer permanence within the microsystem of human beings, in a more or less marked way, and diffuse through the other elements. C) Second category includes the six petals: education, leisure, work, the economy, politics and justice. They unfold from the microsystem (the person in relation) to the macrosystem of the human being that is translated by the contemporary democratic society in which they evolve. All the poles are, in turn, under the influence of others and are reorganized according to the changes taking place within each of them, but also, on a larger scale, in society in general, or even in external companies. D) At the ends of each petal, we find concentric dashed circles that represent the other characteristics of Bronfenbrenner's ecological approach and that conceptualize the dynamic relationship between the person and their environment to contribute to their development. These systems thus cut across each pole and each

environment, and indicate, in each of them, that the human being is more or less directly interacting with their constituent elements. E) Straight vertical dashed lines represent the broadening of knowledge, skills, abilities, motivations and others that evolve with the individual's stages of development. F) Finally, if this model is realized under the guise of a contemporary democratic society, it remains nonetheless that it is also influenced by other societies. The white arrows pointing inward and outward of society once again show the dynamics of exchanges between societies in general and between the different elements that compose them in particular.

The main limitation of this research lies in the model itself that we propose, and comes in three aspects. First, the model is open; that is, it can and should be subject to change. This characteristic is peculiar to the inductive methodology of Grounded theory (Glaser & Strauss, 1967) who considers that the model thus created must always be perceived as a developing entity and not as a perfect, finished product. Secondly, the historico-cultural study of the human being and Western societies was, at first, limited to a certain number of authors and works consulted. Therefore, the list developed is not exhaustive and the summary tables of the authors and their thoughts is a tool that allows one to mark out a continuation of this work by specialists from each scientific field in order to synthesize knowledge and to offer a complex, up-to-date understanding of human beings and the elements that lead to their optimal development. Therefore, it would be interesting to enrich certain notions through the study of authors we have not selected or vis-à-vis texts that we have not read to build this basic model of the social dimension of human beings. It should also be noted that if the wish here was to raise recurring concerns among the ancient authors when they touched on issues related to citizenship, the virtuous man or the social aspect of the person, by, for example, some researchers met during the selection phase of thinkers took a cautious look at the mechanism of our research. Indeed, they argued that thinkers took positions in particular times and contexts, and in most cases were far removed from current societal, technological, scientific and cultural characteristics, among others. Thirdly, another aspect of the research boundary is that human beings and the societies in which they evolve are in constant transformation, a model of the development of their social dimension must accompany them in their emancipation. As interesting as this model is of social development that we are currently proposing, it will not be less lacunary, or even partially wrong, in the near future.

5. CONCLUSION

The construction of this model responded to the desire to collect and synthesize the largest number of constitutive elements about the social dimension of human beings, a construction site still too fragmented. If several studies are interested in the process of socialization of individuals to make them "functional citizens," little interest in circumscribing all the constitutive elements of the social dimension from a developmental perspective of the person to tend, deliberately towards higher levels of humanity.

This chapter has also clarified the concept of social development of human beings. Indeed, the term "social dimension" refers on the one hand to the reality of the daily interpersonal relationships of the person perceived as a unique universe to each within the six dominant poles identified and the three permanent transversal environments. On the other hand, the social dimension calls for another reality that is no longer based simply on contextual or conceptual elements, but on their dynamic relationships that contribute to the development of the person, relations between these elements, but also with the person itself. This ambitious research project has become more than necessary as several authors have shown (Fortin, 2007; Legendre, 2002; Marcotte, 2015; Morin, 2000, 2011). Not only must

the characteristics of the human being be studied and articulated together, but more than that, they must target the improvement of human development to truly take a step closer to a more humanizing education that goes beyond the instruction. A future step would be to make this tool applicable to the reading of the current reality and this, in several contemporary social contexts. Humbly, we are now inviting other specialists in the social dimension of human beings and related themes or issues to pursue, revisit and enrich this work so that it can achieve the ambition it sets for itself. The path is still long, but if the human efforts meet around a clear target and are well oriented, the march will be faster.

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Chapter #2

CREATING CONTEMPORARY PICTURE SHORT STORIES USING INTERTEXTUAL HEROES AND PLOT SUBVERSION **An empirical research**

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ABSTRACT

The objective of the present research is to explore the extent to which preschoolers are able to recognize intertextual connections and schemata and build upon them by subverting the plot of classic tales. According to previous findings, children in preschool age are able to acknowledge familiar plots and reproduce the basic narrative structure using pictures as a source. Providing that during preschool age, narrative skill establishes the grounds for narrative comprehension and literacy emergence, it is highly important to examine the potential of the narrative skill. For the purposes of this empirical research, a teaching intervention is conducted with a sample composed of preschoolers from two public Greek kindergartens. The preschoolers' performance is evaluated through context analysis. The interpretation of expression patterns identified in preschoolers' produced narrative speech shows that they are able to introduce familiar fairytale characters into their posterior narratives attributing to them distinctive roles. Furthermore, they are able not only to distinguish fairytale patterns, but also to subvert them by narrating a different sequence of events. The present research contributes to the discussion regarding the extent to which narrative skill could be developed during early childhood. Based on the results, narrative skill can be enriched through the combined use of intertextual connections and patterns subversion.

Keywords: picture short story, intertextual hero, plot subversion, teaching intervention, empirical research, early childhood education.

1. INTRODUCTION

During preschool age, narrative skill plays a fundamental role in the evolution of the self while it establishes the grounds for narrative comprehension and literacy emergence (Whitehead, 2010). The development of narrative skill leads children's informal, verbal interactions to formally structured written communication patterns (Gamble & Yates, 2008). It is a fact nowadays that the child's ability to acknowledge specific narrative structures and to finally recognize the terms and conditions of reading them, has become one of the objectives in the recent field studies. To what extent the potential of the narrative skill can be developed in early age is a question of substantial importance. Thus, this research aims to explore the extent to which particular narrative elements can be used in combinatorial synthesis in narrative speech in order to produce contemporary narratives. Subsequently, this paper discusses whether the differentiation in narrative speech after the use of combined narrative elements leads to a notable development of narrative skill.

2. LITERATURE REVIEW

2.1. Preschoolers as narrators

Oral narratives (storytelling, story retelling, story generation) are an essential part of the academic and social interactions of school-aged children (Crais & Lorch, 1994). Studies have suggested that retelling significantly improves children's story comprehension, remembering of story information, sense of story structure, and oral language complexity (John, Lui, & Tannock, 2003; Gambrell, Koskinen, & Kapinus, 1991; Morrow 1985). Direct teaching of the story parts can improve not only children's understanding of the language arts, but especially their readiness for reading. Therefore, incorporating the storytelling and retelling process into the kindergarten schedule is a practical as well as developmentally appropriate means so as several academic subjects to be taught and skills to be mastered at this beginning level (George-Remy, 1991).

Children are narrators by nature. Although most people develop their ability to narrate through apprenticeship in their everyday life, its communicable value is noticeable by educational research. Narration has been considered as a primitive educational medium, not only in language lessons but in other subjects as well (Stadler & Ward, 2005). When the narrator is a child, some issues are examined differently. Children need something to trigger their interest and motivate them to create their own stories. Specifically in kindergarten, there are several ways of facilitating story fabrication by children: by posing hypothetical questions, by using images as a guide, by distortion of words which can transform them into productive initiation points of a story, by altering the content of existing, well known stories or by simply adding an "afterwards" part to them, by improvising a story with no title. The aforementioned approaches mainly aim at enhancing children's imagination and trigger the story creation process by providing an initial point for the story plot and/or one or more initial characters. It is a fact that children at this age are often not able to write, but they are able to create stories on their own (Papanikolaou & Tsilimeni, 1992).

2.2. The type of contemporary picture short story

One of the most recent studies (Kalaitzi, 2018) identifies contemporary picture short story as a literary type which includes the fairytale narrative framing, the narrative basic structure, intertextual characters, subversion of the fairytale plot and picture-text interaction. The short length and the dyadic mode of this type, which transfers the meaning through both the image and the narration, not only meets the needs and the level of competency of early stages, but it could also enable its comprehension and reproduction by preschoolers.

2.3. Relevant research

2.3.1. Previous research on the generation of narratives in early stages

According to several studies (John et al., 2003; Morrow, 1985; Stein & Glenn, 1979; Applebee, 1978/1973) changes emerge in the child's personal narrative voice. Five-year-olds tell temporally organized stories, and knowledge of narrative structure begins to emerge at this age. Children from ages four to six tend to include beginnings, settings, and outcomes in their stories; and, between the ages of six and eleven years, children's reporting of internal responses of the characters improves. Tompkins, Guo, and Justice (2012) examined the relationship between inference making while narrating a wordless book and story comprehension of a storybook in four to five-year olds. The results show that children make three types of inferences, which are significantly related to story comprehension -characters goals, actions that achieved those goals, and character states. Another recent research

conducted by Silva, Strassser, and Cain (2014) in preschoolers showed that questions based on the wordless picturebook can scaffold the production of more coherent narratives at that stage.

In Sipe's (2001) study conducted in first- and second-grade classroom of twenty children in an urban elementary school in a large eastern city, students responded to readalouds of variants (constituting a text set) of a classic tale. Seven types of intertextual connections were identified: children express personal familiarity with the text or textual features (recognition) and they personalize the story, projecting personal experience(s) onto the story (empathy/personal critique). They, also, connect the language of one text with the language of another text (language) as well as plot details, characters, etc. of one text to those of another -using these connections to make predictions (story). They connect illustration(s) of one text with illustration(s) from another (illustrations), texts within a genre ("They all...") and they suggest alternative plots, based on an understanding of a particular genre, or express preferences (alternatives/ preferences). Based on the findings, Sipe suggested a theoretical model regarding/referring to young children's schema building for traditional stories. According to that, children build story schemata in the following ways: (a) by personalizing the story, recognizing their familiarity with it, expressing empathy for the story characters, or inserting their own opinions based on their life experiences, (b) by making connections to other stories (and other discrete arrays of signs) and/or between illustrations and other visual features -in picturebooks-, at the level of the specific language of the story and the plot sequence, (c) by analyzing the story, understanding the function of characters, the plot sequence, the setting, and the other narrative elements by "close reading".

2.3.2. The current research case

A question of whether preschoolers are able to recognize intertextual connections and schemata and build upon them by subverting the plot of classic tales is explored in this particular research. Taking into account the previous studies presented above, it is preschoolers who are able to acknowledge familiar plots and reproduce the basic narrative structure using pictures as a source, and it is first graders who make intertextual connections among texts and among pictures, recognize schemata or patterns and are able to suggest alternative plots. Given that, there is no study undertaken showing that preschoolers are able to make intertextual connections and schema/plot subversions in their own produced variants of tales. Therefore the questions of this particular research are (1) whether preschoolers are able to use characters from earlier texts in their own narratives, (2) whether they are able to subvert the plot sequence and (3) to what extent they are able to combine the two narrative elements of intertextual hero and plot subversion to produce their own tale variants suited to the type of picture short story.

3. METHODOLOGY

3.1. Research approach and sampling

The particular empirical research included the observation of the population sample during their participation in a teaching intervention conducted within a six month period. Two Greek public kindergartens were selected for sampling on the basis of social equivalence and cultural parity (Malec, Stagg-Peterson, & Elshereif, 2017; Nasir, Naqvi, & Bhamani, 2013). The sample consisted of thirty four preschoolers of typical development, between the age of five and six and a half years old, since at this age their narrative skill is developed radically into distinctive developmental stages enabling the comprehension and generation of specific structural and morphological narrative elements (Morrow, 1985; Stein & Glenn, 1979; Applebee, 1978/1973).

3.2. Data collection tool

Focus group was chosen as a data collection tool. Preschoolers were divided into small groups of three or four members and produced narrative speech while interacting with each other. Focus groups enabled the interplay among children, the constructive influence and the exchange of prior knowledge and experience concerning familiar fairytale characters and patterns. Focus group methodology enabled a better observation of the process of narrative production in action. Each group's narratives were recorded and transcribed by the researcher (Wilkinson, 1998).

3.3. Teaching intervention

The intervention, which was designed especially for the purposes of the present research, was based on the objectives of the Greek New Curriculum (Institute of Educational Policy, 2014), concerning the learning area of language, which sets as goal – among others- the oral production of stories. The design and the order of the activities' implementation was based on the principles of constructivism applied in Early Childhood Curriculum, which attributes a fundamental role to active, constructive and playful learning (DeVries, Zan, Hildebrandt, Edmiaston, & Sales, 2002). Preschoolers participated either in pairs or in groups in fairytale board games, story puzzles and plot cubes games, all of which formed activities repeated as many times as needed in order for every preschooler to produce narrative speech. All students build on their prior knowledge which included the identification and reproduction of the narrative basic structure (Silva et al., 2014; Morrow, 1985; Stein & Glenn, 1979; Applebee, 1978/1973). Given that, the first phase of the program, aiming at the comprehension and use of the intertextual hero, included four activities in which preschoolers tried to discern the different roles of fairytale characters, to identify intertextual heroes in fairytales, to introduce fairytale characters into different stories, and to retell basic fairytale structures including intertextual heroes. After preschoolers had comprehended and used intertextual characters into familiar tales, the second phase followed, aiming at the comprehension and use of the plot subversion caused by the introduction of a new character. Likewise, it also included four activities in which preschoolers tried to distinguish a fairytale pattern/schema, to identify reversals of the good and the villain character, to subvert the fairytale pattern/schema, and to reverse both the characters' action and the chronological sequence of events. In Table 1, the title and a short description of each activity are presented.

3.4. Context analysis of preschoolers' narrative speech

Preschoolers' performance was evaluated through context analysis of their narrative speech, on the basis that this qualitative approach treats data as representations of text, image, expression, subject or rhetorical patterns created to be identified, analyzed and interpreted by the researcher's personal judgment (Huckin, 2004). Specific expression patterns (Tables 1, 2 & 3) were set before the implementation of the intervention in order to form the data for identification, analysis and interpretation by the researcher. In particular, the clear and concise reference to a familiar fairytale character -introduced to a posterior narrative adopting the discrete role of either *deus ex machina* or the villain- was identified as the narrative element of the intertextual hero. Similarly, the reversal of the familiar patterns of classic fairytales was identified as the narrative element of the plot subversion under the condition that the change of pattern leads to the subversion of the plot. The last expression pattern set was about the reference of a familiar fairytale character whose introduction causes a new sequence of events. This was identified as the combined use of both narrative elements.

All data collected were interpreted as representations of text and image and the above expression patterns were analyzed as indicators of the narrative elements of the intertextual hero and the plot subversion detected in both the picture created and the text produced. Preschoolers' narrative speech that was produced during the intervention was audiotaped and transcribed. For the purposes of this article a small token of the narrative speech transcripts was translated and adapted from Greek to English language by the researcher. Both the examples of narrative speech and the identified expression patterns are included in Tables 1-3.

*Table 1.
Expression patterns of the Intertextual Hero narrative element identified in preschoolers' narrative speech during the teaching intervention.*


Narrative	Expression pattern	Activity Description	Example of narrative speech	Expression pattern identified
		<p>DEUS EX MACHINA VS VILLAIN: Preschoolers categorize into a dashboard images of fairytale characters in the roles of deus ex machina and the villain.</p>	<p style="text-align: center;"><i>Transcription 1</i></p> 	<p>Familiar fairytale character 1: Lord Duloc from <i>“Shrek”</i>, by William Steig</p>
		<p>WHERE HAVE THE FAIRYTALE HEROES GONE?: Preschoolers distinguish fairytale deus ex machina and villains in contemporary stories.</p>		<p>Familiar fairytale character 2: Mother Goat from <i>“The Wolf and the Seven Young Goats”</i>, by Brothers Grimm</p>
	<p>Attributing a relative role to the new character</p>	<p>THE KINGDOM OF THE GOOD WIZARD: In the board game "The Kingdom of the Good Wizard"-which contains hidden villains figures in its paths- every time the Good Wizard meets a villain he subverts their action and the new ending of the fairytale has to be narrated by the preschoolers.</p>		<p>Attribution of a relative role to fairytale character 1: “Lord Duloc came and grabbed the ball from the princess.”</p>
		<p>FAIRYTALE-COLLAGE: Preschoolers add fairytale figures to photocopied pages of fairy tales and they narrate the new story that emerges from the introduction of the intertextual heroes, which play either the role of deus ex machina or the villain.</p>		<p>Attribution of a relative role to fairytale character 2: “Mother Goat who was nearby came to help. She bit Lord Duloc and he gave the ball back to the frog.”</p>

Table 2.
Expression patterns of the Plot Subversion narrative element identified in preschoolers' narrative speech during the teaching intervention.

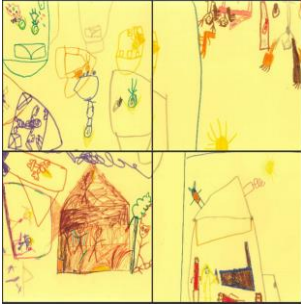

Narrative element	Expression pattern	Activity Description	Example of narrative speech	Expression pattern identified
Plot Subversion	Reversal of the fairytale pattern	<p>MAGIC THREES: Preschoolers distinguish the pattern of threes through the text set of the classic "Goldilocks and the three bears" fairytale and the contemporary variant "Goldilocks and just one bear".</p> <p>THE GOOD AND THE BAD: Preschoolers distinguish the pattern of the good and the bad hero through the text set of the classic "Red Riding Hood" fairytale and the contemporary variant "The true story of Little Red Riding hood!".</p>	<p style="text-align: center;"><i>Transcription 2</i></p>  <p>“... In the Bears house Goldilocks decided to play with the colors because she liked painting. She painted the floor and the walls and the roof. Then she painted her shoes and her clothes and her socks. In the end she paint her face, her nose and her hair. When the three Bears returned to their house they slipped into the water colors that Goldilocks had forgotten to pick up from the floor. And then because Goldilocks left footprints all over the place with her colored shoes the Bears found her hiding. And when the three Bears saw Goldilocks' painted face and nose and hair they got scared and they ran away from their little house so Goldilocks stayed there forever.”</p>	<p>Reversal of the pattern of threes: “<i>She painted the floor and the walls and the roof. Then she painted her shoes and her clothes and her socks. In the end she paint her face, her nose and her hair.</i>”</p> <p>Subversion of the sequence of events: “<i>When the three Bears returned to their house they slipped into the water colors that Goldilocks had forgotten to pick up from the floor. And then because Goldilocks left footprints all over the place with her colored shoes the Bears found her hiding. And when the three Bears saw Goldilocks' painted face and nose and hair they got scared and they ran away from their little house so Goldilocks stayed there forever.</i>”</p>
	A subversion of the sequence of events	<p>PLAYING WITH MAGIC THREES: Preschoolers divided in groups change the pattern of threes in "Goldilocks and the three bears" and narrate the new sequence of events.</p> <p>LOOK WHO'S TALKING!: In the board game "Meet you at the Granny's house" -where four different starting points and paths end up at the Grandmother's house- preschoolers play with the four pawns of Red Riding Hood, the Wolf, Granny, and the Hunter, reaching the house each time in a different chronological order and narrating the new sequence of events based on the new characters' profile.</p>		

Table 3.

Expression patterns of the combined use of Intertextual Hero and Plot Subversion narrative elements identified in preschoolers' narrative speech during the teaching intervention.

Narrative element	Expression pattern	Activity Description	Example of narrative speech	Expression pattern identified
Combination of intertextual hero and plot subversion	Use of a familiar fairytale character whose introduction causes a new sequence of events	<p>PICTURE SHORT STORY BOARD: Preschoolers depict -both by text and illustration- the character, the scenery, the intertextual hero's introduction and the subversion of the fairytale's plot.</p>	<p style="text-align: center;">Transcription 3</p>  <p>“Once upon a time there was Red Riding Hood. She had moved to a big city where there were a lot of colorful houses. Every house had a different color but they all looked like each other. One day Red Riding Hood went to her Granny's house to bring her some soup. But she was lost in the big city and she couldn't find her way to the Granny's house because all houses look like each other. Then Pluto came to help her. He sniffed their way to the Granny's house but he also sniffed the Big Bad Wolf who was also inside the house. Pluto barked very loud and the Wolf got scared and he ran away without hurting the Granny. Red Riding Hood adopted Pluto to be her guide into the big city and she never lost her way to the Granny's house since then and they lived all together happily ever after in the colorful city.”</p>	<p>Introduction of a familiar character who causes a new sequence of events: “Then Pluto came to help her. He sniffed their way to the Granny's house but he also sniffed the Big Bad Wolf who was also inside the house. Pluto barked very loud and the Wolf got scared and he ran away without hurting the Granny. Red Riding Hood adopted Pluto to be her guide into the big city and she never lost her way to the Granny's house...”</p>

In Transcription 1 (Table 1), the expression pattern “reference to a familiar fairytale character” is identified. Preschoolers drew the Mother Goat and the Lord Duloc figures, cut them and glued them in the picture extracted from a familiar fairytale. Then, they reproduced the narrative basic structure of the “Frog King” maintaining the same narrative framing, while introducing in certain points of the plot the aforementioned characters in the text as well. There is a clear and concise reference to these two familiar fairytale characters by their names, and also a particular role attributed to them. Lord Duloc was introduced as the villain character, causing a problem to the protagonist, and Mother Goat was introduced as the deus ex machina character, helping the protagonist to find a solution to the problem. Preschoolers based on the profile of the intertextual characters assigned them with appropriate roles in the posterior narrative. Both references were interpreted as indicators of intertextual heroes.

In Transcription 2 (Table 2), the expression pattern “reversal of the fairytale pattern” is identified. After distinguishing the pattern of threes in "Goldilocks and the Three Bears" classic fairytale, preschoolers altered the context of this fairytale pattern. In their meta-narratives, they changed the protagonist's actions of sitting, eating and resting, with three different actions which caused totally different sequence of events. In the example of narrative speech, preschoolers depicted both in the picture and in the text all possible changes in the characters' action due to the new pattern of threes. What is worth noting is that the construction of the new pattern caused an alteration, not only to the plot but also to the production of a definitely different ending, the one that the three bears “*got scared and they ran away from their little house so Goldilocks stayed there forever*”. Both the change of pattern and the new sequence were interpreted as indicators of plot subversion.

In Transcription 3 (Table 3), the expression pattern “use of a familiar fairytale character whose introduction causes a new sequence of events” is identified. At this point, preschoolers constructed illustrated storyboards, depicting the character, the scenery and the plot and, then, they produced their own picture short stories by combining the intertextual hero and the plot subversion elements. In this last example of narrative speech, it is clearly shown that the intertextual hero's introduction, in this case Pluto, which acted as the *deus ex machina* helping Red Riding Hood with her problem, caused the subversion of the plot of the classic fairytale leading to a different sequence of events. Preschoolers illustrated their narratives in a way that the intertextual heroes' introduction and the new sequence of events were clearly depicted in the picture as well. What is, also, worth mentioning is that preschoolers produced narratives which are suited to the contemporary type of picture short story. The last transcription includes a fairytale narrative framing, a narrative basic structure, an introduction of an intertextual hero and a subversion of the “Red Riding Hood” familiar plot. The length is short and there is a clear interaction between the picture and the text, where the two modes share different kinds of information and they equally transfer the meaning of the story.

4. DISCUSSION AND CONCLUSION

4.1. Discussion of findings

Providing that during preschool age, narrative skill sets the grounds for narrative comprehension and literacy emergence, it is highly important to examine the potential of the narrative skill. Based on previous research, preschoolers are capable of acknowledging the narrative basic framing and structure and reproducing it (John et al., 2003; Morrow, 1985; Stein & Glenn, 1979; Applebee, 1978/1973). Especially when a picture/illustration is used as a guide, the retelling of the story can be considered more coherent and well-developed (Tompkins et al., 2012). The findings of the present research expand all previous findings and add to Sipe's (2001) findings that first and second graders are capable of intertextual connection in their produced narratives. According to preschoolers' narrative speech context analysis, it can be assumed that children in this early stage are also capable of borrowing elements from earlier texts in order to use them in their own posterior narratives. Produced narratives, in which identifiable expression patterns were interpreted as indicators of the under-consideration narrative elements, show a notable development in preschoolers' narrative speech. All illustrated narratives are framed with fairytale beginnings and endings, present a protagonist who has a problem, introduce intertextual heroes either to help them with the problem or to cause further problems, and they subvert a familiar fairytale plot (Kalaitzi, 2018). The results confirmed the initial hypotheses that (1) preschoolers are able to use characters from earlier texts in their own narratives, attributing a distinctive role to each one of them, (2) they are able to subvert the plot sequence, by attributing a new context

to fairytale patterns, and (3) they are able to combine the narrative elements of intertextual hero and plot subversion in order to produce their own narratives suited to the type of picture short story, depicting different but equally important information in picture and in text.

The constructivist approach of the curriculum was considered as an appropriate basis to build upon the intervention (DeVries et al., 2002). The implementation was based on the natural development of narrative speech through preschool age (Applebee, 1973). Children were urged to build on the existing knowledge of familiar fairytale contexts, a skill which presupposes the decoding and interpretation of the perception of the narrative structure, as well as the recognition of the archetypal patterns (John et al., 2003). They used the already known fairytale basic structures, they distinguished familiar fairytale characters into the roles of deus ex machina and the villain, they improvised alterations to familiar fairytale patterns, and subsequently, they produced their own illustrated variants of tales.

The effectiveness of focus group lies on the fact that this methodology enabled the observation of discussion and the narrative speech transcription (Wilkinson, 1998). The empirical observation presented in this particular research confirms the practicality of an intervention including specially designed activities which can be used by preschool educators in order to enable preschoolers' narrative speech enhancement.

4.2. Contribution of the current study and future research implications

It could be supported that the present research contributes to the discussion regarding the potential of narrative skill's development during early childhood. Based on the results of the present research, narrative speech can be enriched further than previous research has shown. The combined use of intertextual connections and patterns subversion sets a new level of competency concerning narrative skill at preschool stage.

Given that the teaching intervention was implemented for the purposes of the present research at preschool stage, a multi-level approach is recommended for future use in order to achieve a holistic evaluation of reliability. Specifically, apart from the evaluation of performance at preschool age (level 1), the exploration of teacher's experience and attitude towards the effectiveness of the intervention could be considered (level 2), whilst demographics of regions where the kindergartens located can be also included (level 3). With that multilevel analysis of nested data, the different levels (preschooler, teacher, kindergarten) will provide a more complete view due to multiple dimensions and criteria (Frenzel, Pekrun, & Goetz, 2007), providing that a consecutive implementation of the intervention in older stages could lead to assumptions regarding the development of narrative speech with regards to the use of combined narrative elements.

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Chapter #3

FRENCH IMMERSION TEACHER AND STUDENT PERCEPTIONS ABOUT LEARNING SCIENCE IN A SECOND LANGUAGE

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ABSTRACT

In Ontario, students enrolled in English language schools have the option to learn academic subjects in both French and English (French Immersion). In response to requests for instructional support from French Immersion (FI) Science teachers, representatives from the Council of Ontario Directors of Education approached Laurentian University researchers to embark on a project that would contribute to building the capacity of teachers who teach Science in French in the Junior and Intermediate grades (7-10). This study utilized a mixed methods approach to investigate teacher perceptions about teaching science to second language learners, their science efficacy beliefs, and students' engagement. A total of 37 grade 7-10 FI teachers and their respective 324 students participated in the study. Findings show that most teacher participants were generally confident about their knowledge of science, felt that they taught the subject effectively, and were continually striving to engage their students in science classes. However, these teachers faced unique challenges concerning limited language proficiency among students, and lack of suitable instructional resources. Student surveys show mixed results in terms of their self-efficacy and self-regulation, those with genuine interest in science, were more likely to be confident in their ability to succeed in FI science classes.

Keywords: French immersion, science education, teacher efficacy, teacher beliefs, student engagement.

1. INTRODUCTION

In Ontario, Canada, the vision for French Immersion (FI) education is grounded in the federal linguistic duality approach, which perceives knowledge of Canada's two official languages (French and English) as an important part of Canadian history as well as a notable asset in terms of student interaction and employability on an international spectrum (Ontario Ministry of Education, 2013). In keeping with the two official languages of Canada, the education system comprises of both English language schools and French language schools. Students from English speaking homes who wish to study French can enroll in French Immersion (FI) programs offered in the English schools. These programs differ in terms of the number of subjects or hours of the day, when students can learn in French or English (Cummins & Carson, 1997). The various subjects taught in French are the same as in the regular English stream, except that they learn in a second language for the mostly English-speaking students. According to Laplante (1997), students' limited proficiency in French constrains what they can learn in various subject areas. French Immersion teachers have the task of incorporating the content objectives as well as the second language objectives in each lesson. Turnbull, Cormier, and Bourque (2012) pointed to the challenges faced by FI teachers who teach complex subjects like science and math when students' language proficiency is limited. The challenges they noted include: a) school administrator and parental expectations that their children will cover the same

subject matter as students enrolled in regular English-medium programs; and b) classroom materials that have been developed for native speakers of French that tend to be too advanced for beginning language learners. It is for this reason that fewer FI schools in Ontario offer Science and Math in French.

French Immersion teachers in Ontario Canada have highlighted similar challenges, and the current study is an effort by the Ontario Ministry of Education to respond to FI science teachers' concerns. The larger project funded by the Ontario Ministry of Education utilized research to develop resources and offered professional development workshops for middle school FI teachers. This chapter presents findings from research on teacher perceptions about FI science teaching, their science efficacy beliefs, and students' engagement in FI science. The objectives of the study were to determine: a) the relationship between teachers' science efficacy beliefs and their perceptions about teaching the subject; and b) influence of students' perceptions about science on their engagement in FI classes.

2. LITERATURE REVIEW

Numerous studies suggest that teachers' specific subject beliefs tend to be compatible with their instructional strategies (Gallagher, 1991; Rowell & Gustafson, 1993). Teachers who believe that they can influence student learning by effective teaching, and are confident in their own teaching abilities are more likely to demonstrate better performance and outcomes than teachers who have lower expectations about their ability to influence student learning (Riggs & Enochs, 1990). According to Bandura (1995; 1997) self-efficacy beliefs influence how people think, act, feel, and motivate themselves in relation to all aspects of their lives. Although researchers agree that beliefs guide teaching behaviours and practices undertaken by teachers, Riggs and Enochs (1990) proposed outcome expectancy as a second component of self-efficacy. This refers to a teacher's belief about students being able to learn science given external factors such as family background, social economic status, or school. It is widely accepted that student intrinsic motivation and self-regulatory practices can influence their engagement and achievement (Velayutham, Aldridge & Fraser, 2011). It is therefore noteworthy to mention that both teachers' own beliefs and their students' motivation towards science learning have a considerable impact on learning outcomes. However, it is also important to consider the multiple roles that other factors such as language play in learning scientific concepts. Rivard, Cormier and Turnbull (2012) reported that many teachers often note that textbooks and pedagogical resources in science tend to be too difficult for French Immersion students and that, the curriculum is too overloaded to allow for the teaching of language arts concepts (reading and writing strategies) in content instruction of scientific concepts.

Modalities of teaching various content subjects in French Immersion have been widely researched (Turnbull, Cormier & Bourque, 2011). Some researchers believe that the incorporation of more language arts practices in science will help student comprehension and learning of these concepts (Cormier & Turnbull, 2009; Lyster, 2007). Additionally, researchers have particularly conducted studies that resulted in their validating certain successful approaches to enhance student learning in FI. Rivard et al. (2012), for example, present strategies that they have developed to create rich conversational spaces in FI Science classrooms. They propose that developing reading skills is crucial in science instruction, especially in FI classrooms. The four key concepts that support their rationale are the following: the nature of science, classroom realities, the immersion context, and creating discursive spaces. Laplante (1997) suggests that some teachers have successfully

utilized thematic teaching approaches, which merge science instruction to language arts concepts in the French Immersion classroom. This would include presenting content-based science concepts while utilizing approaches related to reading and writing instruction (ex. literature circles on a current event in science, etc.). Turnbull et al. (2011) further suggest that an experimental approach that integrates literacy into science instruction and learning is beneficial to helping students in a French Immersion setting to master scientific concepts.

Several studies have addressed different facets of science teaching and learning, and presented some important considerations for teachers. A multi-national study on the Relevance of Science Education (ROSE), found that students generally agree that science and technology are important for societal growth, and mostly understand that there are benefits to learning about science (Sjeborg & Schreiner, 2010). However, they also reported that some students find it difficult to be motivated to learn science because they feel that their classes do not present enough relevant and current events to link to concepts, do not allow sufficient opportunities for debate, and teach too many theoretical scientific concepts that require rote memorization. More importantly, some students feel that they do not possess the necessary cognitive skills to grasp science concepts. The researchers suggested solutions that engage students such as experiential learning outside the classroom and helping students see science as a way to solve problems rather than learning by heart (Agence Science-Press, 2007). Many science educators agree that engaging students with hands-on investigations is a great way to teach the subject. Teachers have reported that kids like hands-on science investigations, but they are not too interested in textbook learning (Pedretti, Bellomo, & Jagger, 2015). Researchers have come up with a long list of reasons why teachers of science do investigations with their students. For example motivating students, increasing interest and enjoyment, teaching inquiry skills, developing manipulative and fine motor skills, strengthening theoretical knowledge, teaching how scientific knowledge may be used in daily life, increasing creative thinking skills, nurturing scientific and higher order thinking skills, and developing communication skills (Hodson, 2008; Johnstone & Al-Shuaili, 2001; Reid & Shah, 2007; Wellington, 1998; Henser, 2005; Kur & Heitzmann, 2008).

3. METHODS

A mixed methods research design was utilized to gain a more in-depth understanding of the factors influencing teaching and learning of science in French Immersion classrooms in Ontario. Data were collected through telephone interviews with teachers, the Science Teaching Efficacy Belief Instrument (Riggs & Knoch, 1990), and the Student Adaptive Learning Engagement in Science Survey (Velayutham et. al., 2011). Both instruments are based on a 1-5 Likert scale rating (where 1= strongly disagree and 5= strongly agree). The participant recruitment process involved sending invitation letters to teachers in School Boards that offer French Immersion Science in grades 7-10 across Ontario. A total of 37 teachers were recruited, 30 grade 7-8 teachers, and 7 grade 9-10 teachers. The researchers scheduled a 20-25 minute telephone interview with each teacher at a time that was convenient for them. The interview questions gathered teacher biographical information as well as their perceptions about FI science teaching challenges, teaching strategies, and their own science knowledge. All the interviews were audio-recorded. The Teacher Efficacy Belief Instrument was administered in person when teachers attended professional development workshops that were offered as part of the project. The researchers then

visited the classrooms of 10 volunteer teacher participants to administer the Student Adaptive Learning Engagement in Science Survey. A total of 132 students completed the survey. Qualitative data analysis involved transcribing the telephone interviews verbatim. The researchers and research assistants read and re-read the transcripts to identify emerging themes. Quantitative data were analyzed using SPSS software to determine the variability in responses as well as to see relationships among the themes. A triangulation of the quantitative and qualitative data enabled the researchers to develop a richer understanding of the factors that may directly influence FI science teaching and learning.

4. FINDINGS

4.1. Science teacher efficacy beliefs

Findings from the Science Teacher Efficacy Beliefs Instrument (STEBI) show that the majority of participants generally felt confident about their own understanding of science (Table 1). However, a significant number of teachers did not feel confident about the abilities of their FI learners to design their own investigations. Teacher responses to most of the items on the STEBI had a low standard deviation ($SD < 1.0$), showing that in most cases the teachers generally shared similar beliefs about their FI science teaching practices. There were few questions that had outliers, showing diverse views as indicated by higher standard deviations ($SD > 1.0$). Table 1 below highlights the type of questions with outliers, these were grouped into 3 categories of teacher beliefs.

Table 1.
Teacher beliefs about their science knowledge and ability to affect student learning.

Teacher Beliefs	Questions (n=37)	Mean	SD
Teacher confidence about their own knowledge and teaching capability	<i>Question 5</i> - I know the steps necessary to teach science concepts effectively	3.59	1.05
	<i>Question 12</i> - I understand science concepts well enough to be effective in teaching elementary science	4.0	1.07
Teacher beliefs about their Impact on student learning	<i>Question 14</i> - The teacher is generally responsible for the achievement of students in science	3.05	1.05
Teacher beliefs about using science inquiry strategies	<i>Question 26</i> - When teaching science I let students design their own investigations and gather the evidence	3.41	1.05
	<i>Question 30</i> - When teaching Science I require my students to communicate and justify their explanations to the class	3.96	1.09

Responses to the questions shown in table 1 indicate that, although the majority of teachers show confidence about their science knowledge (mean of 4.0 and $SD > 1$), there are a few teachers on the margins who either strongly believe in their knowledge and practice, or lack confidence in their own knowledge and practice. Similarly, although a fair number of teachers were confident about their abilities to impact student learning (Mean 3.05 and $SD > 1$), there are a few teachers on the margins who either feel very confident in their teaching effectiveness, or feel that they are not able to effectively impact their students'

learning. Whereas some teachers felt confident about their students' abilities to design their own experiments, a few teachers either strongly believed, or did not believe in their students' inquiry abilities.

4.2. Teacher perceptions about FI science teaching

Data from teacher interviews show similar trends to the quantitative results, and it helped to provide an in-depth understanding of the trends observed. When asked if they feel they have enough knowledge to teach FI Science, most of the teachers said that they had enough knowledge. However, some teachers mentioned that they felt more comfortable teaching only some of the units, and that they needed support with resources that would help them to teach well, as highlighted by one of the teachers; *"Yes and no. I think there are certain strands that we're more comfortable with...I find that I do it, but I would like more resources..."* Most grade 9 and 10 teachers were generally confident about their level of science knowledge and ability to teach the subject in general, but they felt that there were some topics where their knowledge was shaky. On the other hand, a few grade 7 and 8 teachers did not feel that they had enough knowledge of the subject, because either they did not major in science or they were teaching it for the first time as shown in the following quotation from a grade 8 teacher:

"Um...I could definitely use a lot of work. Again, one of the questions on your survey was, have I taken any courses...post-secondary courses...no I have not...Basically, I'm just basing it off of like...my main research and through the Pearson textbook."

Notably, most of the teachers interviewed reported that a common challenge in teaching FI science to students who typically do not speak French as a first language is that they spend more time ensuring that students understand the scientific vocabulary, which leaves them limited opportunities for inquiry-based teaching. Findings show that all the teachers generally agreed that some of their students had limited French vocabulary, which made it difficult for them to comprehend the concepts. The following quotation captures the teachers' concerns:

"Though, the concepts are hard enough on their own, students don't have the basic vocabulary they need to understand it, so they have two challenges at the same time, so trying to get them to digest all these new concepts along with a whole bunch of new words for them. So they may have already heard the English term before, just out in the world, so they have a little bit of an understanding of what the English word means, but suddenly when you put it in French, they have an extra challenge."

Teachers also noted that there were varying levels of student's abilities throughout their classrooms. They felt that some of their students would be better off in the English programs where the resources to support them are available:

"I do have students that are in there because mom/dad wants them to be in there and they don't understand a bit of French. And then I have uhm, students that are there from the French world, they had instructions in French from kindergarten until grade 6, and then they switch into our board, so varying levels really, some of them kids are getting it, and then some kids are just, like it gets over their heads."

Some of the teachers interviewed had the dilemma of whether to focus on students' mastery of the French vocabulary or the understanding of science concepts regardless of the language used. Lack of teaching resources that are suitable for the students' level of French comprehension exacerbated these challenges as noted by one 8th grade teacher:

"...finding resources that are at the student's level for French Immersion is difficult because a lot of the times the textbooks are written for Francophone students, so if they're doing any kind of reading I usually have to do it as a class and then really break down the vocabulary, so some of the time finding resources at their level is challenging."

The majority of teachers mentioned that they use different strategies to ensure that students understood the concepts, for example, using English videos that help to explain the concepts or using both English and French when necessary as shown in the following quotation:

"I, sadly have to use English resources to just solidify, like the stuff to make sure that they understand it...A lot of visuals, lots of, and lots of hands on."

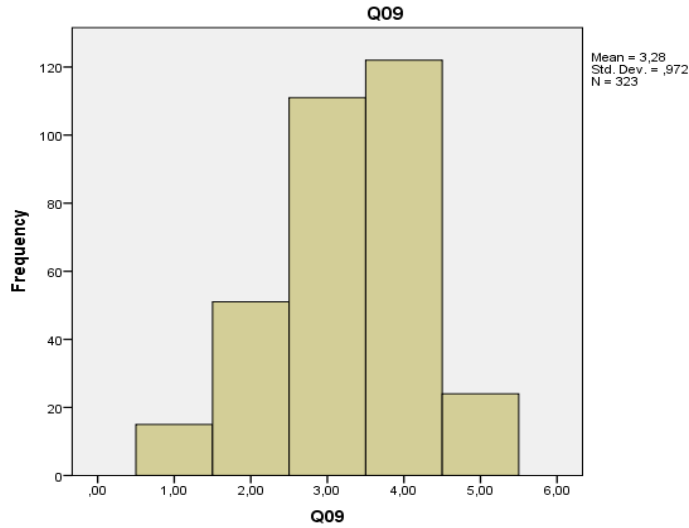
Most grade 9 and 10 teachers also mentioned using hands-on investigations, as well as practical and visual ways to help students understand the French materials, as illustrated in the following quotation:

"Um, so I do always try to have some kind of visual, especially with the French students I find they need the visual with it. I know there is visual learners in other areas as well, but I find it particularly useful in French so they normally have their graphic organizer or a list of vocabulary or, uh, even something up on our projector that they can refer back to throughout a lesson. In the early stages, we do a lot of working together and then in smaller groups."

4.3. Student adaptive engagement in science

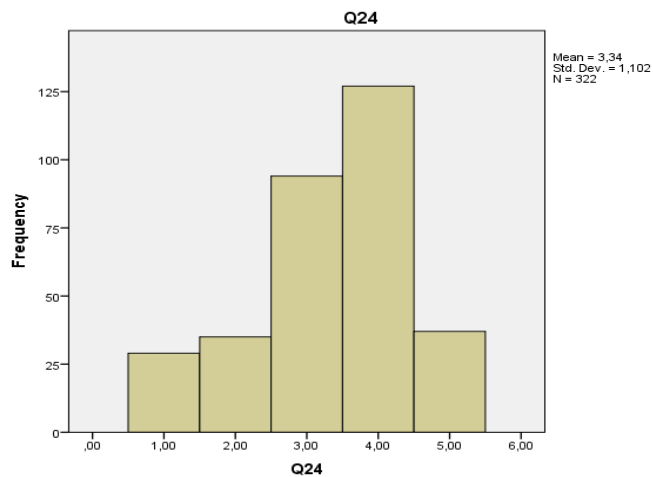
Findings from the students' adaptive engagement questionnaire show that students in this study generally have positive attitudes towards science, and they realise that it is important to learn the subject. Although students' responses show, beliefs that, given time and effort, they could succeed; the data also show that they lack confidence about their knowledge and ability to master scientific knowledge and skills. It is important to note that data from students in grades 9 and 10 has lower standard deviation than that of students in grades 7-8 (where there are more outliers). Responses to the question about mastering science skills showed lower averages and high deviance, which indicates that contrary to their perceptions of the importance of the subject; some students do not have a strong inclination to learning it. Figure 1 below shows the distribution of student responses to questions about the relevance of science in their daily life, which had a mean value of 3.28 and SD 0.97 (N=322). There were outliers showing that there are a few students who consider the subject very relevant and a few who do not.

Figure 1.
Student perceptions about the relevance of science in their daily lives.



Responses to questions about student self-efficacy show that most students may not appear to have confidence in their ability to perform well in science class. Figure 2 below shows the distribution of student responses to the question about how good they are at the subject. A mean of 3.34 & SD 1.1 (N= 322) shows that the majority of students do not believe in their abilities in the subject, and only less than half of the students believe in their learning abilities.

Figure 2.
Student self-efficacy, confidence and attitudes towards science.



5. DISCUSSION

Findings from this study indicate that the teachers generally believe that they have the science knowledge needed to teach, and that they can teach the subject effectively. On the other hand, these teachers were concerned about their ability to influence students' learning in FI science. They strongly expressed the need for more support and resources in order to meet the needs of students learning science in a second language. They also expressed their concern about some of their students who were having difficulty learning science due to limited French proficiency. Although previous findings on science teacher beliefs show that teachers' specific subject beliefs tend to be compatible with their instructional strategies (Bourgoin, 2016; Gallagher, 1991; Rowell & Gustafson, 1993), findings from the current study are contrary. The difference in findings is due to the study context. Whereas previous studies focused on science classrooms for first language learners, the second language context in this study makes it difficult for students to learn complex concepts regardless of teacher beliefs (Davis, Ballinger & Sarkar, 2019; Vandergrift & Baker, 2018). The findings are in agreement with Turnbull et al. (2012) who pointed to the challenges faced by FI teachers who teach complex subjects like science and math when students' language proficiency is limited. From interviews with teachers, it was clear that there is a difference in the level of French language proficiency among students, with some students struggling to learn science in a second language.

Secondly, most teachers strongly felt the impact that lack of teaching resources such as textbooks and other online sources specifically designed for second language learners had on their practice. This finding is in agreement with the earlier report by Rivard et al. (2012) who highlighted the challenges faced by FI science teachers due to lack of resources that meet the needs of French Immersion students. Findings from this study are also consistent with earlier studies that have reported on the overloaded FI science curriculum that hampers the ability of teachers to engage students in inquiry investigations. Teachers have reported that they spend more time ensuring that students understand the science vocabulary in French. It is therefore clear from the findings that external factors influence teachers' practice, and this likely leads to "teachers feeling they have no control" (Riggs & Enochs, 1990, p. 633). These challenges can help to explain some of the teachers' lack of confidence in their abilities to influence student learning in FI science. Since FI students are required to become fluent in the French language as well as achieve the curriculum expectations, teachers have the dilemma of whether to focus on assessing one or the other. Some teachers felt that limited French language proficiency hampered the abilities of some students to communicate their understanding of science concepts. Some studies support this assumption, indicating that literacy and content skills develop interdependently across languages (Archambault, Mercer, Cheng & Saqui, 2018). The teachers therefore felt that there is need for assessment requirements in FI to be more flexible in order to enable them to assess understanding of concepts even when a student has limited language proficiency.

Most teachers reported that they were trying to use different teaching strategies to help their students who have limited French language proficiency, and others reported using English language resources due to limited French resources that are at the level of their students. The teachers also reported that they found themselves in a situation where they have to develop their own resources in order to accommodate the language proficiency level of their students. Similarly, teachers' responses varied in terms of their beliefs about using inquiry strategies, with almost half the teachers indicating that they would not let students design their own experiments. Most teachers mentioned that they did not have enough time to engage students in hands-on investigations since they spend more time

teaching vocabulary. These challenges clearly show the reasons why some teachers felt that students who were struggling to express themselves in French would not be able to design their own inquiry investigations.

In addition to lack of resources, and lack of proficiency in the French language among some students, other factors such as student's science background, and low motivation could be contributing to the challenges faced by the FI teachers. Data from the students' adaptive engagement in science questionnaire show that most students lack confidence about their science knowledge and ability to master scientific knowledge and skills. Similarly, a wide distribution in terms of students' beliefs about the relevance of science shows that the majority of students generally think that the subject is relevant in their daily lives. This wide distribution in responses may be due to differences in French language proficiency among students. Students may find it difficult to express their understanding in a second language, which could lead to lack of confidence in their ability to perform well. Similarly, lack of language proficiency could also inhibit comprehensive understanding of the content and its application to their lives. The differences in responses among students may also be due to the difference among performing and underperforming students. Although there were no significant differences among students at different grade levels for most questions, the question referring to self-regulation had more outliers among grade 7 and 8 students compared to those in grades 9 and 10. This is because students who continue in the FI stream in high school are generally more proficient in the French language; hence, they are willing to work hard when facing difficult problems.

6. CONCLUSION

This study investigated FI teacher perceptions about teaching science to second language learners, their beliefs about science teaching efficacy, as well as students' adaptive learning engagement. A total of 37 grade 7-10 FI teachers and their respective 324 students from across Ontario, Canada, participated in the project. Data were collected through telephone interviews, completing *the Science Teaching Efficacy Belief Survey* (for teachers) and the *Student Adaptive Learning Engagement in Science Survey* (for students). Findings from the study show that the teachers generally believe that they have the science knowledge needed to teach, and that they can teach effectively. Student survey results show a wide distribution of responses in terms of confidence in their knowledge and ability to master scientific knowledge and skills, indicating that there are outliers with some students who have good understanding and a few who are struggling. The study findings also show that FI teachers face several challenges including, limited French language proficiency among their students and lack of instructional resources suitable for French second language learners. Teachers have to find suitable resources, translate resources as well as design their own resources in order to accommodate their learners; and c) lack of assessment policies that are specific for second language learners. In order to address the challenges faced by FI teachers there is need to provide FI science resources that are at the reading level of French second language learners. There is also need for flexibility in terms of curriculum coverage and assessment for students learning science in French in order to enable teachers to accommodate all second language learners who may have limited French language proficiency. This study clearly shows that other factors should be taken into consideration when investigating science teacher efficacy and beliefs in FI or any second language learning context.

The implications of the study findings for FI teachers and for educators in general are that where teachers have strong beliefs and confidence in their knowledge of the subject being taught, they are likely more apt to create a better learning environment for their students. However, in order to ensure optimal performance by these teachers, resources that are at the level of the language proficiency of the students such as textbooks, videos, inquiry activities, and worksheets must be provided. As such, teachers who lack confidence in their knowledge should continuously strive to build and update their content knowledge in order to improve their students' learning. There is need to provide professional development initiatives and supports especially for primary teachers who may not have specialization in the content area. In turn, where students lack confidence in their scientific abilities, they are less likely to be engaged in their learning. This finding underscores the importance of providing the necessary resources and supports that will enable teachers to use inquiry-based activities in order to motivate learners, promote understanding, and help them to appreciate the importance of science in their daily lives. Moreover, participants in this study appeared to concur that science assessment and evaluation should focus on understanding of concepts, and that language abilities should be assessed in the language class. This would provide a clearer picture of the students' true performance levels in both subjects, independent of the other. In sum, there appears to be a societal stigma that transcends the walls of the classroom, where science is sometimes perceived as an elite subject in which strong students are expected to succeed (Agence Science-Pressé, 2007). One way to commit to spreading the message that everyone can be successful in science, regardless of academic abilities or language of instruction is to provide the necessary resources and supports to teachers of second language learners.

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Chapter #4

THE LIFESTYLES AND HEALTH HABITS OF STUDENTS FROM A QUEBEC UNIVERSITY

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ABSTRACT

Despite the physical and psychological benefits associated with healthy lifestyle habits, approximately 50% of Canadians fail to adopt an active lifestyle and a healthy diet (Statistics Canada, 2014). University students are no exception to this tendency, even though the literature acknowledges the benefits of healthy lifestyles for academic success (La Cascia et al., 2019). In this context, the objectives of this study were to: 1) examine the lifestyles and health habits of a sample of Quebec university students and 2) explore this sample's needs with respect to strategies that can be used to promote healthy habits on campus. A cross-sectional design, a web-based survey (n = 1,980 students), and three focus groups (n = 22 students, ~7/group) were used to reach these objectives. The results showed that: 1) 55.2% of students were considered sedentary and 81.2% did not meet the Canadian recommendations regarding vegetable and fruit consumption and 2) lack of time and excessive workload were the main barriers to physical activity practice and maintaining a healthy diet. Future research should focus on maintaining a balance between offline (e.g., workshops) and online (e.g., computer tailoring) interventions to promote physical activity and healthy diet maintenance throughout the academic year.

Keywords: lifestyle habits, physical activity, food habits, health, students, university.

1. INTRODUCTION

The World Health Organization (WHO) has already described the situation of obesity and overweightness as an epidemic (2003). Although obesity is a multifactorial health problem, the literature firmly establishes that those most affected by this problem overeat and lead sedentary lifestyles (WHO, 2014). Despite the many physical and psychological health benefits associated with healthy lifestyle habits, approximately 50% of Canadians fail to adopt an active lifestyle and healthy eating habits (Statistics Canada, 2014). In addition, the transition to university is recognized as a risk period for young adults regarding body weight management, as demonstrated in the US (Levitsky, Halbmaier, & Mrdjenovic, 2004), Sweden (Schmidt, 2012), Cyprus (Hadjimbei, Botsaris, Gekas, & Panayiotou, 2016) or Canada (Pérusse-Lachance, Tremblay, & Drapeau, 2010; Walsh, Taylor, & Brennick, 2018). The contribution of lifestyle habits in the field of education sparks interest among researchers, both when it comes to young students (Florence,

Asbridge, & Veugelers, 2008; Singh, Uijtdewilligen, Twisk, Van Mechelen, & Chinapaw, 2012) and adult students (La Cascia et al., 2019). In higher education, the literature acknowledges the potential benefits of healthy lifestyles for academic success, including physical activity and healthy diet (Wald, Muenning, O'Connell, & Garber, 2014). Additionally, many experts believe that environments influence the increase in obesity more than biological factors, such as body composition (Byrne & Hills, 2013), some going so far as to describe environments that promote obesity as "obesogenic" environments (Swinburn, Egger, & Raza, 1999; Swinburn et al., 2011).

2. BACKGROUND

Recent years have witnessed a sharp rise in obesity, a trend so disturbing it was declared an epidemic (WHO, 2014). Obesity is associated with increased risk of chronic diseases like cardiovascular disease, type 2 diabetes, arthritis, and some types of cancers (Kopelman, 2000). Moreover, weight gain is common during young adulthood (Norman, Bild, Lewis, Liu, & West, 2003). In 2014, 39% of adults were overweight compared to 28.9% in 1980 (WHO, 2014). Among Canadian adults, rates of overweightness rose from 27.8% in 1985 to 33.6% in 2012, while obesity rates tripled in the same period, from 6.1% to 18.3% (Twells, Gregory, Reddigan, & Midodzi, 2014).

Statistics Canada (2014) showed that 50% of Canadians do not adhere to active lifestyles and healthy eating habits, although such lifestyles have been acknowledged for their important psychological and physical benefits (Craft & Perna, 2004; Haskell et al., 2007). Identifying the reasons for this lack of adherence to healthy lifestyles will provide a basis for developing strategies and interventions to eliminate obstacles and motivate the population to improve their lifestyles (Weinberg, 2018).

Therefore, evidence-based, multi-level public health interventions could improve obesity-related behaviors in adults (Compernelle et al., 2014). There is growing agreement among experts that the environment, rather than biology, is driving this epidemic (Booth, Pinkston, & Poston, 2005; Hill, Wyatt, Reed, & Peters, 2003; Swinburn et al., 2011). Biology clearly contributes to individual differences in weight and height, but the rapid weight gain that has occurred over the past three decades is a result of the changing environment (Hill et al., 2003). In this regard, since 1980, it has been reported that students tend to gain a significant amount of weight during the first year of university. In the US, this phenomenon has been called the "Freshman 15" in reference to the perception that students gain 15 pounds (6.8 kg) during the first year of university (Brown, 2008). However, studies have shown that this weight increase actually ranges from 0.7 kg to 3.1 kg (Crombie, Ilich, Dutton, Panton, & Abood, 2009). Nevertheless, in 2007, data from a national survey revealed that nearly 30% of US college students were overweight or obese (American College Health Assessment, 2006). The literature shows that among university students, weight gain is associated with poor eating habits, stress, and lower physical activity following the transition from a structured high school environment to university (Crombie et al., 2009; Gropper, Simmons, Connell, & Ulrich, 2012; Vadeboncoeur, Townsend, & Foster, 2015). Because students do experience important weight changes, universities need to focus on increasing health promotion to help students maintain and adopt healthy behaviors (Vadeboncoeur et al., 2015).

The situation found in Quebec is different from the one found in Canada and the rest of North America given that students from this specific Canadian province do not transfer directly from high school to university. In Quebec, high school students have to complete a two-year general program prior to being admitted to university. Also, in Quebec, for

cegeps' students, physical education courses are mandatory and have a strong emphasis on active living instruction from Kindergarten to pre-university college. The introduction of a one credit course on lifestyle for two-year community college students resulted in a non-significant 8% reduction in the prevalence of overweight and obesity (Lytle et al., 2017). Therefore, one could wonder what are the characteristics of Quebec's university students regarding their prior equivalent of nine credits of physical education and lifestyle courses during their two-year preparatory college instruction. Indeed, it may be hypothesized that these students may be less subject to a weight increase when starting university. To our knowledge, this has not been investigated yet.

In this context, it becomes highly relevant to examine whether the "Freshman 15" phenomenon is also of concern in Quebec university students. To explore this issue, it is essential to study the lifestyle habits of students (in particular physical activity and eating habits) responsible for this phenomenon as previously mentioned by Vadeboncoeur and colleagues (2015). The originality of the present study lies in its combination of using both a qualitative and quantitative phases, which are described below.

3. OBJECTIVES

A mixed-method study including two phases, quantitative and qualitative, was used to achieve the following objectives: 1) to examine the lifestyles and health habits of a sample of Quebec university students and 2) to explore this sample's needs and interests with respect to strategies that can be used to promote healthy habits on campus.

4. METHODS

4.1. Procedure, tools and participants

4.1.1. First objective

The quantitative phase used a cross-sectional, web-based survey, which participants completed during the fall semester of the academic year. More specifically, an e-mail including a hyperlink to an online questionnaire was sent to all university students ($n = 15,000$) at the beginning of October 2016, and a recall was also sent to all of the students at the end of October. The final sample was composed of 1,980 students: female (F) = 1,517 (76.6%), male (M) = 463 (23.4%); mean age = 25 years ($SD = 7.3$). Notably, the gender proportions represented those of the overall university student population. Data was analyzed using SPSS (version 24) and descriptive statistics (means, standard deviations, percentages, and frequencies). The web-based survey comprised six sections, but due to space limitations, only three sections will be presented in the present chapter: 1) sociodemographic information, 2) physical activity (PA) habits, and 3) eating habits. The official guidelines recommended by the Canadian Government were used. The 2011 Canadian Society for Exercise Physiology (CSEP) guidelines suggested 150 minutes of moderate to vigorous PA per week for adults in bouts of 10 minutes or more (2011); these guidelines were used for all questions that assessed self-reported PA. Also, the Canada's Food Guide was used as a standard of healthy eating for adults. This guide presented four food groups, each with a standard portion: vegetable and fruit (V&F), grain products, dairy and alternatives, and meat and alternatives (Health Canada, 2011). The standard portion was used as a benchmark for V&F intake when participants were asked to report their intake for each day. We chose V&F because they are the reference in healthy eating.

4.1.2. Second objective

Several participants who completed the web-based survey (October 2016) did not agree to participate in a subsequent qualitative phase. When the second phase started, during the winter semester 2018, many of them had already completed their studies or left university. With the collaboration of the university, we were able to contact 339 active students, and 22 agreed to take part in the focus groups schedule. The focus groups comprised 22 students distributed as well (F = 17; M = 5), including undergraduates (n = 5) and post-graduates (n = 17). These students were divided into three groups: Group 1 (n = 6; F = 5, M = 1), Group 2 (n = 8; F = 7, M = 1), and Group 3 (n = 8; F = 5, M = 3). Each focus group lasted approx. 90 minutes and was guided by ten key questions divided into four major themes/environments based on the *Conceptual Framework* (Quebec Ministry of Health and Social Services, 2012): 1) individual characteristics, 2) living environments, 3) systems, and 4) overall context. Although there are several frameworks relevant to our subject (e.g., Cohen, Scribner, & Farley, 2000), the *Conceptual Framework* proved to be the best guide for examining the interaction of healthy lifestyles with multiple environments in a Quebec-specific context. Boutin (2007) inspired the analysis strategy. Content was audio recorded, transcribed, and analyzed using NVivo 11 qualitative data analysis software (Poupart, 2011), which facilitated the delineation, coding, and grouping of units of meaning, the emergence of sub-categories, and an analysis of the similarities and differences in the comments of the various participants.

4.2. Ethical, considerations and limitations

The ethics board of the home university approved this study, and all participants signed an informed consent form. Although the aim of qualitative research does not pertain to results generalization, the surveyed sample (n = 22) was not representative of university students. The overrepresentation of graduate students (n = 17) can be explained by the fact that these students are more prone to engaging in research. The results obtained from the second phase must therefore be interpreted with caution.

5. MAIN RESULTS/DISCUSSION

5.1. First objective

With regard to the quantitative phase, results showed that many students were not meeting the CSEP recommendation of 150 minutes of moderate-to-vigorous PA per week (44.8%). The present sample was considered more sedentary (55.2%) than the Canadian Community, which found that 46.3% of young adults were considered sedentary (Statistics Canada, 2014). However, the present sample was considered less sedentary (55.2% vs. 66.1%) than the sample examined by Pérusse-Lachance and colleagues (2010) in a study that also described various health-related factors within a Canadian university community. In addition, 33.6% of students reported not using any active transportation. This finding could potentially highlight barriers to the built environments, such as limited travel distance made accessible by walking or biking. As previous studies have shown, there is an association between living in walkable neighborhoods and having a lower BMI in adults of all ages (Loo, Greiver, Aliarzadeh, & Lewis, 2017). It could be interesting to examine potential barriers to active transportation as well as the effects of those barriers on students' engagement in healthy habits. In addition, results revealed that 81.2% of students did not consume the daily recommended portions of V&F (i.e., seven for women and eight for men). The mean daily V&F intake of the students was 4.54 portions. Regarding eating

habits, the present results are in line with those that have been found in the preexisting literature (Peltzer, Pengpid, Yung, Aounallah-Skhiri, & Rehman, 2016). The present findings also showed that students had a tendency to skip breakfast and snack less. These findings seem to corroborate previous studies that showed that 30% of the adult population skips breakfast. Moreover, students generally had less desirable eating patterns than did employees, as was also found by Pérusse-Lachance et al. (2010). These results appear to support the “Freshman 15” phenomenon. Given that most students tend to gain 0.7-3.1 kg in the first year of university (Crombie et al., 2009), it would make sense to assume that their health behaviors are not as beneficial as those of staff members, especially since recent studies (e.g., Smith et al., 2017) found an association between healthy habits and weight gain among adults.

5.2. Second objective

With regard to the qualitative phase, findings, from the angle of obstacles, fell into four main categories based on the *Conceptual Framework* (Quebec Ministry of Health and Social Services, 2012). First, results concerning individual characteristics showed that most students were interested in practicing PA but lacked the time and motivation to do so, owing to their heavy workloads. The same holds true for healthy eating, as students reported that their workloads did not allow them to organize meals in advance. These findings are consistent with those of Daskapan, Tuzun, and Eker (2006). Second, in terms of living environments, students found that the overall cost of PA facilities was slightly higher on campus than it was off campus. Similarly, a research study conducted in a U.S. university found that participation in PA was in decline and identified the increasing costs of on-campus sport facilities as a barrier (Jones & Barrie, 2011). Furthermore, students described the quality of on-campus food as very poor, expensive, and generally unhealthy, especially when compared with food in the neighboring environment. Third, with regard to systems, students highlighted the importance of improving the structure of the built environments on campus to facilitate the adoption of active transportation in a university setting. Indeed, the lack of connectivity between off-campus cycling paths poses a risk because cyclists are forced to ride in the street; this concern was also raised by Hill et al. (2003). Fourth and finally, the findings suggested that students welcomed the idea of workshops on the subject of health promotion activities to increase their awareness and knowledge of healthy lifestyle habits. Besides offering suggestions for health promotion workshops, students also demonstrated an interest in the development of an application tailored to their needs regarding PA and nutrition. In line with this later issue, an innovative intervention based on the computer personalization technology «*Computer-tailoring*», could be developed. *Computer tailoring* is a form of tailored communications which involves a “combination of strategies and information intended to reach one specific person based on characteristics that are unique to that person, related to the outcome of interest, and derived from an individual assessment” (Kreuter & Skinner, 2000, p.1). In conclusion, they believed that the university should develop policies that support healthy choices through the availability of nutritious food and an affordable fitness center (e.g., LaCaille, Dauner, Krambeer, & Pedersen, 2011).

6. FUTURE RESEARCH DIRECTIONS

Further research should target specific health promotion interventions among university communities to prevent weight gain and promote healthy eating and active lifestyles. Student living environments should be considered and developed with the needs

of students in mind if students are to acquire or maintain healthy lifestyles (e.g., Gadais, Boulanger, Trudeau, & Rivard, 2018; Quebec Ministry of Health and Social Services, 2012). Notably, the surveyed students underscored the importance of establishing a balance between offline (e.g., workshops) and online (e.g., computer tailoring) interventions tailored to their needs in terms of PA and nutrition. Thus, workshops such as active group breaks or healthy recipe demonstrations should be offered regularly throughout the year to maintain student interest in PA and healthy food choices. Computer-tailored interventions could be based on computer personalization technology, which creates an online, individualized program according to the user's desired lifestyle (Boudreau, Moreau, & Côté, 2016). A combination of these interventions would certainly go far in helping students acquire and maintain healthy lifestyle habits. Future longitudinal research could measure the effects of such interventions on students' lifestyle habits, motivation, or academic success.

7. CONCLUSION

This study mainly demonstrated that the lifestyles and health-related habits of university students could be greatly improved, therefore supporting the need to develop and evaluate health promotion and obesity prevention interventions within university communities. These interventions should target both campus and city environments as well as the students themselves. Despite that in Quebec, university students were provided with K-12 (for kindergarten to 12th grade, K-12 is an American expression that indicates the number of years of publicly supported primary and secondary education) physical and health education, the same concerns as the ones found in the US seem present during the first year of university. This study has the potential to guide other Canadian universities in developing a program to promote overall health among students, thereby ensuring the permanence of healthy and active lifestyles for them in the years following their transitions to university. We believe that, when used as an educational strategy, our study could serve as a model for other post-secondary institutions (or even for other professional fields), insofar as it offers a better understanding of the mechanisms associated with the adoption a healthy lifestyle.

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Section 2
Organizational Issues

Chapter #5

A HUMANISING PEDAGOGY: BEING A CONSCIOUS PRESENCE IN THE WORLD¹

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ABSTRACT

Many consider education an arena designed to eliminate structures of oppression, by equipping learners with the necessary abilities to change repressive structures that exist in society. This is significant in the context of South Africa given its history of segregation and apartheid. Also in the context of South Africa's linguistically and culturally diverse classrooms, it is inevitable that teaching and learning from a social justice perspective be prioritised to address injustices and inequities. This chapter draws on conversations with teachers, in which their understandings of a humanising pedagogy, and what this requires of us in the context of teaching and learning environments, are explored. The chapter concludes that a humanizing pedagogy is crucial for both teacher and student success and critical for the academic and social resilience of students. The work emanates from a project between universities in South Africa and Brazil.

Keywords: social justice, humanizing pedagogy, education.

1. INTRODUCTION

A humanizing education is the path through which men and women become conscious about their presence in the world. The way they act and think when they develop all their capacities, taking into consideration their needs, but also the needs and aspirations of others (Freire, Betto & Kotscho, 1985, pp. 14-15).

Many consider education an arena that is designed to eliminate structures of oppression, by equipping learners with the necessary abilities to change repressive structures that exist in society. This is significant in the context of South Africa given its ubiquitous history of segregation and apartheid. Given too, the nature of South Africa's linguistically and culturally diverse society and classrooms, in particular, it is inevitable that teaching and learning from a social justice perspective be prioritised to address forms of injustice and inequity. The South African School's Act (SASA) (no 37 of 1996) which materialised from the Bill of Rights as well as the South African Constitution (1996), assumes a pivotal role in desegregation. This makes it important to continue prioritising and adopting practice to redress historical injustices in the education system of South Africa.

While narrowly perceived to be 'just good teaching', it becomes crucial to unpack meanings of social justice. Essentially, social justice refers to fair and just relations between individuals and society; it involves breaking barriers for social mobility; breaking the cycles of oppression; and examining systems of power and privilege. Defined by Bell (1997, pp. 3-4) as "full and equal participation of all groups in a society that is mutually shaped to meet their needs....the process of social justice should be democratic and participatory, inclusive and affirming of human agency and human capacities for working collaboratively

to create change.” Inclusivity, participation, and equity are foregrounded as core concepts. Nieto (2006: 2) adds that social justice “challenges, confronts, and disrupts misconceptions, untruths, and stereotypes”. To address injustice, we have to challenge and disrupt. Yet despite attempts to transition to a more inclusive, socially just order, legacies of disempowerment and dehumanisation continue to persist in society worldwide (Delport, 2016). And as Zinn and Rogers (2012, p. 76) say, “the educational arena remains a battlefield, in which the struggle to build voice, agency and community continues.” One way of addressing these concerns is through a humanizing pedagogy.

In this chapter, I examine the role of a humanising pedagogy as a key concept underpinned by social justice. I adopt a qualitative case study to examine teachers’ shared understandings of a humanising pedagogy, and what this means in their teaching-learning contexts.

2. THEORETICAL FRAMEWORK

2.1. Humanising pedagogy

Humanising pedagogy grew out of Freire’s (1970) popular education (as referred to in Latin America), or critical pedagogy (as referred to in America), and may be considered a pedagogy that “ceases to be an instrument by which teachers can manipulate students, but rather expresses the consciousness of students themselves” (Freire, 1970, p. 51). “A humanizing education is the path through which men and women become conscious about their presence in the world. The way they act and think when they develop all their capacities, taking into consideration their needs, but also the needs and aspirations of others” (Freire, Betto & Kotscho, 1985, pp. 14-15). Freire argued further that humanizing teachers engage in a quest for mutual humanization, where students are co-investigators in dialogue with teachers. A dialogic approach develops critical consciousness, and teachers who engage in humanizing pedagogy engage in praxis, reflection, and action upon the world to transform it. Freire laments the state of dehumanization in education by asserting that the only effective instrument in the process of re-humanization is humanizing pedagogy. For Freire (1970), a liberatory education could never be conceived without a profound commitment to humanity. For Bartolomé (1994) a humanizing pedagogy promotes respect, trusting relationships between teachers and students, academic rigor and learning contexts where power is shared by teachers and students. Macedo and Bartolomé (2000) add that the pedagogy values students’ background knowledge, language, culture, and life experiences.

Bartolomé (1994) argues for a humanizing pedagogy that respects and uses reality, history and perspectives of students as an integral part of educational practice. He argues that teachers who work with subordinated students in particular have a responsibility to assist them in appropriating knowledge bases and discourse styles seen as desirable in society. This process must be additive. A humanizing pedagogy is crucial for both teacher and student success and critical for the academic and social resiliency of students, given that educational policy is dominated by standardized and technical approaches to schooling that dehumanize students, especially those of colour (Del Carmen Salazar, 2013). Freire’s (1970) conceptualization of “humanization,” “pedagogy,” and “humanizing pedagogy” is therefore seen as a counter-practice to dehumanization in education.

In Huerta’s (2011: 49) work with Latino children, she explains that teachers who employ a humanizing pedagogy in the classroom understand that learning is an act of linking new information to prior knowledge in and out of school, and that learning occurs in a social cultural context. We must understand that language is a tool for learning and through a

culturally bound, socially mediated process of language development, children construct mental frameworks (schema) for perceiving the world around them. Teachers who engage in a humanizing pedagogy engage in classroom practices that respect cultural differences and reflect care for students. They critically question their deficit views of subordinated students and recognize students as knowers and participants in their learning. They take action to create pedagogical structures that help to balance asymmetrical power relations in society. Geduld and Sathorar (2016, p. 46) encapsulate, in their work on humanizing curriculum, we must commit to pedagogy that:

- Is student-focused;
- Is embedded in dialogue and meaning-making;
- Focuses on the praxis that combines new knowledge and experiences of students;
- Recognizes knowledge diversity;
- Engages with tensions between local and global knowledge.

There are certainly overlaps between a humanizing pedagogy and a pedagogy of love. Bartlett (2005, pp. 345-347) also demonstrates this in her ethnographic fieldwork with adult education NGOs in Brazil to show how teachers interpreted and acted upon Freirian principles, in particular, a pedagogy of love. Bartlett's view is that the liberatory, dialogical pedagogical praxis that Freire advocated constituted an act of love. Dialogue cannot exist without love. Love demonstrates commitment to the cause of the oppressed and marginalized, and this commitment is dialogical, and love can only be restored where oppression has been abolished. As individuals, by fighting for the restoration of our humanity we will be attempting the restoration of true generosity, and this fight, because of its purpose, constitutes an act of love (Freire, 1970).

3. THE STUDY

This work emanates from collaboration between universities in Brazil and South Africa. The focus of the project is teacher engagement with education for social change, social justice, cohesion and peace in the two countries. This work serves to report on one aspect in the South African leg of the project. This study followed an interpretivist paradigm, designed as it is to present the reality of participants' views. In interpretivist research, the researcher is a co-creator of meaning, and knowledge is constructed not only by observable phenomena, but by descriptions of people's intentions, beliefs, values, reasons, self-understanding. The methodology tends towards the unstructured: observation, open interviewing, description, qualitative analysis. In this qualitative case study, graduate students involved in the project participated in an introductory seminar where key concepts were deconstructed. The participants were eight graduate students. All are English teachers, six females, and two males. All except for two are South African. The aim of the work was to examine their views on what a humanizing pedagogy might entail. The work presented in this chapter emanates from group discussions and interviews with the teachers. All participants also wrote narratives of (de)humanizing teaching-learning experiences that they may have encountered. This chapter reports on the group discussions and interviews, narratives are discussed in another paper.

4. DISCUSSION

I highlight extracts from the discussions, then proceed to discuss them in relation to teachers' understandings of what a humanising pedagogy embraces:

Jana: "It is about being human, what does it mean to be human...it is about free will... It is about justice. We are equal in all that we do, colour should not separate us, blood brings us together, humanises us. A humanising teacher treats everyone alike. We have the same blood. That's why Schweize Reneke is important, we cannot separate children, they must be taught together"

Ari: "We all have a story, some stories are better than others. We have a history.. We do not come from nowhere. Teachers must know who their students are. A humanising pedagogy acknowledges everyone's story. This is important in the South African context, given our history and our diversity. Be the revolution, get to the heart of the learner"

Marina: "Everyone speaks a different language. In our case (SA) we have 11 languages. I speak English, but as a teacher I have students who speak at least five different languages. A HP acknowledges the child's language, mother tongue. Yet English is the medium of instruction. I can speak about three languages, so I cannot speak to the learners in their languages, I use English which is our policy at school, at most schools. A humanising pedagogy will respect all languages. Yet how do we focus on this?"

Tsepo: "For me it is about culture. What is a person's culture? It is not race or religion, it is about values and beliefs. In my culture I am allowed multiple wives, but it is a patriarchal culture, this I will not support. Yet as a teacher I will respect all my learners' culture. It is their beliefs and how they were brought up. In school today cultural day is about dressing up in your traditional clothing...this is only a small aspect of culture, it is not what makes you, you...inside"

Vina: "A humanising pedagogy is like social justice, it would include bringing up discussions of a critical nature. We need to talk about SAs history, apartheid.. And privilege. We have black and white kids in class. Yet white kids say they are not responsible for apartheid, their ancestors were. Yet they are privileged because of apartheid. We need to have these conversations at all levels."

India: "I spoke Afrikaans as a child, I still do. Many coloureds (mixed race) do. Yet now Afrikaans is stigmatised. It is called the boer language, and we must not speak it.. I feel guilty now, yet I believe a humanising pedagogy recognises my Afrikaans heritage as it does other languages. I was not responsible for apartheid, I am a child of it. I am black, I speak Afrikaans. If this is not acknowledged it is dehumanising".

South Africa is a country riddled with past and present inequities. As a fairly new 25 year old democracy, South Africa's past is tragically reflected in several decades of apartheid during which time black people did not have rights over where they lived, whom they married, or where and how they were educated. Black South Africans lived under complete white domination. Decisions were made for us on the basis of skin colour and the texture of our hair. Since democracy, and given the nature of the country's linguistically and culturally diverse classrooms, it is inevitable that teaching and learning from a social justice perspective be prioritised to address injustices and inequities. The data was coded and analysed according to themes that emerged. Three major themes emerged from the teacher group discussions, regarding their views on what a humanising pedagogy entails: justice, background stories and the value of language.

4.1. Justice

All the teachers referred to a sense of justice as being core to a humanising pedagogy. For Jana, skin colour is superficial, she considers blood a uniting force for human beings. For her a humanising pedagogy means that all learners must be treated the same. Jana makes an interesting reference to Schweize Reneke. Schweize Reneke is a little town in the North West of South Africa. The incident referred to occurred in January this year (2019), when a Grade 1 teacher separated children into two language groups: one that spoke English and one that did not. These groups happened to consist of separate race groups as well, one black and one white. Her understanding was that the children would feel more comfortable among those who spoke their language. The incident went viral very rapidly with much of the country referring to it as a racist act to divide children along linguistic grounds. The teacher later apologised, as her intentions, she claimed, were not racist. Vina too evokes social justice by calling for what he refers to as “discussions of a critical nature”. Zembylas (2015), Zembylas and McGlynn (2012), Zembylas and Papamichael (2017) refer to these conversations as discomfiting or troubling conversations, which tend towards raising issues that give rise to feelings of discomfort. Being able to raise these issues in the classroom gives space to open conversation, but has equal potential to trouble. Vina’s view that white children absolve themselves from apartheid is also troubling. He feels that a humanising pedagogy would involve us engaging in discomfiting dialogues, where we get opportunities to acknowledge our privilege and entitlement, rather than engaging with ‘apartheid denial’.

4.2. Background stories

Ari understands a humanising pedagogy as acknowledging learners’ backgrounds. Given the nature of diversity of learners’ backgrounds, it is crucial that we listen to learners’ stories or narratives. Storytelling lies at the heart of our experiences, they engage us at a spiritual level, and are the voice of change. Ari reminds us of this: stories give voice to children. He also evokes us to “be the revolution”. This is reminiscent of Freire’s (1970) reference to revolutionary teachers. Freire uses the term in opposition to “reactionary” teachers. For Freire (1970) revolutionary teachers establish a permanent relationship with students from subordinated cultures and languages. Revolutionary teachers practice a humanizing pedagogy where the method of instruction is not an instrument by which teachers can manipulate students, because it expresses students’ consciousness (p. 51). Bartolomé (1994) too argues that a humanizing pedagogy values students’ background knowledge, culture and life experiences, and creates learning contexts where students and teachers share power (p. 248).

4.3. Considering the value of language

Schools need to do more than just teach students English. They must also strengthen cultural awareness and identity. Marina’s focus on language and Tsepo’s focus on culture foreground this. Marina’s questioning of how to address language discrepancies in the classroom is a concern in South Africa. Given the linguistic and cultural diversity of South Africa (SA has 11 official languages), it is near impossible for teachers to speak all the children’s languages. However, it is important to acknowledge them. Too often, have children who speak languages other than English been considered marginal or deficit. Language must be highlighted as a vital element to humanisation. Childs (2016) explores the (potential) dehumanising nature of language use in many South African classrooms by highlighting the regular disconnect between the dominant language of the classroom and the home language of the learner. In contexts where English is hegemonic as the language of

teaching and learning, exploring the possibilities of translanguaging can bring about humanising experiences for learners as well as teachers. Childs (2016) says that translanguaging practices are inherently humanising, affording teachers and learners opportunities to participate as social, thinking, transforming individuals. Marina and India evoke these points. India's point however, refers to Afrikaans, originally emanating from Dutch colonisers, and spoken by Afrikaners and SA's coloured, or mixed race people (apartheid nomenclature used for research purposes). Her view is that as a black person she should not feel guilty about speaking the language of the apartheid rulers, she has a right to the language.

Historical realities of dehumanizing in South African education have been well documented by researchers such as Alexander (2002), Chisholm (2004), Jansen (2009), and Soudien (2012). Zinn and Rogers (2012) add that the legacy of dehumanization has been wittingly and unwittingly absorbed into educational arenas that depict hierarchies of power, compliance, fear, suppression and loss of voice. Restoring voice and agency is a key characteristic of what it means to be human. Given our oral tradition, in the south, voice and storytelling are pertinent, storytelling, must be seen as a social and cultural activity. Loss of voice is one aspect of dehumanization; restoring voices equates with agency, which has implications for social justice and human pedagogies.

5. TEACHING AND LEARNING

An important contribution of this work is undeniably, to teaching and learning. No contribution to work on education and development can ignore this impact. A humanising pedagogy holds substantial implications for teaching and learning, and must be considered a commitment to opening paths to equity among linguistically and culturally diverse students, such as those prolific in South Africa. I address this on two levels: language and pre-service teacher education programmes. With regard to language in particular, greater focus must be placed on home and additional languages (Del Carmen Salazar & Fránquiz, 2008). Bilingualism, biculturalism, multilingualism and multiculturalism are assets that should be supported, as should linguistic and cultural identities, which is particularly appropriate given SA's diverse linguistic background and apartheid legacies. A particular focus with regard to language can also be placed on translanguaging, is also valuable in relation to discrepancies between the dominant language/s of the home and school. Childs (2016) says that translanguaging practices are inherently humanising, affording teachers and learners opportunities to participate as social, thinking, transforming individuals.

South Africa also bears witness to the dire need to address and confront issues of race, identity and diversity in the classroom, as well as in teacher education programmes en route to establishing a more socially cohesive society (Sayed, 2016). It is imperative that pre-service teachers engaged with issues of race, identity and diversity in their teacher education programmes. To do so means deconstructing their own issues round race, identity and diversity. This must be grounded in transformative social justice.

6. CONCLUSION

For us to commit to increasing equity and excellence in education of culturally and linguistically diverse students, we must teach against the grain of dehumanizing practices (Del Carmen Salazar & Fránquiz, 2008). Relegating learners to the fringes of society through dehumanising policies and practices that reproduce social and academic inequities is undesirable. For Huerta (2011) research in teacher education has placed emphasis on teacher

knowledge and instruction, not enough on attitudes and perspectives that can contribute significantly to pedagogy. Teachers who embrace a humanizing pedagogy recognize the socio-historical and political context of their own lives and students' lives, including the influence of societal power, racial, ethnic identities and cultural values (Bartolomé, 1994; Freire, 1970; Del Carmen Salazar & Fránquiz, 2008). These teachers believe that marginalized students (due to race, economic class, culture) experience difference in how they learn, not in their ability to learn. As individuals, or as peoples, by fighting for the restoration of (our) humanity (we) will be attempting the restoration of true generosity. And this fight, because of the purpose given it, will actually constitute an act of love (Paulo Freire, 1970).

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Chapter #6

PRINCIPALS' ENTREPRENEURIAL LEADERSHIP EMPOWERING PARENTS OF MARGINALIZED POPULATIONS

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ABSTRACT

The aim of this study is to explore principals' entrepreneurial leadership in a school of a socially marginalized population over a period of eighteen years. The school serves the children of undocumented work migrants and refugees in Israel. These people are perceived by the law as temporary, with no possibility of becoming citizens. However, their children are eligible for an education, as specified in the Law of Compulsory Education. Principals as entrepreneurs have a vision, seize opportunities and engage in innovations, and use networking to pursue their goals. This qualitative study used a 'critical event' inquiry method to reveal the events that triggered the principals' entrepreneurship towards the parents. Principals' acts and perceptions were retrieved from different sources. The different sources include interviews with teachers, interviews with the principals and their interviews on the media and the internet, and school observation, over a period of eighteen years. It was found that the principals applied entrepreneurial leadership to facilitate the parents in accumulating social and cultural capital that would enable them to become part of society by mobilizing funding, volunteers and projects. This study contributes to our knowledge, since it discusses the possibilities and scope of principals' entrepreneurial leadership.

Keywords: entrepreneurial leadership, refugee parents, migrant workers, critical events.

1. INTRODUCTION

Principals are required to be autonomous in their decisions and to act as entrepreneurs to implement innovations; yet at the same time they are required to comply with demands from the external environment (Eyal & Inbar, 2003), that consists of the increasing involvement of parents, stakeholders and regulating agencies (Goldring, 1995). Thus, principals have to bridge the contradictory demands of autonomy and conformity to the external environment.

In their interaction with parents, principals have a large array of strategies, depending on the characteristics of the parents, such as their SES and social and legal status. Parents of low SES are less active and participative than parents of high SES. This is salient in a school that serves socially marginalized populations such as work migrants and refugees. The principals use the resources available to them to advance the parents, so that they gain power and are able to help their children in school.

This study explores three principals acting as entrepreneurs to empower the parents of one school, serving children of migrant workers and refugees, over a period of eighteen years; suggesting that unique external events triggered forms of entrepreneurial leadership regarding the parents.

2. ENTREPRENEURIAL LEADERSHIP

Since the 1980's the educational system has changed due to decentralization (Addi-Raccach, 2006) as a result of a neo-liberal economy that made private funding available to schools (Man, 2010); and to the public's growing dissatisfaction with the low achievements and growing gaps in the educational system (Harel Ben Shahaar, 2018; Yemini, 2018). These developments were manifested in a policy of school autonomy and principals' entrepreneurship. Principals as entrepreneurs faced two contradictory demands: on the one hand, they were granted autonomy and personal discretion; on the other, their growing dependence on external resources while being unable to predict the rapidly changing environment, and the need to still conform to the regulatory environment or government policy (Eyal, 2007).

Research on business entrepreneurship shows that it increases a firm's capabilities of adapting to environmental uncertainty (Ensley, Pearce, & Hmieleski, 2006). There are numerous definitions of the term, since this term is studied in various disciplines (Yemini, 2018) and has a heterogeneous influence on firms across different countries (Terjesen, Hessels, & Li, 2013). However, the social entrepreneur is defined as individually motivated by his or her vision to fulfill social goals, rather than by profit as the business entrepreneur does (Dees, 2004). Social entrepreneurs have some common behaviors and traits (Yemini & Omer Attali, 2017). Vision shapes entrepreneurs' acts (Borasi & Finnigan, 2010).

In education vision is framed as "realistically achievable goals and targets" (Yemini & Omer Attali, 2017, p. 18), or as a philosophy (Borasi & Finnigan, 2010; Ruvio, Rosenblatt, & Hertz-Lazarowitz, 2010). Seeking and exploiting opportunities to implement innovations, and identifying and seizing 'windows of opportunity' is an additional aspect of entrepreneurship (Borasi & Finnigan, 2010; Omer Attali & Yemini, 2017). An opportunity in education is perceived as an "opportunity to create change that aims to solve existing problems (Yemini & Omer Attali, 2017, p. 20). Innovation "is the specific instrument of entrepreneurs" (Drucker, 2015, p. 30) and is related to the creation of a social value (Borasi & Finnigan, 2010; Omer Attali & Yemini, 2017). Innovation can come in different degrees (Man, 2010; Yemini & Omer Attali, 2017). From a radical change that has the potential of transforming the educational system or the individual school (Teske & Williamson, 2006), such as initiating new subject-matter that will extend the studies outside of school – e.g., into museums (Eyal & Inbar, 2003); up to small-scale, incremental changes which "improve the existing situation" (Yemini & Omer Attali, 2017, p. 12), such as maintaining test-scores, class structure, frontal teaching, and introducing methods previously not applied in school but which do not disrupt school stability and the status-quo (Eyal & Inbar, 2003), or supporting new programs for teachers (Teske & Williamson, 2006). Eyal and Inbar (2003) developed a tool for measuring the degree of entrepreneurial leadership based on quantity and degree of school innovation and principal proactiveness. Entrepreneurs also scan the environment "to identify unmet needs of clients" (Borasi & Finnigan, 2010, p. 17) and to identify threats (Kemelgor, 2002), so that they can modify their behavior to comply with its demands (Ensley, et al., 2006). That is because environmental factors, such as institutional regulatory factors and market variables (Man, 2010), geographical location (Eyal & Inbar, 2003), socio-economic status, and the ability of parents to act (Eyal, 2008) impact entrepreneurship. Entrepreneurial leaders are willing to take risks in developing new products, especially in the business area (Terjesen, et al., 2013); in contrast, social entrepreneurs perceive risk as a risk of "missing the boat" rather than risking money (Borasi & Finnigan, 2010, p. 20). Networking and communicating their vision for building support is another trait of social entrepreneurs (Borasi & Finnigan, 2010).

Entrepreneurs are also good at solving problems by finding alternative strategies or approaches and responding to clients' needs (Borasi & Finnigan, 2010). The ability to innovate, articulate a vision and take risks is congruent with the notion of leadership (Man, 2010); proactivity is related to transformational leadership (Eyal & Kark, 2004). However, Borasi and Finnigan (2010) found that entrepreneurship and leadership require different traits, and entrepreneurs sometimes need a champion to carry out their innovation. Entrepreneurial leadership in education is not driven by competition for profit, but for its social values. School principals use their entrepreneurship when interacting with parents, especially when the parents come from marginalized populations such as migrant workers and refugees, and provide them with social and cultural capital (Bourdieu, 2002). Thus, entrepreneurial leadership in education includes seeking to innovate, identifying opportunities to mobilize resources for fulfilling a vision regarding school, and working relentlessly to materialize it. This applies to innovations in school. However, principals may consider parents' involvement and wellbeing part of their role as entrepreneurs, as funding for parents comes entirely from outside sources, since they are all extra-curricular activities; thus, they are not restricted by the government (Eyal, 2007).

3. SCHOOL-PARENT RELATIONS

Parent-school relations were typified by Epstein (2010) as: help families establish home environments to support children as pupils; design school-to-home and home-to-school communications; recruit and organize parents' help and support; provide information to the family about how to help pupils with curriculum-related activities; include parents in school decisions; and collaborate with the community.

The above types can be classified by degrees of involvement (Goldring & Shapira, 1993). Parental involvement refers to participation or reactions of parents when they do not have control over the educational processes in schools. Parental empowerment refers to parental control in schools, manifested by the principal letting parents take part in decision-making (Eyal, 2008).

The degree of parent involvement is dependent on the economic, cultural and social capital they have. Economic capital, e.g. their SES, affects their ability to provide their children with extra educational services; cultural capital consists of knowing the rules of the game, having information in general and in particular, such as their children's rights and school standards and values (Lareau, 2015), and congruence between their values and those of the school (Lareau, 2015); social capital consists of networks that grant them access to resources, so that they become members of society (Bourdieu, 2002). All these affect the children's ability to obtain high achievements (Lareau & Weininger, 2003). Low-SES parents, such as migrants and refugees, are passive in their relations with school and the patterns of their involvement are different. That is because they lack the means to contribute materially to the school, they do not have information, there is incongruence between their values and those of the school, and they do not have access to social networks.

The relations between school and parents have changed since the establishment of the State in 1948. The Israeli educational system was centralized on its establishment and parents were not allowed to be involved until the 80's, due to the mass immigration of Jews into the country and the need to build a national identity (Eyal, 2008). Since then the system has been decentralized and partially privatized (Harel Ben Shahr, 2018). This promoted parental initiatives and schools of choice (Eyal, 2008). Parents became involved in several areas and on various levels.

3.1. Refugee and immigrant parents' involvement

Migrant and refugee parents are unable to provide academic, emotional or cultural capital to their children, because they lack these resources, and because they have encountered trauma themselves (McBrien, 2005; Rah, Choi & Nguyễn, 2009).

There are several barriers to refugee parents' involvement in school: (1) lack of language proficiency (Bergset, 2017; Rah et al., 2009); (2) time constraints due to family socio-economic status; (3) traditional family structures (Rah et al., 2009); (4) cultural differences - for instance, home-school collaboration is not the norm in the refugees' countries of origin (McBrien, 2005), or parents express dissatisfaction with the lack of discipline (Tadmor-Shimoni, 2008; Bergset, 2017) in the host country; (5) deferential attitudes towards school authority - perceiving that voicing an opinion about school matters is a lack of respect for the teachers (Bouakaz, 2009 in Bergset, 2017); and (6) lack of information regarding their new environs (Eden & Kalekin-Fishman, 2002).

This study aims at exploring the actions principals take to pursue their vision regarding the parents, and the entrepreneurial characteristics and behaviors they use for that purpose.

4. THE ISRAELI CASE

The school studied here is a Jewish State school that serves the children of work migrants in Israel, and refugees who claim to be asylum-seekers, most of whom have not been granted that special status and remained undocumented. The first influx of migrant workers to Israel occurred in 1998. They came from Latin America, Africa, the Far East Turkey and the Former Soviet Union, either as tourists or as temporary permit holders (called 'foreign workers' in Israel) due to the shortage of caregivers and manual workers in Israel but stayed on in the country and became undocumented. Most of these parents are perceived now as residents, with no possibility of obtaining citizenship. In 2007 refugees and asylum-seekers, mainly from the war-stricken countries of Sudan and Eritrea, infiltrated the country. Their children are more exposed than veteran pupils to events such as parents being arrested by the police or immigration police, fathers living abroad because they left or were deported, or physical violence in the family (Meir, Slone, & Lavi, 2012). These parents are perceived by the law as potentially deportable. Although the United Nations Conference of July 28, 1951 framed laws, regulations and definitions regarding refugees, which are implemented by the UN Commissioner for Refugees (Anderson, Hamilton, Moore, Loewen, & Frater-Mathieson, 2004), in Israel these parents are not recognized legally and they are not welcome. However, their children are eligible for education, as specified in the Compulsory Education Act of 1949. The school population comes from 48 Third-world countries, speaking 20 languages.

The principals applied their entrepreneurship to organize and empower the parents by mobilizing funding, recruiting volunteers and initiating projects, and caring for their needs beyond school boundaries. The questions that arise are: (a) what triggered the principals to use their entrepreneurial skills to empower the parents? (b) how did the principals perceive their role vis-à-vis the parents? (c) how did the principals use their entrepreneurial skills to enhance parents' integration? Although the school is in a unique situation, the actions of the principals are generalizable to entrepreneurial leadership and its opportunities.

5. METHODOLOGY

This qualitative study uses a 'critical events' narrative inquiry method (Mertova & Webster, 2012), with the interviewees identifying the critical events (McLaren, Murray, & Campbell, 2014). A critical event is "an unplanned and unstructured event that significantly impacts the professional practice of an academic practitioner" (Mertova & Webster, 2012, p. 16). The event can be internal or external. The impact of the event on these people has considerably changed their professional worldview. Mertova and Webster (2012) distinguish between 'critical', 'like' and 'other' events, depending on the degree of significance and uniqueness of the event. A 'critical' event is "unique, illustrative, and confirmatory in nature in relation to the studied phenomenon" (Mertova & Webster, 2012, p. 16). An event that is not unique as the critical event but is identically significant and repeated the experience and broadened the knowledge of the critical event, was labelled a 'like' event (Mertova & Webster, 2012). Events that occurred independently of a 'critical' event but were interwoven in it were labelled as 'other' events, since they added information regarding the 'critical' event (Ibid). This study includes only 'critical' events.

Usually critical events (or incidents) are identified through narratives of the informants in face-to-face interviews (Ibid). However, in this study numerous sources of information were used to present their narratives, due to the limited time of the staff and principals for long interviews, because of the growing attention they have been given by the media. Thus, information was retrieved using a 'data triangulation', which is the use of multiple sources of data to reach the same data set, to study the phenomenon from different perspectives (Eyal 2008; Zambrana, Ray, Espino, Douthirt Cohen & Eliason, 2015). The different sources include face-to-face interviews with teachers and supporting staff, two out of the three principals, document-reading such as interviews in the newspapers and on the internet, and school observation.

The data were collected during a period of eighteen years, which included three principals. This study is part of a larger study conducted since 2002, which explored developments in this school in different fields. The first part explored the teachers (Eden & Kalekin-Fishman, 2002), this study explores parent-school relations, and the next study (in progress) will examine school-State relations.

6. FINDINGS

The findings are presented for each principal separately, to show the external and internal events that occurred and the way they shaped the principals' entrepreneurial leadership. Only activities initiated by principals as a result of critical events are presented here. All three principals shared a vision in which the pupils and parents "are all Israelis to us" (a phrase stated repeatedly by interviewed teachers and staff members), contradictory to official State policy and to the opinion of a large portion of society. Thus, their actions aim at achieving this worldview. First, the external events that influenced principals at the external macro level, which are State policy, are presented; then events on the mezzo-community level; and finally, the internal micro level of innovations the principals introduced vis-a-vis the parents are discussed.

6.1. First event: The influx of migrant workers

The first principal who experienced this critical event led the school in 1992-2003. On the macro level, the first children of migrant workers entered school in the early 2000's. On the mezzo level, some local parents objected to these children attending school. On the micro level, this elementary school was faced with the challenge of dealing with these children, most of whom were born in Israel but did not speak the language and were not Jewish; who were obliged to attend school but were ignored by the State and not financed until 2002. In addition, their parents did not speak the language and were poor but not eligible for any financial assistance from government agencies (Ministry of Education, health care and insurance, welfare services).

The principal responded to these events by mobilizing support from the municipality and from local parents who welcomed the newly-arrived families as a result of the principal's actions.

Mobilizing resources: because the children were ignored by the authorities (Ministry of Education, municipality) the principal did not have alternative sources of funding. She sought funding from the municipality. She negotiated with them until they did, as she said about herself "I am a leech" (Eden & Kalekin-Fishman, 2002). Later, the municipality established an information center for the migrant workers and cooperated with the school.

Mobilizing veteran parents: in her struggle to have the Ministry of Education recognize these children and allocate money for them, the principal mobilized some local parents from the Parents Association, who had connections with some politicians attempting to influence political decision-making.

Collaboration with the community: the undocumented parents would bring their children to school, but then the police would appear at the school and arrest the fathers. The principal initiated an agreement with the police not to position themselves close to the school. The police have stayed away from the school since then (Eden & Kalekin-Fishman, 2002).

Cultural mediator: having a bilingual liaison officer is mandated by the Ministry of Education for Jewish immigrants. However, children of migrant workers were denied any educational service except for the obligation to attend school. Therefore, the principal demanded that one of the qualifications required from teachers be the knowledge of a foreign language which was spoken in school. Later the parents who became more veteran served this function.

Assisting with bureaucracy: The principal also helped a parent with documents of application for family reunification (Eden & Kalekin-Fishman, 2002).

In sum, the first principal had limited opportunities to act, but she acted beyond her role as a principal and established the basis of networking for her successors and for the establishment of relations of trust with the parents (Bergset, 2017).

6.2. Second event: The influx of refugees and asylum seekers

The second principal experienced the macro critical event of the arrival of refugees and asylum seekers while leading the school in 2005-2011; they were undocumented and status-less, mostly from Africa. The mezzo community level was the merger of the elementary school with a junior- and high- school to form a k-12 campus. Also, the local veteran Jewish families left the neighborhood or sent their children to schools outside their zone; due either to objections to their children learning with the Africans, or because they moved to more affluent places. For the first time in the country, a State-Jewish school was comprised of non-Jews, non-citizens who did not speak the language, and did not know the history of the country. This is contrary to planned only-refugee schools in other countries such as Sweden, where the schools could consolidate resources, competences, and

minority-language teachers in a single school (Nilsson & Bunar, 2016). The principal recruited volunteers, funding, and initiated activities for parents that would enable them to integrate into the host society.

Mobilizing resources: By the time this principal was in office, school principals were granted more autonomy and had more opportunities to network and mobilize support. The principal approached a non-profit anti-deportation organization to help the parents, by advising them how to deal with the bureaucracy they faced. This NGO has operated on the school premises since then. The NGO advises parents how to avoid deportation, finds other countries that agree to host the deportees, and how to write letters to authorities regarding their status, such as asylum seekers (Davy, 2016). NGOs operate in schools or in the community in other countries (Rah et al., 2009); however, here they operate in a situation of deportation threats to parents.

Another source is volunteers such as retired professionals and teachers. These volunteers work in various areas needed by the asylum-seekers and refugee pupils and their parents.

Information: Medical students from a neighboring university volunteered to teach hygiene and health issues in Israel to refugee parents, since refugees lack information and access to health services (Davy, 2016). Volunteers were also brought in to teach the new language to the parents as it is linguistic capital (Blackledge, 2001), the lack of which is a barrier to helping children with homework and to involvement in school (Rah et al., 2009). They also arranged psychological diagnoses for pupils who underwent traumas, which the parents could not afford to pay; and informed parents of potential dangers, such as a case of a pedophile in the neighborhood, as most parents are mostly interested in their children's safety (Ibid).

Parents received help in finding employment and professional training, through the school's cooperation with the private sector, to help the parents become contributing members of the community (Davy, 2016).

The school also provided them with counselling on parents-adolescents relations, since these are different in Israel from those in their home countries. In addition, guided field trips were organized for parents through non-profit organizations and museums, to learn about the history of the country. This was done to socialize them nationally, and to give them a sense of belonging.

In sum, the autonomy granted to principals enabled the principals to look for opportunities outside school for assistance, and to mobilize financial and manpower resources to initiate innovations that meet the unique needs of these parents.

6.3. The third event: The deportation threats against refugees and asylum-seekers

The third principal was appointed in 2011 and is still in office. He experienced, in addition to all the above events, the event of increasing threats of deportation of parents and children made by the government. In August 2010 the State issued a statement which granted legal status (but not citizenship) to children of migrant workers born in Israel who attended school at that time, but not to children of asylum seekers and refugees who were born abroad and who joined school later, or were graduates at that time (Kibbutsim College, 2011). In 2018 the threats became more real, as the government concluded an agreement with an African state to receive them, even non-voluntarily. The micro-level event was the sudden absence of children from school, and its impact on the remaining pupils, some of whom were in the same situation. That plan was later cancelled following major objections by the general public.

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Informing parents: The actions initiated by the principal aimed at revoking the State decision about deportation. The principal gathered the parents in a special meeting, stating to the media that the school would issue them a document confirming that their children attend school to prevent deportation, and denounced the government deportation decision as an immoral decision (Fishbain, 2018).

Mobilizing support: the principal mobilized the media by inviting them to the above meetings and by being interviewed on the main media channels. The principal opened a hotline, on which parents could call him 24 hours a day when informed about their coming deportation or other emergency situations. Thus, the staff perceived the principal as "forming a fence between the parents and the State" (staff member). The pupils and staff of this school, together with other schools that have a growing number of undocumented children and parents, demonstrated against the recent deportation threats of some of the parents and children (Alon, 2019).

In sum, the principal used his networking skills to struggle for his vision of turning the parents into Israelis and revoking the government decision to deport them.

7. CONCLUSIONS

The principals used their resources and their acquired entrepreneurship abilities to pursue two goals. The first was to improve parent-school relations by "imparting the skills parents needed to navigate the educational system on their own" (Davy 2016, p. 175). The second was to enhance social and cultural capital in parents, that would enable them to integrate into the host society. For this vision, articulated in cooperation with the staff, they mobilized money and volunteers and media attention. They scanned the environment for support such as the media; they relentlessly sought opportunities and seized them. such as the growing size of civil society manifested in volunteers; and gathered information regarding the projects they implemented in school.

The actions of the principals regarding the parents over the years can be analyzed using Bourdieu's (2002) notions of social and cultural capital, defined as the accumulation of resources that provide power in various situations. The literature shows that there is a connection between low capital and pupils' low achievements (Ciabattari, 2010), and between teachers' use of their capital and their interaction with parents (Addi-Racah & Grinshtain, 2016).

The principals helped parents accumulate the three forms of capital: economic, cultural and social. They enabled the parents to accumulate economic capital, manifested in their attempts to find employment and training for them. The principals enabled the parents to accumulate cultural capital which means qualifications, habits, norms and behavior (Bourdieu, 2002), and knowing 'the rules of the game' of how the school system and society in general work, so that they can use it to their advantage (Lareau & Weininger, 2003). This is acquired by socialization or inherited (Lareau, 2015). The principals achieved this by providing parents with knowledge about how things are done here, such as the health system, counseling on adolescent rearing, and language proficiency. Social capital, which the principals enabled the parents to acquire, is defined as an "aggregate of the actual or potential resources which are linked to...membership in a group" (Bourdieu, 2002, p. 286). The principals provided parents with opportunities by connecting them with NGO's, and by creating a hotline on which parents can call at all times when they face deportation notices or any other emergency; thus, establishing a social network for the parents. The principals also provided the parents with national socialization aimed at turning them into members of Israeli society and minimizing their marginalization and 'outsider' status. They acted to

provide parents with information. Information is defined by Coleman (1988) as an important element of social capital, as through information people acquire the norms and values of the local society. These include their children's education and neighborhood safety, in addition to the usual activities that schools conduct with parents. The more knowledge parents have and the more norms they hold that are congruent with school norms, the more they feel comfortable in interacting with teachers (Lareau, 2015). Thus, teaching the parents the dominant norms will make them more involved and integrated into society.

Parental involvement is encouraged in every setting as the pre-determinant of children's outcomes. Parental lack of direct involvement in school is perceived by teachers as bad parenting (Al-deen & Windle, 2016; Blackledge, 2010; Lareau, 2015). This case reveals that principals extended their entrepreneurship beyond their original role, and used their autonomy to encourage parents who came with no capital required for effective participation in school and society. The principals did not wait for "big-level societal change to address the inequities that marginalized pupils are experiencing" (Davy 2016, p. 174). Rather, they provided assistance to the parents, thus replacing the regulatory agencies. Entrepreneurship is related to neo-liberal ideas that stress competition and marketization of education, thus it serves to reproduce the hierarchical structure of the educational system. However, it also holds opportunities when principals have a social vision, as it enables changes that are not deep at the macro level but generate transformation of parents of marginalized populations at the micro school level by empowering them.

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Chapter #7

THE SCREENERS PROJECT The Age of New Communication

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ABSTRACT

Nowadays, daily-use of a computer, notebook, tablet, and other display is natural. Thanks to the development of new technologies, we are gradually moving from textual-cultural to hypertextual expression. The Internet is a relatively new data medium and requires a new method of reading and working with information. New media, coupled with technical advances (in addition to art), brings about a cultural transformation of mass society through a wealth of easily accessible visual data with different purposes and content. Contemporary life in our global society manifests itself in two ways: everyday life in the real world without a connection and a digital platform through which one is connected via a screen. The rapid development of the Internet and digital technologies is also reflected in art education as well as the creations of students without the use of computers.

Keywords: digital platforms, identity, internet, reshaped reality, generation Z.

1. INTRODUCTION

The present era is marked by the end of traditional communication, manifested by frequent communication via various screens and displays. Mobile technology further allows us to redirect our attention to a different digital environment instantaneously. There is an increasing number of people for whom it is natural to integrate their Self into the digital realm and create digital identity - a virtual profile through which one can communicate and live. I'm working on research, called 'The Screeners Project: The Age of New Communication'. This research explores two contemporary life platforms, digital (online) and biological (offline), because today we are constantly switching between these two worlds. The digital sphere influences our cognition towards life itself. It prompts several questions: How is technological acceleration significant in art education, particularly with respect to "Generation Z" (born after the year 2000). Because digital platforms are becoming more and more important, how do they interfere with the life and communication of members of this generation? These are the main research questions I would like to answer.

Figure 1.
Illustrative image for “The Screeners project”, 2019.



2. BACKGROUND

I have previously dealt with digital technologies and changes in thinking within a globalized society, for example, in the ‘Dialogue’ project, in which I became aware of our connection with television screens. Television long-ago replaced the family fireplace, and people have since started to prefer the artificial, simulated lives of fictional characters over their own lives. Screens and displays have, for several generations, been an essential part of everyday life. While I was working on the ‘Dialogue’ project in 2003 at the Academy of Fine Arts in Prague. I longed for love and wanted to appropriate the actor's confession of love, to become a metaphysical part of his love. I edited out the actress to whom the confession was addressed and placed myself there instead. I put myself into her role. I lived my dream, albeit simulated, to compensate for my loneliness.

Figure 2.
Stills from “Dialogue” video, 3.22 by Petra Pětiletá.



When I later started teaching art education, I realized to what extent student artworks could be reflections of society and its various aspects (consumer expansion, consumer trends, transforming communication thanks to information technology, hypertexts, applications, and

games). This is also increasingly projected into student artworks. The computer aesthetic of digital environment ‘windows’, the navigation of pages, and the sorting of information influences artistic reasoning as well. Digital computer models/artwork is gradually becoming more and more a part of conventional analogue art production (computer-less creations), transforming the cultural archetypes at the same time. *“Because new media is created on computers, distributed via computers, and stored and archived on computers, the logic of a computer can be expected to significantly influence the traditional cultural logic of media; that is, we may expect that the computer layer will affect the cultural layer.”* (Manowich, 2017, p. 60).

2.1. Theoretical base

2.1.1. Digital era, digital possibilities

For digital life we need to be online, and it’s the essential thing today. We need internet. One of the critical study, which completely describes nature of Internet, how is it modifying our thinking. In the book of Nicolas Carr, *The Shallows: What the Internet is Doing to Our Brains* (2017), Carr pays attention to the Internet as a new hybrid data medium, documenting the crucial importance of Gutenberg’s invention of the letterpress in the transformation of human understanding and in spreading and reading the imprints of thoughts through the use of character sets—words. With its arrival and expansion, people learned something completely new and literacy gradually penetrated all households. Today, linear text has been replaced by *hypertext*, which owes its existence to an invention in the development of literacy no less of a breakthrough than was the book at that time: the Internet. Indeed, this has always been the case with images. The only difference being that today, thanks to the digital environment of the Internet, we have many more of them around us than ever before, and thanks to constant acceleration, the time to evaluate all the information viewed or read has been reduced. It is natural for the younger generation to go rapidly through a large amount of internet-based visual information on a daily basis, especially on social networks or in other virtual environments.

Due to multitasking, it is common today to have several windows (tables) running simultaneously and switch between them. The biggest problem Carr (2017) and Spitzer (2014) see is that switching attention in the digital environment shatters attention and concentration, which contributes to less conscious action. In my research I’m looking for internet aspects in students’ artworks, how these influences from digital platform is appearing in non-digital picture. Internet navigation obviously influences students’ artworks. I collect these artworks, mainly those that acknowledge the significant fact that we are living in a world where we are naturally switching between the two platforms of digital (online) and biological (offline).

The key to memory consolidation is attentiveness. Storing explicit memories and, equally important, forming connections between them requires strong mental concentration, amplified by repetition or by intense intellectual or emotional engagement. The sharper the attention, the sharper the memory. ‘For a memory to persist . . . the incoming information must be thoroughly and deeply processed. This is accomplished by attending to the information and associating it meaningfully and systematically with knowledge already well established in memory.’ If we’re unable to attend to the information in our working memory, the information lasts only as long as the neurons that hold it maintain their electric charge—a few seconds at best. Then it’s gone, leaving little or no trace in the mind. (Kandell, 2007, p. 210).

Various neuroscience studies warn of an emerging ‘digital dementia’ in connection with digitization in general. For example, studies and research by Manfred Spitzer point to visible changes in brain function (changes in the quality of cognitive function, effects on long-term and short-term memory). On the other hand, such changes could represent an evolutionary shift, characterized by a species adapting its capabilities in response to changes in its environment. However, given the aforementioned new development in the human brain and psyche, these development trends can in any case be expected to project into our social and cultural functioning and will undoubtedly be reflected in interpersonal communication strategies as well. What changes they will bring and what impact they will have, we can only assume. In the postindustrial phase, the development of society is, in short, accelerating more and more thanks to the technologies, to which the youngest always adapt best. The Internet can, of course, also be perceived as a powerful manipulation tool which is gradually replacing traditional print media. Its effect on the recipient of information is, in comparison to printing, much more variable, multiplying its influence on users with its incomparably higher speed of information dissemination and transmission. The internet contains a large amount of hidden software, most of which use personalisation to make choices without us. In this way it is actually artificial intelligence, that is shaping our choices in a smart way. *“For example, it used to recommend photos, videos, music and other media. and it also used to suggest people what to follow...”*(Manowich, 2017, p. 8).

We - users don’t have to necessarily know about existence of AI (artificial intelligence, but it is there. We are becoming algorithmic. For “Generation Z”, this means that algorithms are, in some part, educating them from early childhood.

Other current philosophical studies devoted to a critique of the Internet as a data medium for political use of strategies in various forms of internet communication. Nowadays almost everyone is an internet user.

“In many situations, users do not deliberately ponder over whether or not they should engage in media use. Instead, media exposure is initiated unconsciously through media habits. More specifically, habits are characterized by automatic, impulse-driven initiation of behavior. Thus the more habitually a medium is used, the more likely the medium is selected automatically and impulsively.” (Gilroy-Ware, 2017, p. 33)

Studies point to the notion of neoliberalism in connection with the digital internet sphere having become a huge haven for the free market and broadcast without admission. There is also talk of the Internet as a tool to accelerate shifts in the frame of capitalism, power, and control (Bown, 2018; Zizek, 2018). The ‘Big Data’ theory speaks of collecting digital data by the largest servers, such as Google, which offer its data backup services for free, but the collected data then becomes a source of user information (metadata). Digital information represents a modern nonmaterial business commodity. In today’s age, personalization and the possibility to comment on almost anything thanks to social networking means that every user is creating their own ‘identity footprint’ or, if you like, a data trail in the online internet environment. Nowadays, quite often, people, regardless of their age, experience almost pathological dependence on constant internet access. With little exaggeration, the Internet could be seen as external human memory or as the ‘central hard-drive of digital version of humanity’, filled with migrating data ‘unbound’ from its original context, full of copies of copies.

“Technology is not only a helper for human activity, but also a powerful force that transforms these activities and their meaning.” (Winner in Carr, 2017, p. 54).

The digital (online) and biological (offline) platforms of are reflected in human life by switching between these two positions, often automatically. This has increasingly become second nature. Our digital life is part of our biological one – today the two are inseparable.

“In many situations, users do not deliberately ponder over whether or not they should engage in media use. Instead, media exposure is initiated unconsciously through media habits. More specifically, habits are characterized by automatic, impulse-driven initiation of behavior. Thus the more habitually a medium is used, the more likely the medium is selected automatically and impulsively.” (Gilroy-Ware, 2017, p. 33).

Today, it is to a certain extent possible to evaluate how, in a relatively short time, our society has changed thanks to mobile displays, and how much the generation gap has increased. Screens entered our society with the expansion of television broadcasting. For older generations, computer monitors and the Internet are used more for passive entertainment—for watching videos or, alternatively, for finding information. These digital technologies are important for them as additional tools. The middle generation uses digital technology and the Internet knowing the interactive possibilities with which one can work, if possible. However, for Generation Z (people born after the turn of the millennium), the digital world is a natural and inseparable part of their lives in a much deeper way than for previous generations. A connection and a wifi symbol are so important to much of our globalized society that the inability to connect to the Internet can be a source of great stress.

Since children often have mobile phones from an early age, it is logical that content from the digital environment plays an important role in their upbringing. In fact, children learn based on what they are experiencing in the moment, regardless of whether it is in a virtual world or a real world. Digital tools and media, according to current neuroscientists (Spitzer, 2014; Carr, 2017; Gilroy-Ware, 2017), additionally shape how children think in a way that is increasingly creating a communication gap between people of different ages.

Alfie Bown describes the current pervasive internet culture as a ‘distraction culture’: *‘We enjoy hundreds of essentially mindless things which fill up our time—not just mobile games or online spreadsheets, but also social network notifications and YouTube videos’* (Bown, 2018, p. 35).

It is as though we were living in a discourse in which we prefer ‘insignificant’, immaterial things on the Internet, whilst we have much less time for matters of importance (building actual relationships, developing patience) which we need to acquire our own life experiences from the biological (offline) world. At this point, however, we are diverging from Generation Z, for which ‘digital issues’ (online world) seems that are often more important than experiences in the biological world. Can it be true? It is, of course, also necessary to consider the specific developmental stage of childhood—it is typical and natural for children not to distinguish what is essential and what is not.

However, it is indisputable that the use of modern technologies will influence Generation Z in an educational and cognitive way in the future. Moreover, youth are the most easily influenced target group for a variety of purposes, from politics to marketing. When a person spends a lot of time in the digital sphere, they are essentially running from their own reality, which, according to social psychology, has an impact on their personality. The user-person automatically switches between two worlds and two self-representations (two different identities), transcending their physical Self in the digital version.

Figure 3.
Illustration image by Petra Pětiletá 2019.



2.2. Instant experience

In today's technologically accelerated society, we have the opportunity to indulge whenever we desire in a variety of easily accessible (*la jouissance*), nice, pleasant, appealing experiences or entertainment and humor. Digital platforms offer us an infinite number of possibilities to instantly satisfy our needs and desires in a variety of ways. Every user can indulge in a variety of simulative platforms on their mobile phones, and much faster and more efficiently than before. Everyday something new and funny arises which simplifies our lives. The digital sphere also serves an escape from the biological present or satisfies our need for its 'modification'. This phenomenon was addressed, for example, by Gilles Lipovetsky in his book *Hypermodern Times* (2013).

'Enjoyment' ('*la jouissance*' in the original) as a phenomenological term was first dealt with by Jacques Lacan. But another phenomenon of postmodern society is 'personalization', which gives us the opportunity to tune into the services we receive as well as many other matters according to our discretion and needs. Our limitations have decreased to the point where we, additionally, no longer need to (needlessly) wait to share anything. Gilles Lipovetsky (2008) calls this state a 'culture of right now'. For this culture, it is typical to have changed its perception and conception of time. Today's post-industrial society is focused on 'now' with less regard for the future. The studies of these authors show that the aspect of 'instant action' is also manifested in the sphere of "offline" communication, where it may seem difficult to wait.

Of course, it should be noted that all of the above-described phenomena developed independently outside the digital environment, is only accelerating. (Lipovetsky 2008) Lev Manovich examines in his works the nature of new media, which has gradually become digital, in detail. Of interest is the way new media and technology reflect a certain human character. For Marshall McLuhan (1991), all media technologies were extensions of humans. Computer is extension of human thinking with all new automating algorithms

3. RESEARCH PROBE

I conducted a research probe. I focused in classes with students of lower gymnasium, age 11-16 year, later on I made an interviews with students in several schools, to have more valid spectrum. For a visual part of research, I assigned students the task of developing a mind map on the topic of digital (online) and biological (offline) worlds. There was no specific explanation about my expectations from participants. I was looking for an answer to the question of how students actually perceive the world around them in relation to the two mentioned platforms and how their perception reflects the impact of the Internet, social networks, or online games.

Of interest to me were the values the students would display through their work with the thematic mind maps. Mind maps have proven to me a better way of showing individuals' natural thinking. The principle of mind maps and work with them supports associative thinking and its gradual layering. The system for processing ideas on a given topic is not limited beforehand, which offers room for freer expression. Almost always, something rather unexpected appears in the processing of the mind map results.

Figure 4.

Ongoing evaluation from research probe of 60 mind-maps, 30 for "Bio" life and 30 for "digital life", made by 11 - 13 years old students, samples of mind maps.

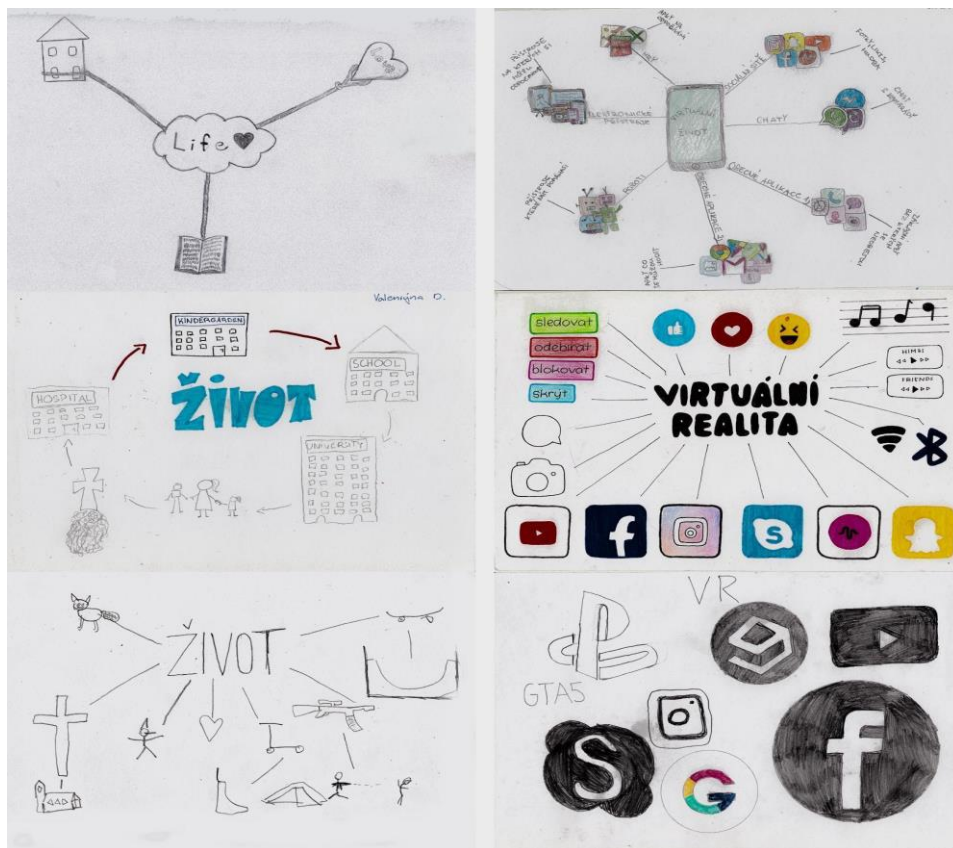
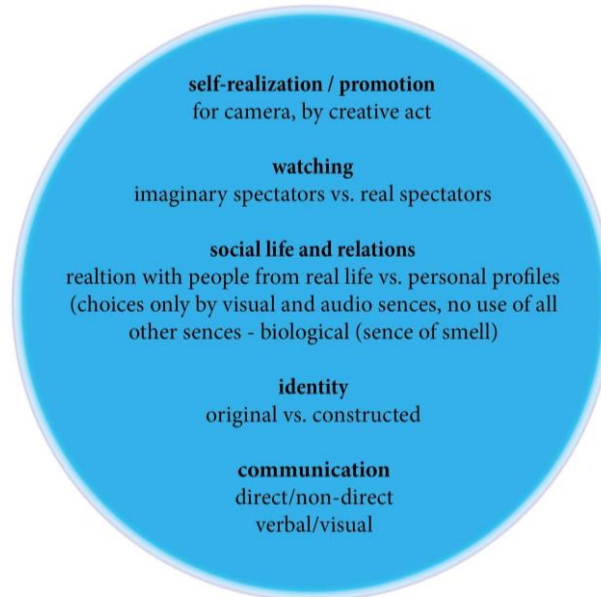


Figure 5.
Targeting the main aspects of my qualitative research inquiry, 2019.



3.1. Digital self (online) versus biological self (offline)

The concept of self-presentation in an online and offline platform environment varies. An interesting finding in this context is the investigation into the concept of an ‘avatar’ and virtual identity types, adjustable by the users themselves. The tools to realize a ‘new type of self-presentation’, or, alternatively, self-realization, are also constantly evolving, but in principle it is personalization. We choose what and how we modify when creating a profile even though it is always our reflection, a reflection of our original Self. Biological reality can sometimes seem—unlike an image for the digital sphere, which can be customized and corrected—imperfect. Most of the visual information on the Internet becomes a design, which, in some way, is moving away from reality.

The biological (original/actual) identity is overlaid by a digital identity (a profile or avatar). It appears that in users who live ‘interactively’ and always have one foot in the digital world- These identities cannot be completely separated. What photo or image a user chooses as their representation can act as evidence of many things, but it does not say much about reality; most of the time this image shows an idealized demo version of a user’s personality. In addition, younger generations lack perspective, take their online presentation extremely seriously, and place significant meaning in their profile. I had the opportunity to verify this fact many times in art education classes.

The analysis of the manually coded mind maps (qualitative analysis) consisted of sixty mind maps in total, and took into account the age of the interviewed students, which ranged between eleven and sixteen years. From the first look is significant, how important the icons of applications are for students. In many cases, the pupils needed to capture the icons carefully, leaving no time for anything else.

Students have a fondness for indirect internet chat communication because they admit they can hide behind it. Anonymity is not a barrier to communication; rather, on the contrary,

it makes it possible to communicate in a way we would not dare to if our identity were revealed. At the same time, on the other hand, they have the opportunity to communicate immediately and to exclude from their communication their own personality barriers: bad mood, appearance, or a psychiatric condition, which would be evident in real life. In the online world, they always have a choice of multiple possibilities, positions, and settings. However, students are well aware that physical movement and the experiences connected with it cannot be replaced by anything available in the online world yet, and that virtual pizza has no taste. Some children find the biological world less interesting and boring, due to which there is a growing habit of making this 'ordinary' world somehow special, refining and upgrading it. This habit then becomes second nature. In the context of time perception, pupils in the digital world appreciate that it simplifies their lives by never getting bored in it, and that they immediately have some audiovisual data available to entertain them. Whereas, the biological (offline) world itself does not have this ability to spontaneously entertain oneself.

4. FUTURE RESEARCH DIRECTIONS

In my investigation, I confirmed that children switch automatically between the two platforms (digital and biological). They often find the digital world more interesting (most children chose to work first on the digital world). They are well aware that they are expected to keep their screen time under control and maintain a distance from the online world, but it is difficult for them. It is a world which they can control to some extent, be it the use of social networks, something slightly more widespread among girls; playing interactive online games, which boys spend more time on; or identifying with influencers on channels like YouTube. In the lives of Generation Z, the online world plays a much more important role than we like to admit. In what way? My research also includes interview transcripts with students of different schools, and which will be used for further qualitative and quantitative study. I have coded these mind maps in the MAXQDA software as part of the ongoing qualitative investigation using the "in vivo method". I'm searching for new expressions and connections and preparing case studies that hope to prove that acceleration in digital living the redefinition of the concept of art education.

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Section 3
Teachers and Students

Chapter #8

SELF-ASSESSMENT THROUGH THE METACOGNITIVE AWARENESS PROCESS IN READING COMPREHENSION

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ABSTRACT

This study aims to investigate the relationship between adult self-assessment and the level of metacognitive awareness in reading comprehension. The sample of the research was adults who were participating in a training programme in order to obtain a certification of pedagogical competence during the year 2017-2018. MARSİ (Mokhtari & Reichard, 2002) was used as a research tool and open-ended questions were distributed to the trainees. The study focused on the overall index and the metacognitive development of the trainees. Both quantitative and qualitative analysis of the data was conducted. The analysis of the data revealed high level of awareness of metacognitive reading strategies ($M > 3.5$), which is also in relevance to high quality educational level of the trainees and their age ($M = 35$). With regard to the effect of the training on their metacognitive awareness, there has been a statistically significant increase in the overall average of MARSİ, which indicates the positive impact of the training on a population of high educational level and older than the normal trainee population. The qualitative analysis of the data revealed the enhancement of self-assessment among trainees and the development of reading skills through the use of digital technologies etc. The positive contribution of the training to the participants' metacognitive awareness seems to be focused only on those with pre-existing teaching experience and have been more highly self-assessed.

Keywords: self-assessment, metacognitive awareness, metacognitive skills, reflection, reading skills.

1. INTRODUCTION

Reading is one of the most important factors to enhance students' learning. Learners must know how they can comprehend the text effectively by using a variety of reading strategies (Iwai, 2016). Academic and technical courses demand substantial readings, so there is a need for learners to be able to comprehend what they read in order to succeed in their academic life and beyond. According to Paris, Lipso and Wixson (1983); Westby (2004), more proficient readers employ many different reading strategies, such as guessing, identifying main ideas, and focusing on text structures, while less proficient readers use fewer reading strategies.

Baker and Brown (1984) recognized the important role of metacognition in understanding the content of a text by storing information in memory. Cross and Paris (1988) highlighted the important role of metacognitive monitoring and control in achieving reading comprehension. According to Kolic-Vehovec (2010), metacognitive awareness and reading skill strategies, when developed parallel to the reading ability, can enhance reading comprehension and it could be considered that metacognition can predict levels of reading comprehension.

Flavell (1979) used the term “metacognition” to refer to an individual’s awareness of thinking and learning. He provided the following explanation: “Metacognition refers to one’s knowledge concerning one’s own cognitive processes and products or anything related to them” (p. 232). There are many other definitions, such as “knowledge about knowledge” or “people’s knowledge about what they know, remember and think” (Metcalf & Shimamura, 1994). The prefix “meta” of the word, refers to the process of the second level of knowledge. As a consequence, the cognitive and metacognitive skills get desegregated. Cognitive skills are perception, memory, performance, cognition, language, critical acumen, problem solving, decision making and critical thinking. The metacognitive skills on the other hand, “assist the understanding and awareness of the learning process and regulate the performance in terms of processing and assimilating new knowledge”. These are two interrelated processes that cannot be considered as separated parts.

In addition, according to Paris and Winograd (1990) “Metacognition introduces two key-features: Self-assessment and self-management of mind. Self-assessment refers to the theoretical aspect of metacognition, and more explicitly to the personal reflections that people make about their mental states, motives and traits as traumatized. Such reflections refer to “what do I know?. Questions, like ‘how do I think?’ and “when and how can I apply specific learning strategies?” (Paris & Winograd 1990, p. 17). Self-management refers to the practical form of metacognition, namely the mobilization of the mental processes responsible for the orchestration of various aspects of problem solving process, the alternative designs that we organize before dealing with a work, the adaptations we make while working on the revisions after completing our work (as above p. 18).

Metacognitive reading strategy awareness plays an important role in educational process (Ditzel, 2010; Mytrowicz, Goss & Steinberg, 2014; Ahmadi, Ismail, & Abdulla, 2013). Students who use metacognitive strategies perform better in reading tests and courses (Ahmadi et al., 2013; Tavakoli, 2014; Magogwe, 2013; Hong-Nam & Page, 2014; Memis & Bozkurt, 2013; Phakiti, 2006; Kummin & Rahman, 2010). Research has shown that positive effects of metacognitive strategies on reading comprehension and performance of students. Specifically, Estacio (2013) argues that the use of the metacognitive reading strategies can predict the reading comprehension test scores. Moreover, Ilustre (2011) claims that metacognitive reading strategies are better predictors of text comprehension and that problem solving strategies are positively correlated with reading comprehension. Another study found that training on the use of metacognitive strategies among low sufficient learners improves reading comprehension and performance (Ismail & Tawalbeh, 2015).

The significant role of a training program has been indicated by Royanto (2012) who examined the effectiveness of an intervention program based on scaffolding to improve metacognitive strategies in reading. She found out that the program activated unused metacognitive strategies, leading to the conclusion that the learners have the metacognition. However, Djudin (2017) found out that few college instructors explicitly teach strategies for monitoring learning. They assume that students have already learned these strategies in high school. However, many are unaware of the metacognitive process and its importance to learning. This study will contribute to covering the gap that there is on adult training in higher education, since most research focuses only on the students’ learning strategies in compulsory education.

2. METHOD

The MARSIS is designed to provide both an overall indicator of the level of awareness of metacognitive reading strategies and sub-indices on the three categories of strategies: general strategies, problem-solving strategies and support strategies. In this point, it is crucial to be highlighted that, this research focuses only on the overall awareness indicator as well as on the questions which refer to metacognitive development.

Both quantitative and qualitative analysis of the data was conducted. For the quantitative analysis of the data, the variable scales are described using the mean value, while the ordinates are referenced by the MARSIS total index. Parameter testing of t-test dependent samples (regularity analysis confirms the use of parametric methods), while the Wilcoxon-sign rank test was applied per question.

The qualitative study was conducted for a better understating of participants' perceptions on investigating trainees' skills. The study maintained a particular interest for the metacognitive skills developed through the trainee participation in the Program. An inductive thematic analysis was conducted on the transcribed data (Creswell, 2000). This approach supplies a frame work for the thematic analysis of qualitative data and provides a way of thinking about how to manage themes and data; this process is likely to reflect the analyst's awareness of recurring ideas and topics in the data (Bryman, 2016: 587).

2.1. Participants

245 adults participated in an education training programme in order to obtain a certification of pedagogical competence during the year 2017-2018 took place in this research. The participants were students' teachers studying in the educational training Programme and holders of higher level education degree of different specialties. More specifically, the trainees were of different specialty, such as Nurses, Civil Engineers, Doctors, Teachers, Lawyers, Economists, Accountants e.t.c. Sixty-two (62) out of them were males and one hundred fifty-one (151) out of them were females. Ten (10) out of them were under 25 years old, one hundred and eight (108) were between 26-35 years old and ninety-six (96) were older than 35 years old. One hundred twenty-one (121) out of them hold an undergraduate degree, whereas one hundred eighteen (119), hold a postgraduate degree and Phd. One hundred and five (105) out of them had pre-existing teaching experience, whereas one hundred thirty-nine (139) didn't have any teaching proficiency.

As far as the education training programme is concerned, it has been operating the last few decades in twelve cities of Greece and it provides the opportunity to the participants to gain a certification of pedagogical competence. It is a programme of pedagogy, theory and practice in which theory is integrating into practice through practical experiences within a contemporary learning environment. There are two semesters in the education training program. All the programme's courses are obligatory for all the participants during their training.

2.2. Instrument

MARSIS (Mokhtari & Reichard, 2002) was used as a research tool and open-ended questions were distributed to the trainees. MARSIS contains 30 questions and provides an overall indicator of the level of awareness of metacognitive reading strategies as well as individual indicators of metacognitive strategies in reading. A Metacognitive Awareness of Reading Strategies Inventory (MARSIS) was translated and validated in Greek student

population (Koulianou, Roussos & Samartzi, in Press). This study focuses on the overall index and the metacognitive development of the trainees. It refers to a selection from a scale in statements related to the relative reading strategy, which took place during the reading process and consists of 30 questions. The self-report tool involves three types of strategies: (a), problem-solving strategies, (b) global, and (c) support. Each of the strategies is associated with one of the three subcategories. Problem Solving Strategies (8 questions), Global Reading Strategies (13 questions), Support Reading Strategies (9 questions).

The questionnaire was completed in two phases during the year 2017-18, in the beginning and at the end of the education training programme. Of these 240 were complete, while in five of them qualitative questions were missing.

2.3. Objective and research questions

The scope of this study was to investigate the evolution of awareness of metacognitive reading strategies among learners of an education training programme in the School of Pedagogical and Technological Education (ASPETE) in Greece. More specifically, this research investigates the relationship between adult self-assessment and the level of metacognitive awareness in reading comprehension.

- What is the level of metacognitive awareness in reading comprehension of the trainees and how does this evolve during their participation in the training programme?
- How does the existing teaching experience of students affect the development of metacognitive awareness in reading comprehension?
- What is the relationship between development of the metacognitive awareness of reading strategies and self-assessment?

3. RESULTS

As far as the gender is concerned, the number of men is 62 and the number of women is 151. Regarding the age: 4.7% of students / students are under 25, 50.5%, among 26 -35 years, 44.9% is over 35 years old. As far as the level of education is concerned, 50.4% are graduates without postgraduate studies, while 49.6% have a Master's degree and PhD.

Regarding the level of metacognitive awareness in reading comprehension of the trainees and how this evolves during their participation in the training programme, the statistical analysis of the data revealed the high level of awareness of metacognitive reading strategies (about 70% of students were indicated at a high level, ie $M > 3,5$), which is consistent with the high educational level of the trainees (49, 6% holders of postgraduate / doctoral degrees), as well with the age of the trainees ($M = 35$, $SD = 7$).

More specifically, seven questions out of them have median '3' (ie, 'I do this sometimes (about 50% of the times)'). In twenty-three out of thirty questions, the trainees stated '4' or '5', (ie 'I usually do this' and 'I always or almost always do that'.) Three questions were statistically significant at a median of '4', revealing the positive effect of the programme. In two other questions, although the median did not change, there was a statistically significant improvement.

Table 1.
The evolution of metacognitive awareness in reading comprehension during the training programme.

	Median (at the beginning)	Median (in the end)	P
15. I use reference materials such as dictionaries to help me understand what I am reading.	3.00	3.00	0,002
6. I write summaries to reflect on key ideas in the text.	3.00	4.00	<0,001
9. I discuss my reading with others to check my understanding.	3.00	3.00	0,068
28. I ask myself questions I like to have answered in the text.	3.00	3.00	0,037
17. I use tables, figures, and pictures in the text to increase my understanding.	3.00	4.00	0,002
5. When text becomes difficult, I read aloud to help myself understand what I'm reading.	3.00	4.00	0,001
29. I check to see if my guesses about the text are right or wrong.	3.00	3.00	0,288

The specialty of the trainees is related to the negative attitude towards reflection, something that is mentioned particularly in the department of Nurses (a very high percentage did not answer at all and a very high percentage had a negative attitude towards the influence of the questionnaire and the program. It can be stated that, further research needed to investigate the representations of the different specialties regarding reading and metacognitive skills and their contribution to the educational process.

With regard to impact of the teaching experience on the metacognitive experiences of students participating in the program, statistic analysis did not reveal significant statistical differentiation in relation to the studies of the trainees. Of particular interest is the fact that positive differentiation is associated only with those trainees who have teaching experience in educational institutions or in non-formal education.

Figure 1.
Evolution of MARSII.



As far as the impact of the training programme on the metacognitive awareness of trainees is concerned, there has been a statistically significant increase in the overall average of MARSI, which indicates the positive impact of the training on a population of high educational level and of relatively older age than the normal trainee population. More specifically, although the level did not statistically significantly change [Mdnpre = 3.0, Mdnpost = 3.0 (where '3' = high), $z = -0.536$, $P = 0.607$] there was a statistically significant increase in the total mean MARSI [Mpre = 3.62, Mpost = 3.75 (in the range 1 to 5), $t(243) = -2.507$, $P = 0.013$].

The qualitative analysis of the open-ended questions showed the enhancement of self-assessment among trainees as a dominant metacognitive skill, and significant conclusions were drawn regarding reading skills through the use of digital technologies, the way of study, the link between theory and practice, etc. It is of most importance the fact that the positive contribution of the training process to the metacognitive awareness of the participants appears to be focused only on those with pre-existing teaching experience in educational structures that seem to have been more highly self-assessed.

Regarding the correlation of the improvement of reading skills with the use of digital technologies there is a positive correlation between the reading skills in comprehension during the implementation of the program and digital technologies. There was a variety in the terms that they used to describe digital technologies such as: technologies, internet, computer, website, Wikipedia. Negative correlation between specialty and digital technologies is noted only in departments of Nurses and Electrical Engineers, where there was not any mention of digital technologies at all.

According to the participants' responses, it can be claimed that trainees did not seem to be conscious in most cases of the fact that their negative attitude towards the questionnaire is a metacognitive process: "I was not influenced by the way of studying during the training program. The way of studying hasn't been changed since I was student". The programme has influenced my way of thinking, I have become tolerant; Nevertheless it did not affect my way of studying".

Regarding the way of studying, it can be considered that the development of the metacognitive awareness changed their way of studying: "Certainly it helped me understand some actions that I do unintentionally" "I will try to abolish the bad habit I have when I do not understand the meaning of a text, abandoning any effort. Now, I will insist on trying to understand the meaning." It can be claimed that the trainees learned how to apply the appropriate reading strategies effectively. It demonstrates the perceived acquisition of conditional knowledge, which is an important element in reading performance (Iwai, 2016).

Moreover, the trainees learned to link theory with practice: "I was more focused on how the theory is integrated into practice and I gained a more critical judgment on the content of all the modules I have been taught." "I believe that things I made unintentionally, now I am able to put them in order and I will use some helpful ways of studying more consciously."

The answers of the participants revealed the fact that although they used to employ self - reflective processes when reading they didn't know the terminology of them. "I didn't change my way of studying because I think it is effective. They only new thing I acquired from the programme is the fact that I learned the terminology."

The answers of participants, also, revealed the important role of metacognitive awareness in real life and in professional development. "I manage my time better; I do not postpone things for later. I will try to be more organizational and not postpone things in

the future”. “I stated to read having a specific goal in my mind and identifying the elements that were important for me as a student as well as a professional”.

As far as the importance of metacognition is concerned, a trainee leads to an epistemological and ontological assumption of great importance for education that “everything around us is Knowledge”. “I learned to read using keywords. In the second semester I was helped to understand that everything around me is knowledge”.

The trainee acquires a metacognitive awareness of the importance of associations, understanding the way we establish new knowledge in long-term memory, a basic pedagogical and theoretical assumption of the processes that we use in order to learn. “I have been collaborating to remember what I am reading and to understand in depth the meaning of the text”.

4. DISCUSSION

The qualitative analysis of trainees’ response data revealed that the trainees developed metacognitive skills in reading comprehension. More specifically, the trainees learned to monitor and control the Knowledge, something which is in accordance with Cross and Paris (1988), who have highlighted the important role of metacognitive monitoring and control in reading comprehension. The findings of the study are in contrast with other studies in which readers (typically young developing readers and some inexperienced adolescents and adults) have lower metacognitive knowledge about reading (Paris & Winograd, 1990). They do relatively little monitoring of their own memory, comprehension and other cognitive tasks (Flavell, 1979; Markman, 1979) and tend to focus on reading as a decoding process rather than as a meaning-getting process (Baker & Brown, 1984).

From the analysis of the data, it seems that the trainees who participated in the programme belong to the skilled readers. Although they did employ self - reflective processes and metacognitive strategies in reading, in many cases they did not know their terminology. Skilled readers, according to Snow, Burns, and Griffin (1998), are good comprehenders. They differ from unskilled readers in “their use of general world knowledge to comprehend text literally as well as to draw valid inferences from texts, in their comprehension of words, and when using monitoring and repair strategies” (p. 62).

In addition, the trainees stressed out the importance of metacognition awareness for their life and their professional development. They developed metacognitive skills, as reflected in their responses to the transfer of knowledge to their future lives and similar situations. The trainees of the programme belong to independent readers. On the contrary, according to Djudin (2017) novice learners do not make connections or see the relevance of the material in their lives. Furthermore, they developed the ability to dedicate their time to learning, autonomy, discipline, perseverance and information management in the learning process, which are basic skills in the Deusto model (Olalla, Mora, Paredes, Otero, Ildefonso, Ruiz, Eizaguirre & Sanchez, 2008), as well as in the Binkley et.al. model (2012).

According to the theory of Rosenblatt (1992: 8-9) which refers to literary experience, reading experience is described as a kind of intense personal activity, a means of personal exploration, of nature, of mental and emotional abilities, of the outside world, as well as alternative ways of life.

Regarding the correlation of the reading skills with the use of digital technologies the findings revealed the improvement of reading skills during the implementation of the program with the use of the digital technologies. More specifically, in terms of computer use, they developed skills related to the use of text as well as other more specialized

software and they realized the correlation between reading skills in comprehension and digital technologies, which are basic in the Deusto model (Olalla et.al., 2008).

In Greece the MARSİ has been used in teenagers with or without learning difficulties, with satisfactory validity and reliability (Koulianou et.al., in Press). In this study, the innovation lies in the fact that the MARSİ was used in a population of adults with particular characteristics. Finally, they approached a higher level of reading comprehension during the implementation of the program and they developed critical thinking, as their answers revealed. They were aware of what they were reading and they seemed to know the reason for reading. They had tentative plans or strategies for handling the problems they came up with as well as for monitoring their comprehension of textual information (Pressley & Afflerbach, 1995).

More specifically, this study argues that the trainees increased awareness of their own reading strategies. They were able to evaluate themselves and to amend the conceptions they hold about reading and learning from text. Becoming aware of their cognitive processes while reading is a first important step toward achieving the type of constructively responsive and thoughtful reading, that is emphasized by current models of reading (Mokhtari & Reichard, 2002).

According to Paris and Winograd (1990), such “consciousness-raising” has two benefits: “(a) it transfers responsibility for monitoring learning from teachers to trainees themselves, and (b) it promotes positive self-perceptions and motivation among trainees. In this manner, metacognition provides personal insights into one’s own thinking and fosters independent learning” (p. 15).

5. CONCLUSION / FUTURE RESEARCH DIRECTIONS

The research focused on trainees’ use and awareness of metacognitive reading strategies in the education training programme. Therefore, there was no significant difference between them regarding the studies, the results showed significant differences regarding the pre-existing teaching experience. The trainees who had pre-existing teaching experience in education structures could apply what they learned from the course.

It could be explained by the fact that the trainees with pre-existing teaching experience (mostly teachers) might have been more familiar with specific names of reading strategies and might have had better knowledge of these strategies than the ones with no pre-existing teaching experience. In addition, teachers were also in their field of expertise, where they could apply what they have studied and what they have learned from the course during the training program. On the other hand, the participants of different specialties (Lawyers, doctors, Nurses, Economists e.t.c) in the education programme had just started to learn literacy in general and they did not have a lot of knowledge of reading strategies.

In general, the qualitative analysis of open self-assessment questions revealed the enhancement of self-assessment as the most important metacognitive skill. It is vital the fact that the positive contribution of the training program to the metacognitive awareness of the participants appears to be focused only on those with pre-existing teaching experience in education structures that seem to have had themselves more highly self-assessed.

Reading strategies improve reading comprehension and lead to fluent reading. For this reason they can be taught to less proficient readers and can be integrated into training programs. In this case, it is proposed to enrich such training actions with more self-assessment practices and techniques, when designing and implementing them in order to contribute to a further improvement of the metacognitive awareness of all the participants. An analysis of the level of each different cognitive specialty is also proposed.

Finally, the need to further explore the representations of the different specialties for reading and metacognitive skills and their contribution to the educational process is also pointed out.

It should be mentioned that the role of the educators is very important as they should educate their trainees on these metacognitive strategies in reading comprehension during the period of the programme. Trainees must get used to connecting new information to former knowledge, to monitoring and evaluating the thinking processes, in order to enhance their metacognitive skills.

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Chapter #9

LEGAL CASE VS LEGAL TEXT How to Teach Law in Teacher Training

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ABSTRACT

Both scholars and educators agree on the importance of law education for future teachers. However, the predominant majority of methodological literature deals only with the K12 level. Law is complex, it has its own challenging terminology. The novelty of this chapter lies in offering methods for the implementation of these elements and presenting an example of how it is possible to ensure the basic legal and ethics preparedness of students in a teacher training programme. Our institute (Eötvös Loránd University, Faculty of Education and Psychology, Institute of Education), which is responsible for the pedagogical content of teacher training, recognised the lack of these elements in teacher training curricula. To this end we designed a course on legal and ethics knowledge. This course did not have antecedents, thus the author of this chapter, as the responsible professor, had the freedom to compose the methodology and content. The title of the course is “The Legal and Ethics Framework of the Teaching Profession.” This chapter presents the challenges during the first two semesters, the experiences of which involved modifications, and the students’ opinions about the course. Furthermore, the chapter offers best practices and tools for teacher educators in other countries.

Keywords: knowledge about the law, conscious citizen, self-esteem development, teacher training.

1. INTRODUCTION

Nowadays, all of us have to face two different phenomena. Firstly, as our world gets more and more difficult, the legal system becomes more complex. Secondly, we can often recognise the infringement of the legal norms. The more rights people have, the more numerous are their violations. Although the authorities have more advanced tools to handle these infringements, this is often impossible and, occasionally, not necessary at all. Hence, it is important to know our rights and obligations in order to know when it is essential to turn to the authorities, and when protecting our rights on our own is possible. The fact that the presence of law and legal regulations nowadays is more stressed than before underlines the importance of acting for one’s own rights (Delaney, 2016). Educating children about knowing their rights and obligations is a basic task of their family. Yet society and schools must not leave this aspect of education to the family alone. Although the family has a key role in this regard, in some cases the parents do not know much about their rights either, and, in other cases, the family may even be the cause of the infringement of children’s rights (Rónay, 2019). Thus, it is imperative to educate the children on basic legal knowledge which can only be generally secured by the school. Therefore, it is crucial to implement legal content in public education. As Pillay (2014) stated, there is no successful teaching without teaching educational rights. This is especially the case in societies where the level of legal knowledge is considerably low (Gajduschek, 2016). In countries where

a well-developed legal culture is lacking, and where values like the rule of law, human dignity, equal right to education, free speech, freedom of the press are weak, it is necessary to arm students with the understanding and basic knowledge of the law. Even so, the volume of literature on methodology is low (and most is from the seventies and eighties), and scholars mostly focus on the teaching of law in schools (see Gibson, 1970; Maxwell, Henning & White, 1975; Newmann, Bertocci, & Landsness, 1977; Pereira, 1988; Le Brun & Clark, 1989). Lately, several organisations responsible for the realisation of fundamental rights recognised the necessity of guidelines for teaching law in schools. So, the UN published the “*ABC: Teaching Human Rights: Practical Activities for Primary and Secondary Schools*” (United Nations, 2004), and the Council of Europe managed the birth of the *Compasito* (Flowers, 2008) and *Compass* (Brander, Keen, & Lemineur, 2015), Manuals for Human Rights Education for children and young people. These very important pieces tell teachers what to teach about law in school, but do not answer the question how to do it. Furthermore, scholars reported that teachers’ knowledge on law is in an alarming condition. Unfortunately, only in the US did scholars publish reports on every decade. Nonetheless, the conclusion of all of these was the necessity of offering legal courses to both future and in-practice teachers (Hyman, 1984; Przybyszewski & Tosetto, 1991; Balch, Memory, & Hofmeister, 2008; Gajda, 2008; Littleton, 2008). Hence, it is fundamental to teach law in a teacher training programme. This was also recognised by the universities, which decided to collaborate and establish the EduLaw project (www.edulaweu.eu). As the project contributors themselves noted, the project aims to introduce modules on law and rights in programmes of teacher training and educational sciences and contributes to building rights-based education systems in countries in transition.

Teachers, students, and parents must face several phenomena in the school and classroom such as aggression, black pedagogy, and the challenges of migration, as well as digitalisation. Nevertheless, we should not forget the fact that the teacher is also an employee. This means that teachers have rights and obligations not only in relation to students and parents, but as members of a school/workplace community, have rights and obligations to the school community, colleagues, principals, the maintainer, and the state. This is apparent not only in the legal framework but also the ethics requirements. As Gullatt and Tollett (1997: 131) state, “educators must learn more about legislation and court decisions affecting their lives.” Therefore, while it is crucial, it is not enough to educate (future) teachers on rights and obligations in general and in connection with students; it is also essential to prepare them to know their own rights and obligations. Summarizing the data and the facts, while there is a consensus on the necessity of teaching law to future teachers, and also on the content thereof, only few scholars proposed methods for this (Gullatt & Tollett, 1997; Balch, Memory & Hofmeister, 2008).

2. METHODOLOGY OF TEACHING LAW TO NON-LAW STUDENTS

2.1. Background of the course

Besides the aforementioned methodological challenges, the Hungarian teacher training system presents further demands. Differently from the previous so-called Bologna programmes, which pay more attention to the pedagogical and psychological content, the requirements in Learning Outcomes of the current programmes allocates only 28 credits (from the 300-360) to the pedagogical, psychological, and practical knowledge, part of which is supplying the candidates with legal knowledge. Hence, there is neither enough credits, time, opportunity, nor tools to offer the necessary legal knowledge. Most higher education institutions in Hungary formally solve this problem by offering a single 90-minute frontal lecture. In worse cases, they do not even teach legal knowledge at all. This issue is similar to the one Gullatt and Tollett (1997:132) mention: there is a “lack of room in the curriculum” for teaching law.

In our Institute, approximately 30,000 students study, among them there are more than 3,000 that take part in the teacher training programme. The number of students for the course may seem extremely low, but 23-25 persons is generally optimal, especially as the course is not compulsory. In the autumn semester of the 2018/2019 academic year (hereinafter referred to as the “autumn semester”), 23 students opted for the course. By the spring semester of the 2018/2019 academic year (hereinafter referred to as the “spring semester”), the number of the students did not change significantly: we had 25 students. In both semesters, the majority of the students came from the undivided teacher training programme, and only a few of them came from others. We can conclude that the course was popular among students, and the target group recognised the course’s potential. The course being non-compulsory allows for every student – independently of their programme – to opt for it, which is evidenced by the participation of one education master’s degree student in the autumn semester.

2.2. Recommended methodology in the literature

Even though the need to teach law to future teachers appears in current literature, there appear to be no detailed proposals for the methods. Scholars working on this topic typically approach it from the viewpoint of K12 education. However, the recommended methods for this age group are quite similar to how we should teach future teachers. Moreover, if we use the same tools, we can provide good examples for the students who can use them later as practicing teachers. The biggest issue in connection with the methods is the relationship between theory and practice. Where shall we approach the topics from? If we start from the direction of theory, students will be bored; occasionally, the content will be unclear because of the special terminology. If we skip theory, we will not be able to explain the case studies, and so the practical aspects will also be unclear. Johnson and Sublett (1969) reported on a programme which was developed in collaboration with teachers, curricula designers, and the representatives of local lawyers. They focused on practical knowledge connected to the local problems. The learning materials developed since then based on the were centred around examples. The books which target the pupils and the older students are full of simple stories (Brander, Keen, & Lemineur, 2015; Flowers, 2008). These books try to use easily understandable examples and explanations. They are in general a combination of theory, a clear presentation of the relevant law, and different difficult exercises pertaining to the legal topic (see: Compass - Manual for Human Rights Education with Young People, Compasito – Manual on human rights education for children). Gullatt and Tollett (1997) go a step further and emphasise the necessity of

collaboration between universities, legal authorities and local education authorities to develop workshops which can disseminate information about law within school. While this workshop model can help to fill the gap in sharing legal knowledge among educators, it does not offer regular pedagogical methods. Balch, Memory, and Hofmeister (2008) underline that the valuable legal textbooks available specifically for teacher candidates are no substitute for the methods of practicing law. Therefore, they propose using sample classroom situations and describe four such “scenarios”. This example also shows that the challenge is to find the ideal balance between avoiding dull legal terms and legal theories while retaining knowledge of the essential connections and basic terms applicable either to the school students or the teacher training programme students.

In what follows, this chapter presents the process of the course design. During this process, we had to face some challenges, so it was important to get feedback from students. After both semesters, the students were asked to fill out a questionnaire. The first time, we used the answers to survey the suitability of our ideas and correct the course design. The second questionnaire we used to review the appropriateness of the changes. For the latter purpose, in the next we are continuously asking for feedback. However, this chapter is not a research report. Tools similar to the research methodology were used specifically for the evaluation of the course by the students, and for checking the success of the methodology and its modification. The presentation of the results also serves this purpose.

2.3. Course design

The fact that this course did not have antecedents was a relief and a difficulty at the same time. The designer could work between broad limits but lacked all practical guidelines. Therefore, the autumn semester was an experimental one, and it was obvious that before the spring semester, the course needed modifications.

The most noticeable difference was in the schedule of the course. In the autumn semester, classes were held every week, which equates to twelve lessons (90 minutes each week). Although this was less overburdened, time limits were a constant challenge. The different topics could not be finished in the course of a lesson, the dynamics always broke down. Hence, the format was changed, and the course was held in 6 lessons (180 minutes at every other week). This secured a better dynamic, even though some students complained that the length was exhausting.

Nevertheless, the new schedule enabled the introduction of the topics, the participants, and the sharing of personal experiences, which were in separate lessons in the autumn, to be on one occasion in the spring. The combination of these topics reduced the formality of self-introduction as everyone had a story to tell. During storytelling, students were free to interject comments, which helped highlight their legal relevance. This provided a good foundation to continue the next lesson with the legal environment, and legal language. The situation was the same as with the organisational framework and the topic of interpersonal connections, communication, and aggression. While in the autumn semester, we could not connect these, in the spring the length of the lessons provided the opportunity to explain the connections between these elements of the schools’ daily life. Afterwards, we covered the following topics: the human being as a subject and person; the teacher in the school, the teacher as an employee; the student's legal position including their assessment and disciplinary responsibility. Despite the fact that teachers’ employee’s rights were more highly emphasised in the autumn semester, the spring semester’s approach to this topic from the direction of human dignity and the teachers’ connection to students, parents, colleagues, and the management yielded better results. In both semesters, the course ended with a summary, which was an excellent opportunity to answer the remaining questions and

evaluate the course together. The work done during lessons and the homework will be presented in the next subchapter, but it is necessary to mention that the presentation of homework (Case-study presentations no. 1 and 2) took an inordinate amount of time in the autumn. Therefore, it was necessary to reorganise it in the spring.

2.4. The students' work

2.4.1. The work at the lessons

The methods used during teacher training programmes, especially its pedagogical contents, is based on the students' expectations that the work in the lessons should be rather interactive, the lessons should be rather exciting, and they should have to work in groups, etc. Therefore, lecturers should avoid frontal lecturing, however, this is especially difficult during the theoretically grounding. Therefore, group work was the method of choice for students to be introduced to the regulations. The first step was the control, management, and institutional system of public education. For this, the students worked in groups and had to sketch the system using the Internet and a legal database. Next time, the students worked in groups again and tried to describe the system of a school as well as the interpersonal connections within a school. They could not use Internet resources; they had to discern the components and connections based on their own experiences and previous knowledge. When we continued the course with the topic of aggression, students were asked to draw a web, which demonstrated the types, forms and directions of aggression (Coloroso, 2014; Aáry-Tamás & Aronson, 2010). Due to the complexity of this topic, the group work was preceded by a discussion in the lesson. Effective use of this occasion is crucial. To give an example, we talked about human and personal rights, which are strongly connected to aggression. These were illustrated with movie scenes, after which the students were asked complete a questionnaire to describe the type and direction of the aggressions the scenes presented. It was also necessary to answer the question which rights were offended and by whom.

Opposite to the autumn semester, in the spring, the rules of disciplinary proceedings were emphasised more. Since this topic required deeper knowledge of legal norms, the group work came after a theoretical foundation. In the spring semester, this was complete with a simulation, which was connected to project work as homework. This tool is similar to the scenarios mentioned by Balch, Memory, & Hofmeister (2008).

2.4.2. The Homework

Besides the regularity of the lessons, the other meaningful change was the rethinking of the homework. While according to the original concept, students had to find two separate relevant cases from the Annual Reports of the Commissioner for Educational Rights, where the involved person – either as a victim (injured party), or as an offender – is, first, a student, second, a teacher. Using case-studies promises to be an appropriate approach of legal context for educators (Lauwers, Zaçellari, & Miço, 2019). Students had to create a power point presentations based on the given points of view. Unfortunately, for two occasions, 23 presentations proved too much, and often cases were the same (with only maybe the approach differing). Since the students' time management was weak, the presentations took up an inordinate amount of class time.

Thus, it was necessary to modify the original concept, which was done in coherence with students' proposed changes. Therefore, in the spring, students were assigned two different tasks, and the homework was combined with the lesson work:

1. Find one relevant case among the aforementioned Reports where the involved person can be a student or a teacher, similar to the autumn semester; they had to create not only a power point, but also a case brief. The presentation was limited to 5 minutes.

2. In addition, they had to complete a project work. First, they had to establish groups, and afterwards had to find a case in which the disciplinary responsibility of a student comes into play, and finally work out the script of a disciplinary hearing. The project week ended in the playing out of the trial at the lesson. After that, they had to assess this in a given template of the project diary by writing the roles and the rate of contribution.

2.4.3. The assessment of the students

In the autumn semester, the assessment was based on participation – 60% was required, and the preparation of the homework. The final mark's criterion was less elaborate and foreseeable. Partly based on students' opinion, partly on the marks handed out, a more complex system was created. The condition for assessment was participation in at least four classes (out of six). After all tasks, the students obtained points. The maximum available points were fixed in advance.

The reconstruction of the assessment system did not bring any major changes. While, at first, every student obtained 5 (which is the best result, while 1 means class failure), in the spring semester, it was necessary to refuse the assessment for one student who missed three classes out of six, and only three obtained 4 and 3. These latter students did not complete the homework (the participation in the project work). It is visible that the more detailed assessment system leads to differentiation in the marks, but the wide range of each mark reduces the differences.

2.5. The evaluation of the course

Besides the aforementioned discussion with the students in the last, summarising lesson, students also had the opportunity to provide anonymous opinions. As part of the Quality Assurance System, ELTE University uses an official questionnaire (see Table 1), which ask about the course content, structure, and miscellaneous topics. Furthermore, the students were also asked using their own questionnaire.

Table 1
Data of official questionnaires.

Students (all/responders)	Fall Semester			Spring Semester		
	23/21			25/23		
Level of students' satisfaction:	Fully(%)	Mostly(%)	Less(%)	Fully(%)	Mostly(%)	Less(%)
Clearness of the course's goal:	95	5		95	5	
Structure of the course:	86	14		85	15	
The requirements were unambiguous:	100			75	25	
Achievability of the course's requirements:	100			90	10	
The knowledge is new and relevant:	95	5		85	15	
Helpfulness of the course:	95	5		85	10	5
The lecturer was inspiring:	95	5		75	25	
The communication of the lecture was clear:	100			80	10	10
Interactivity of the lessons:	90	10		100		
Informative answers to the questions:	100			95		5
Successful time management:	67	29	5	90	5	5
Respectful atmosphere of the lessons:	100			100		

Although the rethinking of the course was based on the fall semester's results, comparing the results, development needs to be continued, taking into account the spring results. However, this can be accompanied by stricter assessment of the students and more homework.

Students' own questionnaires, developed for the course in the autumn, were completed both on paper and online, and in the spring semester only online. This reduced the reliability of the latter's results. While in the autumn, twenty-three answers (eighteen in the last lesson in written form, five online) were sent back, in the spring only five were completed. This supports the conclusion that online completion is less effective than filling

them out during class. Comparing the two results, we can identify some similarities, e.g. the popularity of the use of legal case studies, the partial dissatisfaction with organising the group work, and, in general, the unpopularity of group work. However, all in all, the changes were a success, and the disciplinary process and aggression as new topic were truly popular. We can also state that the students thought that the most useful topics were the separation of law and ethics and – in both semesters, according to the majority of the students – the (legal) case studies. This latter topic was found to be the most popular as well. Students in the spring semester stressed the popularity of the simulation of the disciplinary hearing and also remarked on how enjoyable sharing their experiences was. The majority of the respondents indicated that the legal text analysis the least useful exercise. The less popular elements were the organisation of group work, the frontal lessons and the too many similar cases.

Further interesting answers were in connection with advice for the future. While in the autumn semester, the students proposed more recitation, strictness and more exercises, the spring semester participants suggested fewer exercises.

After both semesters, the respondents thought that their attitude to law and ethics changed definitely in a positive direction, and their legal knowledge definitely developed. The majority of them considered that the chance of using the knowledge later on was very high, and their confidence in their own and the students' rights and obligations improved.

3. CONCLUSION AND FUTURE RESEARCH DIRECTIONS

As a multitude of research remarks, the level of teachers' legal knowledge is lower than what should be required. This result is independent from the level of rule of law or democratisation, as supported by the data of U.S. Scholars recognising the importance of developing teachers' knowledge about school law. Nevertheless, methodological experts focus only on the K12 level, while there is a distinct lack of methodological works in teacher training. This chapter highlights the necessity not only of research into the broader field, but the development of methods. Recognising the lack of methodological foundations, we developed a course, the possible methods and also the demands of which were presented.

The experience of the first two semesters proves that students need these law-focused courses. It is also clear that the more practical elements there were, the more popular the course was. As expected, the right way to approach the topic is from the practicum to the theory. Students enjoy legal cases which serve as the connection between the law and their daily life. Hence, if we try to introduce law in teacher training, it is worth focusing on the legal cases as well as situational exercises. The rate of legal text analysis should be reduced as much as possible.

Further research is required on the legal knowledge in the world of school to make the course more well-grounded. To this end, besides continuing the current research project entitled "Anxiety versus ego strength", research which targets the topic of knowledge and opinion about the law (KOL) directly among the teachers, students, and parents is planned. The latter is expectable next year. Furthermore, the research and methods of the topic are being implemented in our PhD programmes. The designing of a new subject for future teachers is also proposed. It can be a new teacher training programme: that of the teacher specialised in teaching law.

With these steps, future schools will be able to provide the legal education which is missing today. We hope, for the first steps, this chapter can be a guideline.

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Chapter #10

A MODEL FOR MODIFIED MUSIC STANDARDS IN PROFESSIONAL MUSIC TRAINING: A CASE STUDY

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ABSTRACT

Music standards equip music educators with abilities to translate music education verbiage to administrators and policymakers so that the latter may more readily comprehend standard instructional vocabulary. One of the realities of music education is its teachers work as professional musicians whose administrators have little training in music education and knowledge of the 2014 National Coalition for Core Arts Standards' educational standards for fine arts disciplines, including music. The purpose of this paper is to use the National Association for Music Education's three artistic processes of creating, performing, and responding (CPR) guidelines for music teachers to analyze and explore evaluation measures and the process of giving students tools in instructional programs. The focus is the guidelines' areas and practices across a range of standards representative of the quality of learning outcomes and balanced music curriculum, including responding to and creating and performing music. Insight into some of the implications of students' results is gained through the Music Department in the Tainan University of Technology, Taiwan. The findings demonstrate that accurate assessment of music performance in authentic contexts is realized by raising the quality of practice, defined as meeting learning objectives in performance, that conform to academic and performance requirements' criteria.

Keywords: music standards, music assessment, taxonomy.

1. INTRODUCTION

Contemporary educational reforms have incentivized creating statewide educational standards (Mullen, 2019). Music education researchers have noted the impact of various policies, particularly those created within the music education profession, on music teachers. The 2014 Music Standards are all about music literacy. The standards emphasize conceptual understanding in areas that reflect the actual processes in which musicians engage. The standards cultivate a student's ability to carry out the three artistic processes of creating, performing, and responding. The National Coalition for Core Arts Standards (NCCAS, 2014) reflects authentic artistic processes or artistic literacy in music and provide teachers with sequential learning standards to improve arts instruction for all students in the United States (Mullen, 2019). Assessment and grading of student work is an activity that is of considerable interest in the higher education sector internationally (Gynnild, 2016). In Taiwan, the United Kingdom's Art Education Act, presented in 1997, provided a solid foundation in music education for all students and provided the legal basis for music and other arts curricula in schools (Schmidt & Colwell, 2017). Music education curriculum, as part of the Grade 1-12 curriculum guidelines and framework for arts education, were implemented in 2018. The Grade 1-12 curriculum guidelines drew on the experiences of other countries in creating the artistic achievement assessment, such as the U.S. 2014 Music Standards (NafME, 2014), the Australian Curriculum Achievement Standard-Music

(Queensland Government, 2015), and the music level descriptors of the Hong-Kong Examinations and Assessment Authority (HKEAA, 2014). These standards represent a stage in the evolution of music curriculum standards.

1.1. The new bloom's taxonomy

Bloom's Taxonomy of Educational Objectives was first published in 1956 and has been widely influential in education and assessment standards ever since (Anderson & Krathwohl, 2001). A revised taxonomy was published in 2001 and continues to play a central role in setting educational standards and objectives to overcome the misconception that student learning in music cannot be assessed in the same manner as other subjects, such as math and science (Hanna, 2007). In this study, the new taxonomy is first examined as applied to the national standards in music education as they relate to teaching undergraduate procedural skills. Thereafter, a series of lesson plans to demonstrate how the revised taxonomy is applied in music courses is presented.

1.2. The taxonomy in practice: music knowledge instruction aligns with assessment criteria

Assessment in higher education has been under scrutiny since 1990 (Rawlusk, 2018, p. 34), and music assessment is included in the areas "identified by those in the measurement community as prime examples of unreliable measurement" (Parkes, 2010, p. 98). Researchers from the National Association for Music Education, Centre for Educational Research and Innovation (CERI), American Educational Research Association (AERA), American Psychological Association (APA), and National Council on Measurement in Education (NCME) conducted a study indicating that the education assessment process is designed to promote self-examination of program performance and quality by providing feedback to participants and stakeholders and those "who develop tests, who use tests, and who take tests" (Reynolds, Livingston, & Willson, 2009, p. 15). Professional educational assessment provides essential "information that is used for making decisions about students, curricula and programs, and educational policy" (Mazur & Laguna, 2017, p. 119) and provides information to assist policy makers "become competent in selecting and using assessments" (p. 115). Assessment helps improve the value of the decisions made and outcomes produced. Hanna (2007) noted that there are several reasons the revised taxonomy is particularly appropriate for music education. First, the addition of knowledge domains are important because procedural and metacognitive knowledge are integral to music learning (Taylor, 1993). Second, the new taxonomy elevates creativity as the most complex of the cognitive processes. These additions have made Bloom's taxonomy a tool worthy of further study in the field of music education.

2. BACKGROUND

2.1. Music education and practice in the Taiwan's context

Two main channels of higher education exist in Taiwan: Academic and vocational technology. Tainan, Taiwan, hosts 11 universities: four are academic, and the other seven are vocational technology institutions (Ministry of Education, Taiwan, 2008). Only three of the universities have music departments: Two are academic universities, the National University of Tainan (NUTN) and Tainan National University of the Arts (TNNUA), and one is vocational technology university, namely, Tainan University of Technology (TUT). NUTN, located in the southern metropolitan area of Taiwan, is an historic university with a

distinguished academic legacy (National University of Tainan, 2007). TNNUA is the only professional school of the arts located outside of the Taipei metropolitan area. TUT, founded in August 1964, places its emphasis on home economics and arts and is located in Yongkang City, Tainan County's geographic center. There are 30 fulltime faculty in the music department of TUT; 19 faculty are piano majors, which is 63% of the staff in the music department.



2.2. Creating, performing, and responding model as a possible response

Demands for accreditation standards in music have already been expressed in the Western countries (Branscome, & Robinson, 2017; Jank, 2009). Possible solutions are provided by the creating, performing, and responding (CPR) model and approach to professional music training practice, through which individuals can discover and exert their own musical potential through meaningful learning (Marlowe, 2018). Issues related to creating, performing, and responding provide access to music standards of three artistic processes, namely, procedural knowledge, metacognition and performance strategies, and complexity of cognitive processes, which have become increasingly important in order to dismantle implicit intuitions (Hanna, 2007). Because music standards are becoming an increasingly articulate and holistic, yet objective, set of assessment criteria, it is crucial for music educators to face these challenges (Branscome, & Robinson, 2017; Hanna, 2007). Appropriate teaching strategies for music educators and for professional development in higher music education are being reconsidered.

In this situation, the CPR model can offer guidelines for music teachers and the process of giving students tools in instructional programs to connect with objective assessments, and it may provide a foundation for those assessments to engage accountability matters (Asmus, 1999).

The CPR model is the National Music Content Standards model created under the leadership of the National Association for Music Education (NAfME); the standards emphasize conceptual understanding in areas that reflect the actual processes in which musicians engage (NAMM Foundation, 2019). The NAfME of 2014 initially introduced the CPR model in order to reflect the actual processes in which musicians engage, and its application cultivates a student's ability to carry out the three artistic processes of creating, performing, and responding. The model is very broad in its assessment of competencies; it applies across the processes that musicians have followed for generations, even as they connect through music to their selves and their contemporary societies. Overall, it employs a number of new standards, provided in "strands," that represent the principle ways music instruction is delivered in the United States. In the case of the TUT, this model was adapted to the Taiwanese educational setting and augmented with several consequences influenced by the Music National Standards Comparison: 1994 versus 2014 (as cited in Shuler, Norgaard, & Blakeslee, 2014; see Table 1).

Table 1.
Music National Standards Comparison: 1994 versus 2014.

	1994 Standards		2014 NCCAS Standards				
Focus	Skills and knowledge		Understanding/independence music literacy				
Overarching structure	9 content standards		Three artistic processes				
	Process components		Enduring understandings		Essential questions		
Outcomes	Achievement standards 25-34 per level		Performance standards 13-19 per level				
Elementary/ middle	Kindergarten-Grade 8 Two grade clusters (K4 and 5-8)		Prekindergarten-Grade 8 Grade-by-grade (i.e. 10 levels)				
High school	One set to cover all course types		Customized sets for four strands				
	Two Levels advanced proficient			En- semble	Guitar/ Key- board	Comp/ Theory	Music Tech
			Advanced	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
			Accom- plished	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
			Proficient	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
			Inter- mediate	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	(Level grade 8)	
	Novice		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	(Level grade 5)		
Connections	To the other arts	Content Standards 8	11 Common anchors				
	To other content	Content Standards 9	Embedded within 3 artistic processes				
Assessment tools	Separate publications		Model cornerstone assessments benchmark student work				
Format	Hard copy		Online and customizable				
			Educator-developed Method-neutral Voluntary <u>What is similar</u> Philosophical foundations Goals Assessable outcomes Opportunity-to-learn expectations Glossary				
							

2.3. Review of the Literature

2.3.1. Balancing student goals, employer expectations, and higher education performance standards

Professional music training is a complex learning setting and assessing student outcomes according to reliable and valid standards has presented challenges (Parkes, 2010). Well-defined systems of grading are rare in higher education (given the variance in instructors' assessment practices), but to the extent that common practices exist, they have been conducted to date without a meaningful body of research to support them (Buckmiller, Peters, & Kruse, 2017). As Swart, Duncan, and Hall (2013) noted, a recent study of American college and university grading practices from 1940-2009 found that, on average, across a wide range of schools, the letter grade "A" represented 43% of all grades, an increase of 28% since 1960, and 12% since 1988. The authors concluded that GPAs are so saturated with high-end grades that they have little use as a motivator for students or evaluation tool for graduate and professional schools and employers. The American Library Association (2000) noted that in 2000, the Association of College and Research Libraries (ACRL) also issued the legacy of national guidelines, the *Information Literacy Competency Standards for Higher Education*. The Standards represented the organization's first attempt at national information literacy standards and were approved by the ACRL Board in 2000. Conor (2017) noted that the Music Library Association (MLA) released its own response to the Standards, the *Information Literacy Objectives for Undergraduate Music Students*, in 2005. The MLA's standards are identical in content to the ACRL Standards but include additional, discipline-specific outcomes (Conor, 2017).

Music literacy is the ability to convey one's own musical ideas and understand how others convey their ideas through music (Shuler et al., 2014). Duke and Simmons (2006) revealed that musical goals and expectations are prominent elements in lessons given by internationally renowned artist-teachers. The expectation of the artist-teacher is that the student play in a lesson as if he/she is performing on stage in order to achieve "a high standard" (p. 12). Gande and Kruse-Weber (2017) noted that instrumental music teachers and universities or conservatoires for higher music education have to deal with the sociocultural and educational landscapes' new challenges, for example more flexible and less secure employment compared to permanent positions in the past, changes in the cultural sector, and the popularity of music styles other than classical. As Jank (2009) suggested, it is necessary to design a set of activities that will enable successful cooperation between hard policies (such as decisions concerning cultural and education policies) and soft policies (such as university admissions criteria and curricula). Institutions of higher learning that are being scrutinized for retention and graduation rates may have their numbers affected by the behaviors of the less than serious student. Conflicting forces in society and in the education system are responsible for the seeming irrelevance of music education content and methods to students. Questions raised are the following: Do stakeholders see a future where students go to college to learn specific jobs that lead directly to employment in industry or music? Has the broad based general studies value of college waned, especially in light of the immediacy of knowledge via the internet?

2.3.2. The use of standards-based assessment in creating deeper learning

Continuously assessing the assessment process also provides opportunities for commercial test publishers, professionals, and researchers to exchange views on "guidelines for the ethical and responsible use of tests" (Reynolds et al., 2009, p. 14). Lyotard (1988, p. 13), Reynolds et al. (2009, p. 14), Bradley (2011, p. 79), and Richerme (2016, p. 284) noted the process of assessing assessment draws on information gleaned

from the revised 2014 National Core Music Standards, like the 1994 predecessors, namely, *Standards for Educational and Psychological Testing* (AERA, 1999), accredited by the American National Standards Institute (ANSI); *The Student Evaluation Standards* (Joint Committee on Standards for Educational Evaluation [JCSEE], 2003); the *Code of Professional Responsibilities in Educational Measurement* (NCME, 1995); and the *Code of Fair Testing Practices in Education* (Joint Committee on Testing Practices [JCTP], 1998), among others. While assessments are focused primarily on the people involved, the whole assessment process is used to examine whether the participants and instruments have achieved their stated objectives (Richerme, 2016).

2.4. Purpose of study

The purpose of this paper is to provide a review of noteworthy developments with the Tainan University of Technology (TUT), Taiwan, Music Department's seven-year program from high school directly to a bachelor's degree in vocational education. A performance assessment process at the TUT has been selected to discuss criteria and guidelines for measuring the effectiveness of both student assessment and the ongoing process of program evaluation. Selected areas for consideration are the following:

- Selection and/or development of instruments,
- Alignment to existing programs,
- Student rights and responsibilities,
- Prevention of bias,
- Instructor and administrator responsibilities,
- Student achievement,
- Accommodations, and
- Issues in developing, selecting, scoring, and interpreting students' results.

In this paper, the above processes are explored with reference to the TUT's various goals and strengths and the opportunity used to make recommendations for improvement. Alignment with these processes could offer important criteria for defining and communicating measures for evaluating questions about and objectives for curriculum. Ensuring schools have access to recent and multiple forms of assessment has contributed to "emphasizing the intra-active nature of measurement and empower[ing] themselves to critique and reimagine existing measurement apparatuses and their measurement and assessment practices" (Richerme, 2016, p. 174). Additional creative measures are required for schools to rise to the challenge of "assessment criteria, such as the overall impression of the performance, technical ability, expressive components, and the basic parameters of the quality of the performance" (Mazur & Laguna, 2017, p. 115). Equally important is ensuring students are competent in creating, performing, and responding to enhance results and conclusions.

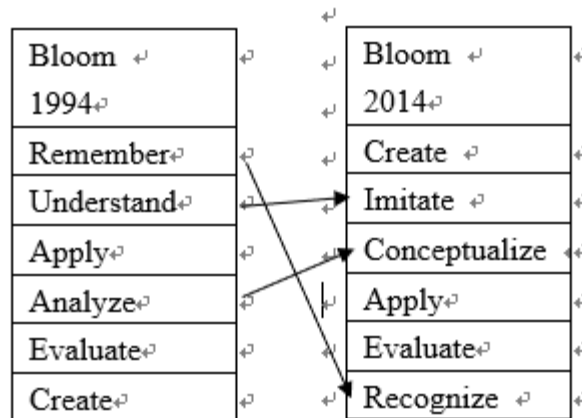
3. METHODS

3.1. A revised taxonomy for assessing performance requirements

As a general overview of TUT's process, the assessment of performance requirements from each Content and Achievement Standard of the 1994 music standards and from each Anchor Standard and sub-Standard of National Coalition for Core Arts Standards (NCCAS, 2014) were applied. Even assuming that everyone enters the assessment event with a sound shared understanding, there is still the question of whether the way a student performs on a given day is truly representative of his or her wider abilities. Whenever assessment of performance requirements seemed to lose meaning out of the context of the standard,

external function (literary criticism by listeners) rather than judgement were applied. How the taxonomy functions in the assessment of performance requirements was then demonstrated. Through this process, two tables presenting the assessment of performance requirements in the format of Bloom’s Taxonomy were generated. The 1994 Standards and the 2014 National Coalition for Core Arts Standards in Bloom’s Taxonomy are summarized in Figure 1. The processes are arranged in ascending order, where the lowest row reflects the simplest cognitive process and progresses to the highest row, which reflects the most complex process in the taxonomy. Arrows indicate where each subsequent study has reordered various stages of the process.

Figure 1.
Comparison of learning taxonomies.



The revised taxonomy put forth by the 2014 National Coalition for Core Arts Standards suggests that the most meaningful learning results when progressing from knowledge retention (remember), a past-based process, to knowledge transfer (create), a future-based process, in which students are able to apply learned material to new situations. The 2014 Core Arts Standards, with substantive support from findings in music cognition studies, recommended renaming and reordering certain processes to reflect the learning experience in an aural skills setting more accurately.

3.2. Formulating an assessment task

The hope is that everyone—students, students' teachers, examiners, and the outside world/profession—will share the same understanding of what is being assessed and how it is being assessed and against which benchmarks. The greatest strengths of the seven-year program at the TUT Music Department are that its instructional programs use multiple measurement/assessment tools in the assessment of performance requirements (see Table 2). For example, a critical listening audience, not only a professional panel, assesses music students in public. Performance assessment at the TUT has continued to expand beyond only learning outcomes to include learning processes. After five years, staff at the TUT's Music Department want to know in what areas students have developed to meet learning goals (skills and knowledge). After seven years, staff in the Music Department want to know 'how' students have grown in their professional development. Students need to perform as singers and as instrumentalists as well as in their lives and careers.

4. RESULTS OF THE CPR MODEL ANALYSIS

The CPR model analysis tasks focused on two skills: (a) understanding/independence and (b) music literacy. All factors were culturally determined systems of knowledge in music and are applied to musical abilities. The assessment of such a complex phenomenon requires diverse approaches with respect to what and how to assess (a) factual knowledge and musical abilities as defined by experts in the field, (b) knowledge components determined by societal needs, and (c) the constraints imposed by the methodology of assessment (Csíkos & Dohány, 2016).

4.1. Understanding/independence

In the first task, subjects had to identify understanding between those doing the assessing and those being assessed about the following basic questions:

1. What is the assessor seeking to look for and measure?
2. What evidence has been chosen to show that the assessor has found what he or she is looking for?
3. Once found, how will that evidence be measured or calibrated in the assessment to decide whether what has been found is of a sufficient quality for the student to be passed?

The answers to these questions formed the raw materials for a set of criteria applicable to the assessment.

4.2. Music literacy

In the second task, students had to cover a wide variety of knowledge components and musical abilities with laboratory-based methods and individual data collection. Since measuring music literacy as a psychological construct requires achieving high reliability, and test length directly correlates with reliability (Spearman-Brown formula), TUT's music department assessment demanded a relatively large number of test items and the use of item formats that permit objective scoring.

Table 2.
Strengths Guidelines in the TUT.

The assessment regime	Teacher assessment	Performance examinations	Accountability	Penalties	Failure of performance examinations	Appeals
1. Teacher assessment, jury examinations, and recitals. 2. The fifth year is a barrier exam; a student must pass to be admitted to the upper classes 3. Semester assessment	1. Holistic judgments capture the overall quality (Thompson & Williamon, 2003, p. 26)	1. Preparation 2. Scheduling 3. Exam structure for B.Mus. performance principal study 4. Repertoire requirements 5. The provision of scores to examiners 6. Marking guidelines for performance examinations 7. Membership of examination and recital panels 8. Conduct during performance examinations 9. Marking procedures 10. Procedures for resolving conflict 11. The report	Staff are Accountable for all grading decisions.	1. Penalties may be applied if performances fall short of or exceed the allowed time limit. 2. Changes in the program incur a penalty.	If student failure occurs in the semester jury, the student can retake the class during the following year along with his/her current credits, or delay his/her graduation one year to complete the requirement.	Under the TUT policy students have right to appeal on the basis of procedural fairness or final result.

Note. Modelled on the Brass Criteria Specific Performance Rubric in “Performance Assessment: Lessons from Performers” by Kelly Parkes in *International Journal of Teaching and Learning in Higher Education*, 22(1), p.102. Copyright 2010.

5. DISCUSSION

In the following discussion, the taxonomy terms outlined by 2014 National Coalition for Core Arts Standards are included in parentheses. Using terms universally applied across disciplines will prove helpful for instructors needing to explain how performance requirements align with assessment criteria endorsed by their respective institutions.

5.1. Recognize (remember)

The initial stage of the taxonomy requires that students be able first to define and then to recognize music performance (singing or playing instruments) in a real musical texture. To accomplish this task, they must remember the student's overall profile of achievement and identify symptoms of weakness in his or her performance. The most logical starting point is a student's 'performance' or his or her achievement as a musical performer.

5.2. Imitate (understand)

The 2014 National Coalition for Core Arts Standards explain that the repertoire of skills students must perform must be a "representative repertoire of the area of musical study," or *imitate* a variety of appropriate styles. For repertoire skills, a varied program will usually offer a representative repertoire of the instrument to cover interpretation (the creation of artistic concepts), technique (their realization), and presentation (their expression).

5.3. Conceptualize (Analyze)

In "Music Performance Assessment: Exploring Three Approaches for Quality Rubric Construction," DeLuca and Bolden (2014) wrote about "how criteria can be constructed that both encourage achievement of curriculum expectations and technical proficiency and leave room for students' expressive intentions" (Abstract). The 2014 National Coalition for Core Arts Standards explain that in the repertoire skills, students must first develop a "performer's ability to perform" before applying skills in artistic expression. The same is true in performance requirements, and an added benefit of renaming this category *conceptualize* is that it cannot be confused with the task of music analysis. Rather, the focus of this stage of the taxonomy is to explore the relationship between assessment and learning in greater detail.

6. CONCLUSION

Branscome and Robinson (2017) noted that the 2014 Core Arts standards aligned with verbs in Bloom's 1956 taxonomy focus and examined the positive and negative implications of applying Bloom's taxonomy (cognitive domain) to music instruction. Through this process, music educators may discover that arts assessment and the alignment of instructional vocabulary are necessary to a strong advocacy platform. As Parkes (2010) noted, the features of assessment, as explained by Shepard (2000), can be seen in the higher education literature across several countries, and more importantly, the research of music performance literature. The increasing demand for "standard-setting process primarily involves consideration of qualitative, evaluative criteria, only then to be followed with the support of the quantitative measurement data" (Wesolowski et al. 2018, p. 226), and this has heightened the need for music performance evaluation. In this paper, an attempt was made to explain the performance assessment process at the TUT to show what reliability means in a contemporary music education context.

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Chapter #11

THE INTRODUCTION OF PROGRAMMING IN K-12 TECHNOLOGY AND MATHEMATICS Teacher choice of programming tools and their perceptions of challenges and opportunities

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ABSTRACT

Many countries have started the process of involving programming in K-12 education. Most experts agree that this will be a positive change, but there are no concrete guidelines on which tools to use, and how to address challenges for the involved teachers. The aim of this study was to describe and analyse teachers' perceptions of integrating programming in technology and mathematics, and their view on programming tools. A case study strategy was used, with two versions of an introductory programming course as the case study units. For both course versions, technology and mathematics teachers taking the course could choose between textual programming in Python and block programming in Scratch. Data have been collected in a mix of submitted essays, programming solutions and researchers' observations. Findings show that a challenge in learning and integrating programming is the perceived time trouble, while an opportunity is that programming is perceived to be fun. Regarding the choice of tools, the majority of the teachers used Python themselves and mentioned that they could see a greater potential for it as a tool in education. However, many of them stated that they still will start off with Scratch, due to the lower threshold for novice programmers.

Keywords: programming tools, block programming, textual programming, K-12 education, teachers professional development.

1. INTRODUCTION

The integration of programming in K-12 settings is a worldwide and ongoing phenomenon (Balanskat & Engelhardt, 2015; Floyd, 2019; Dong et al., 2019). The expectations for this integration are that it should facilitate students' development of computational thinking and create skills that are useful for other school subjects, where some examples are self-efficacy, problem solving and reasoning skills in mathematics (Duncan & Bell, 2015; Psycharis & Kallia, 2017). However, this integration process also brings new challenges such as: access-limitations to computers and the internet, and lack of motivation and computer literacy.

Teachers also need to cope with time-issues in the learning of programming, and there is also the question of how motivating high-quality professional development courses for the teachers should be designed (Tundjungsari, 2016; Jawawi, Mamat, Ridzuan, Khatibsyarhini & Zaki, 2015; Mannila et al., 2014)? On the contrary, a successful integration of programming in K-12 schools might bring new positive opportunities, not only to computer science but also to other subjects. For example, programming might serve as an expressive tool for knowledge construction, and support students' growth from being passive consumers

to a new role as active producers (Feurzeig, 2010; Papert, 1993:142; Tundjungsari, 2016; Psycharis & Kallia, 2017).

In mars 2017 the Swedish government approved and presented a new curriculum for K-9 education that should be implemented no later than in the fall of 2018. A curriculum where digital competence and programming are introduced as interdisciplinary fields with explicit descriptions of programming and algorithm construction as new tools for problem solving in mathematics and technology (Heintz, Mannila, Nordén, Parnes & Regnell, 2017). Despite this rapid implementation plan, there was a lack of concrete guidelines on how programming should be involved in the mathematics and technology curricula (Government Offices of Sweden, 2017). An identified problem in some earlier studies is that many teachers find this stressful and do not know which tools to use (Humble & Mozelius, 2019; Mozelius & Hoff, 2019).

The aim of this study was to describe and analyse technology and mathematics teachers' perceptions of integrating programming, and their view on programming tools. The two important research questions to answer in the study were: 1) What are teachers' perceptions of main challenges and opportunities in learning and integrating programming in K-12 technology and mathematics? 2) Which preferences do K-12 teachers have in the choice of programming tools and how might this be related to subjects and student age?

2. BACKGROUND

The first documented programming experiments were carried out as early as in the 1840s, in the famous collaboration between Ada Lovelace and Charles Babbage (Kim & Toole, 1999). About a hundred years later, Alan Turing constructed the foundation of modern computer programming by designing a model for computational instructions that were possible to store in electronic memories (Morris & Jones, 1984). Modern computational devices can only execute binary instructions that works for the specific processor. To write such programs directly as binary instructions is difficult, and time consuming for a human. To address this the very first assembly language was developed at the Cambridge University in the 1940s. This was done with the idea of replacing binary instructions with mnemonics that are easier to remember for a human brain.

Computer programs are for special purposes still written in assembly languages, but more common is to create the programs in various high-level languages. In a high-level language, a single instruction can correspond to a large number of machine instructions. (Gaddis, 2011) Modern programming languages such as Python and Java also have a design that make them platform independent and possible to run on different types of processors.

2.1. Textual programming in Python

Since the 1950s when the first high-level programming language FORTRAN was developed by IBM, textual programming has been the dominating standard mode of programming. In the traditional textual programming, statements, selection, iteration and other standard programming constructions are built up by combinations of textual instructions that later are syntactically checked by a compiler or by an interpreter (Erwig & Meyer, 1995). Reading, writing and analysing code can be hard in traditional programming languages such as FORTRAN, Cobol, C and Perl. Later in the 1990s new programming languages like Java and Python strived to have a higher readability, and in the case of Python also a higher writability (Lutz, 2001).

Python can be described as a multi-paradigm programming language that was designed and developed with Guido Van Rossum as the main architect in the late 1980s. The language can be classified as multi-paradigm since it fully supports imperative and object-oriented programming, and also implements features that supports functional and aspect-oriented programming (Lutz, 2001; Van Rossum, 2007). Python has a high writability and unlike other dynamic and interpreted languages also a high readability.

High writability in this context means that complex techniques such as file handling or working with data collections just need a few lines of code. Python also has high readability in the sense that Python code is easy to read, understand and analyse. This combination places Python on a slightly higher level than other high-level languages such as Java and C#, which makes Python an interesting candidate for textual programming in K-12 education.

2.2. Block programming in Scratch

Block programming as a type of visual programming, can be understood by looking at the hierarchy of visual aids for programming (Singh & Chignell, 1992). A hierarchy that presents visual programming as a sub-group with different graphical interaction systems and visual language systems. Systems that in its turn consists of flow diagrams, icons, forms and tables (Singh & Chignell, 1992; Lavonen, Meisalo, Lattu & Sutinen, 2003). In a brief and broader definition, visual programming environments use graphical or visual representations of the code in a program (Lavonen et al., 2003).

The process that led to block programming environments can be said to start with the LISP-LOGO programming language. A language that was developed with the aim to offer a more understandable syntax than its predecessor LISP, with the use of graphical commands such as Forward and Right to make it easier to learn and use (Jehng & Chan, 1998). These visual elements have later been further developed in other programming tools where fundamental concepts as variables, functions, flow control and user interactions also have graphical representations (Lavonen et al., 2003).

The most widespread and well-known visual programming tool for a younger audience today is Scratch, a programming environment developed by the Lifelong Kindergarten research group at the MIT Media Lab. A tool where users can create programs by putting blocks of code together in the same way as building physical things with LEGO bricks (Resnick et al., 2009; Brennan & Resnick, 2012). A strength with Scratch, if seen as an educational programming tool, is its low starting threshold in combination with its potential for constructing larger and more complex projects (Shute, Sun & Asbell-Clarke, 2017; Resnick et al., 2009). In the continuously growing Scratch-community users can interact, and learn from each other by watching instructional videos and sharing projects (Brennan, Valverde, Prempeh, Roque & Chung, 2011; Brennan & Resnick, 2012). Furthermore, Scratch programming can be combined with art, music, storytelling and multi-media presentations (Maloney, Resnick, Rusk, Silverman & Eastmond, 2010). Options that are inclusive and have a potential to broaden the participation in programming and engineering among both girls and boys (Rusk, Resnick, Berg & Pezalla-Granlund, 2008).

3. METHODOLOGY

A case study approach was used as the overall research strategy with two instances of a programming course as the case units. The course, which is described in detail in the next section below, has a focus on fundamental programming for K-12 technology and mathematics. The first course instance was given during the autumn of 2018, and the second was given during the 2019 spring semester. As recommended for case studies, data was

collected from multiple data sources to gain a deeper understanding of the studied phenomenon (Yin, 2009:4; Creswell, 2009; Remenyi, 2012; Denscombe, 2007). The collection of data was in both case units conducted through workshop observations, essay assignments, and code submissions. A total of 60 K-12 teachers participated in the first course instance, and a total of 32 teachers participated in the second course instance.

To analyse and identifying topics of interests in the submitted essays a content analysis was carried out as described by Drisko and Maschi (2015:25-26), and Bryman (2016:283). Inductive coding was used in the analysis of the submitted essays (Drisko & Maschi, 2015:43) where the results later were compared to the analysis of the code submissions, and to the workshop observations. The analysed material consisted of: 49 essays, where 31 was gathered from the first instance of the course and 18 was gathered from the second instance of the course; 16 workshop observations (8 from each course instance in the form of campus meetings); and lastly, 209 code submissions, of which 146 code submissions were gathered from the first instance of the course, and 63 code submissions from the second instance of the course.

4. COURSE DESIGN

The programming courses referred to in this study are aimed at K-12 teachers in technology and mathematics. The teachers that took these courses had little or no previous experience in programming, and the use of it as a tool in their own teaching and learning activities. The programming courses are of a total of 7.5 ECTS each, given at a 25% study pace stretched over a twenty-week period and held in the Mid Sweden region. The courses consisted of both face-to-face meetings with lectures and workshops, and organised online learning in the virtual learning platform Moodle. The participating teachers were encouraged to share ideas and collaborate between meetings by creating local study groups.

The authors' experiences from previous similar courses are that only a small part of the participants have experience in the practise of programming. Since the aimed participants of the course not only need to learn how to program but also how to use it as a tool in their teaching and learning activities, the course was divided into five specific sections that meet these needs (Mozelius, 2018).

The first section 'Programming in school, why, what and how?' allowed for a more general discussion with the participants about the overall digitalisation of education and computational thinking (why). While also introducing the basic concepts of programming (what) and give support in the installation of the programming environments for Scratch and Python (how).

The second section of the courses, 'The fundamental building blocks of programming', focused on developing the participants' knowledge on the fundamental building blocks in programming, such as variables, constants, selection and iteration. To be able to build their own programs the participants needs to know and practise these fundamentals of programming.

The third section 'Didactics for Technology and Mathematics' is perhaps what distinguish these courses the most from other programming courses. The participants in the courses are active K-12 teachers in technology and mathematics and in this section the aim is to develop knowledge and skills in how programming can act as a tool for knowledge building in their subjects.

Since the previous experience of programming will differ also among the participating teachers' future students, the participants will have to, to some extent, themselves teach others the basic concepts of programming. The fourth section 'Didactics for programming

education' therefore focuses on developing the knowledge and the skills of the participants to teach others programming, within the frame of technology and mathematics education.

The fifth and last section of the courses 'Project work' draws on the participants' knowledge and skills developed in previous sections and allows them to put these together in creating their own programming material. This is an important part of the courses since the participants are not only there to learn about programming, but to do something explicit that they can bring to their daily work and keep on developing with, or for, their students.

5. FINDINGS AND DISCUSSION

This section presents and discusses the findings from the analysed data in three sub-sections. The first sub-section, 'Challenges and opportunities', presents and discusses findings that relate to the first research question, 'What are teachers' perceptions of main challenges and opportunities in learning and integrating programming in K-12 technology and mathematics?'. The second sub-section, 'Choice of programming tools', presents and discusses findings that relate to the second research question, 'Which preferences do K-12 teachers have in the choice of programming tools and how might this be related to subjects and student age?'. In the third and last sub-section a more general discussion concerning the findings in the study is presented and related to previous research.

5.1. Challenges and opportunities

Regarding perception of challenges and opportunities in the integration and learning of programming in K-12 mathematics and technology, there was a greater consensus among the teachers about challenges. A majority of the teachers mentioned time, commitment, continuity and discussion in their essays as challenges for learning and integrating programming. Especially if the goal of the integration is that programming becomes a useful tool for other subjects, since that requires a higher level of proficiency in programming. Another challenge mentioned in about half of the essays is that it is hard to learn programming since it requires the learner to learn new concepts, structures, logic and so forth in a secondary language (most material is in English).

Although not as coherent as the perception on challenges, a mentioned opportunity that stood out in the teachers' essays where that programming is perceived to be a fun activity, which is mentioned in about a quarter of the essays. The easy access to a lot of learning material on the internet and in books is mentioned as another opportunity, also in about a quarter of the essays. The availability of this material is perceived as an opportunity both for the learning and integration of programming in K-12 mathematics and technology but also as an opportunity for further knowledge development.

5.2. Choice of programming tools

Concerning teachers' choice of programming tool to solve their own programming assignments in the courses there was a general consensus among them. The programming tool used in the majority of the code submissions was Python, regardless to which student age or subject the teacher in question taught. Since a majority of the essays mentioned that they perceived Scratch to be the easier and more fun of the two alternatives this result is quite interesting. This could be understood in the light of that more than half of the essays also mentioned that as a tool for education and other subjects they could see a greater potential for the use of Python than for Scratch.

However, some alignments in the choice of programming tools can be found in the workshop observations of the two course instances. An alignment for programming with younger students and in technology can be found for Scratch; and an alignment for programming with older students and in mathematics can be found for Python. During the workshops many teachers also stated that Python is perceived to be more of a programming language than Scratch and allowed for more freedom to do, for example, complex calculations, which suited older students and the subject of mathematics. These alignments can also be spotted in some of the teacher essays.

Despite that many teachers see a greater potential for Python in the integration and learning of programming in K-12 mathematics and technology and made the choice to solve their own programming assignments in the language of Python; many of them mentions that they probably will start with introducing Scratch to their students. The reason for this is declared to be a lower threshold for learning Scratch and that Python is perceived as complicated, for example in the use of Tkinter as event handling. The use of functions and function calls, the handling of local variables and the effect on semantics by indentation could also be supporting factors to a higher threshold for the Python programming language.

5.3. General discussion

As mentioned in previous research (Tundjungsari, 2016; Jawawi et al., 2015; Mannila et al., 2014) the teachers in our study also brought up the issue of having enough time to both learn programming themselves; and to teach it to their students and integrate it in their teaching activities in mathematics and technology in a meaningful way. The other important issue that the teachers mentioned, that programming is hard to learn, can be viewed as part of the time issue. The harder something is to learn, and to integrate in teaching activities, the more time is needed.

On the other hand, many teachers also mentioned that programming is fun and that there is a lot of material available for learning programming and developing one's knowledge in the field. This could mean that the teachers see the same potential in using programming in their teaching activities as mentioned in previous research. That is, that the integration of programming could bring positive opportunities as a tool for knowledge construction and activating the students (Feurzeig, 2010; Papert, 1993:142; Tundjungsari, 2016; Psycharis & Kallia, 2017).

As for the teachers' choice of programming tool, their preferences could be understood by looking at the history of the programming tools. A strength in Scratch is that it is developed to have a lower threshold than traditional text programming languages (Shute, Sun & Asbell-Clarke, 2017; Resnick et al., 2009). So that the teachers perceived it as easier should not be that surprising. This could also explain why there was a slight alignment towards Scratch by technology teachers and teachers of younger students. An easier language might be more suitable if the outcome of the constructed program is most important, for example, controlling a robot. In the same way, the slight alignment for Python towards teaching older students and mathematics could be understood by the textual programming languages' freedom from predesigned blocks. This makes the activity of writing code more flexible and could also explain why some teachers perceived a greater potential for Python in educational context.

6. CONCLUSION

Although this study is quite limited in that it is located only in the Mid Sweden region, the obvious finding of the study is supported by previous research. That is, the perceived lack of time that teachers mention for learning programming and integrating it properly in teaching activities. While many teachers still mentioned that they perceived programming as a fun activity. Findings also indicates that there is a perceived suitability that influence teachers' choice of programming tool; that is, that they reflect on the context in which it is to be used and make decisions based on that. This can be spotted in that many teachers own choice of programming language in the course was Python, even though many of them stated that they still, probably, will start off with Scratch with their students since it has a lower threshold more suitable to their level.

The conclusion of this study is that teachers need to be given time and opportunity to learn and implement programming in their teaching activities. Preferable, teachers should learn both a block programming tool and a textual programming tool to draw on the opportunities in both languages. This could also serve as a better preparation for the challenges and opportunities, as well as versatility, in bringing programming to the classroom. Lastly, the authors would also like to stress the importance on discussing challenges and opportunities about implementing programming with one's peers, something that K-12 teachers in mathematics and technology also needs to get the time and opportunity to do.

7. FUTURE RESEARCH

This study has analysed the use of textual programming and block programming as teaching and learning tools in K-12 education. Another programming tool is unplugged programming where computational thinking is taught and learnt without the use of computers (AlAmer, Al-Doweesh, Al-Khalifa & Al-Razgan, 2015; Aranda & Ferguson, 2018). A next natural step would be to compare the concept of unplugged programming to textual programming and block programming. To better address the identified challenges in the teachers' professional development, it would be interesting to develop a model for learning analytics that is tailor-made for the target group. A straight-forward and understandable model that can be useful in the continuous revision of courses for teachers' professional development.

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Chapter #12

DOES IT ADD UP? DESIGNING ELEMENTARY AND PRESCHOOL TEACHER PROFESSIONAL DEVELOPMENT TO IMPROVE STUDENT ACHIEVEMENT

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ABSTRACT

The quest for effective teacher math professional development that positively influences student achievement is the genesis of this two-year, mixed methods quasi-experimental design research study. The research evaluated the impact of a comprehensive embedded 120-hour professional development initiative on preschool and elementary math teachers' knowledge, beliefs and behaviors and changes in their student's math achievement. An external evaluation from year 1 and year 2 revealed statistically significant changes on measures of teacher math content knowledge for Treatment group vs matched Control group who completed the *Teacher Knowledge Assessment System (TKAS)*, an online system for administering the *Learning Mathematics for Teaching (LMT)* assessment. The LMT measures teachers' basic mathematical knowledge and teachers' pedagogical content knowledge in mathematics (Hill, Schilling, & Ball, 2004; Phelps, 2011). Student achievement changes from Treatment teacher classrooms increased in year 1 with significant changes found in year two compared with matched Control teacher classrooms on a variety of grade aligned student achievement measures. Findings from this study demonstrate the potential of effective teacher math professional development on both teacher math content knowledge and on student achievement. Implications for future research that result from this study are presented.

Keywords: professional development, teachers, mathematics instruction, elementary mathematics, *Star Math*, *REMA Short Form*, *DIBELS-Math*, student achievement.

1. INTRODUCTION

The importance of early preschool and elementary mathematics as a predictor of future math achievement is well documented (Aubrey, Godfrey, & Dahl, 2006, Duncan et al., 2007, Claessans & Engel, 2013). Despite the awareness and research related to developing early math skills, student math achievement among United States 4th grade students continue to lag many international peers. Data from the 2015 TIMMS study show American student progress stalled after gains recorded in prior year assessments (National Center for Education Statistics, 2015b). On the 2015 NAEP assessment, only 40% of all 4th graders nationally were proficient in math (National Center for Education Statistics, 2015c). Teaching excellence in elementary school mathematics is urgently needed (D'Ambrosio, Boone, & Harkness, 2004). A review of the 2015 PISA international assessment of fifteen-year old American students reveals a significantly wider gap in achievement compared with more than half of other international students (National Center for Education Statistics, 2015a).

One of the most common strategies for improving student math achievement and teaching effectiveness is teacher professional development. Prior research established the impact of professional development on teachers was established in prior research (Farmer, Gerretson, & Lassak, 2003). Teacher development is the strategy to improve both teacher

content knowledge and pedagogical skill. By one estimate, federal and local agency resources extend more than 18 billion dollars for professional development to improve teacher effectiveness with the hope of positively influencing student achievement across many subject domains (TNTP, 2015).

The purpose of this research is to create a model for teacher professional development that both improves teacher effectiveness and consequently increases student math achievement. The research project was funded by the Ohio Department of Education, Math Science Partnership program.

2. BACKGROUND

Professional development as provided in the *Math Strong* research model is comprised of multiple components that together align with the goals of improving teacher math knowledge for teaching and increasing student math achievement. A more complete description of each component of professional development follows.

2.1. Developing a focus on mathematics for teaching

The goal of increasing teacher's basic mathematical knowledge and teacher's pedagogical content knowledge in mathematics and their understanding of mathematical knowledge in the context of how to explain it to children and to understand and respond to student misconceptions, is the basis for the professional development model used in this research (Hill, Schilling, & Ball, 2004; Phelps, 2011). The identification of specific math content and related instructional content knowledge to better understand student learners and learning as measured on the Teacher Knowledge Assessment System (TKAS), the online system for assessing Learning Mathematics for Teaching (LMT) based on prior research (Hill, Schilling, & Ball, 2004; Phelps, 2011) helps guide professional development.

What differentiates this model from others is the identification of discrete content math knowledge domains and related pedagogical knowledge associated with student achievement. For example, instead of relating strategies to solve subtraction problems in isolation from student learning, teachers learn the many ways students think about subtraction. This strategy improves teacher's ability to analyze student errors and consequently redirect students to a more successful problem solving strategy. Multiple studies corroborate this approach including a study by the authors that demonstrate a significant correlation with student achievement in both first and third grade (Hill, Rowan, & Ball, 2005). Charalambous' analysis of nine videotaped teaching segments in an elementary setting provides additional evidence that a teacher's mathematic knowledge for teaching was associated with differences in how teachers provided instruction and the level of cognitive demand (Charalambous, 2010). Finally, a state mandated professional development initiative organized to increase teacher learning mathematics for teaching with 4,000 South Dakota teachers successfully increased teachers mathematical knowledge for teaching (MKT), while increasing their sense of self-efficacy (Carney, Brendefur, Thiede, Hughes, & Sutton, 2016).

2.2. Developing a more effective professional development model

Several recent publications highlight the perils of some well-designed rigorous professional development research initiatives. In one recent study, two professional development models, one focused on reading the other on math, provided extensive professional development to teachers as well as offering individualized coaching (Quint,

2011). Despite the extensive opportunities afforded to teachers, each model fails to show significant change in students achievement. Furthermore, the middle school math program did not record significant gains in teacher math content knowledge. The author suggests the professional development may have resulted in more meaningful outcomes if the professional development activities focused on activities that arise in the school context. In other words, effective teacher professional development requires a more in situ focus which may increase relevancy for teachers and alignment with their daily instruction.

A second study focused on teacher math content knowledge as a result of 93 hours of professional development (Garet et al., 2016). The study found improvements in both teacher math content knowledge and use of mathematical explanations. However, student achievement did not demonstrate gains.

The National Council of Teachers of Mathematics (NCTM) identified several factors that promote effective professional development (National Council of Teachers of Mathematics, 2014). These include: 1. Building teachers' mathematical knowledge and their capacity to use it in practice, 2. Building teachers' capacity to notice, analyze, and respond to students' thinking, 3. Building teachers' productive habits of mind, and 4. Building collegial relationships and structures that support continued learning. Building collegial relationships and structures of support appears to stand out as either under emphasized or missing in research efforts that do not demonstrate changes in student achievement.

An extensive review and analysis identified 35 professional development programs with strong links between professional development and both teacher practice and student outcomes. The review identified seven critical elements that support change and were incorporated into the design of this research study, which are focused content, incorporated active learning, supported collaboration, use of effective practice models, coaching and expert support, feedback and reflection and sustained duration (Darling-Hammond, Hyler, & Gardner, 2017).

The results of the current study suggest two additional critical elements that appear to promote successful professional development design: embedded learning and teacher ownership. Embedded professional development that focuses on actual lessons in contrast with model videotape review provides the opportunity to increase the relevancy, alignment and ownership of professional development while supporting teacher collaboration.

2.3. Lesson study model with videotape lesson review

Lesson Study is an integral part of Japanese teaching and professional development although many aspects of traditional lesson study are not faithfully practiced in international adaptations of Japanese practice (Takahashi & McDougal, 2016). Nonetheless, modified lesson study that follows a prescribed cycle of activity that engage teacher learners in planning a "research lesson", direct observation and data collection of the lesson by teachers, review, reflection and revision based on peer feedback and data offers a promising model for review. As a professional learning model, lesson study promotes teacher collaboration based on lesson review with a specific focus on content, pedagogy and student thinking. Lesson study appears to add additional value in professional development with teacher engagement in their own planning and practice within the lesson study cycle resulting in increased teacher motivation and ownership (Lewis, Perry, Friedkin, & Roth, 2012).

A recent national investigation with randomized assignment of teachers to one of two Control groups or lesson study with math resources (Treatment) provided a comparative evaluation of lesson study as a professional development model on teacher and student learning of fractions. (Lewis & Perry, 2017). Compared with both Control conditions, lesson study teachers and their students demonstrated greater fraction knowledge. Assessment of

fraction knowledge was based on a subset of items from the LMT also used in the present study (Hill, Rowan, & Ball, 2005). As significant, lesson study teachers also reported having experienced a higher quality of professional development. In a prior study, it was reported that teacher engagement in their own planning and practice within the lesson study increased teacher motivation and ownership (Lewis et al., 2012).

An essential part of lesson study is the direct observation of the research lesson by teachers participating in lesson study. Limitations on common planning schedules, budget and substitute teachers makes direct observation more challenging in most schools. One strategy developed for this research project is the remote videotape of the research lesson using the SWIVL robot. The SWIVL device is a commercially produced robot that tracks target teacher while simultaneously recording teacher and student audio. Coupled with the Swivl Cloud, teachers can collaborate and provide feedback on the research lesson by typing annotated remarks matched to specific events in the video recorded lesson. Using this system, teachers have the ability to review a lesson at a convenient time while also accessing all team member feedback recorded during the lesson. Unlike traditional lesson study sessions organized around one public research lesson, teachers in this project will gain understanding from review of their own and other teacher's classroom video while retaining the traditional focus on a group planned lesson.

The use of classroom video as a feedback tool for teacher improvement in math and science is supported by several recent studies (Allen, Pianta, Gregory, Mikami, & Lun, 2011; Brantlinger, Sherin, & Linsenmeier, 2011; Roth et al., 2011, Schoenfeld, 2017), and is consistent with earlier reports about the value of feedback as part of professional development. In this project, teachers will reflect and evaluate audio and video obtained through the new Swivl robot within the TRU Math framework (Teaching for Robust Understanding) to provide a lens to focus on teacher and student math content understanding within the lesson study cycle (Schoenfeld, Floden, & the Algebra Teaching Study and Mathematics Assessment Project, 2014).

3. DESIGN AND RESEARCH METHODOLOGY

Math Strong was a two-year, quasi-experimental mixed methods research project to evaluate the effect of 120-hour non-traditional professional development on preschool and elementary teachers' knowledge/beliefs and behaviors related to mathematics instruction and the resultant impact on student math achievement. This chapter reports on year two of the study.

The central research question for this study was, "What is the effectiveness of a (120+ hours) of math professional development integrated with bi-weekly lesson study using video and math coaches to increase teacher and student math content knowledge in preschool and elementary classrooms?" Specific objectives paired with outcome measures include the following:

1. Improve PK- 5 teachers' math content knowledge as measured by the LMT because of 120+ hours of PROFESSIONAL DEVELOPMENT with video-assisted lesson study and math coaching.
2. Increase student math achievement as measured by grade appropriate assessments including the REMA-Short Version (preschool), DIBELS-Math (grades 1-5) and STAR Math (2-5).

The research design was organized to answer three essential questions:

1. Does professional development increase teacher mathematical knowledge?

2. Does professional development improve teacher's classroom mathematical teaching?
3. Does the professional development lead to increases in student mathematical achievement?

The research design for this study used a quasi-experimental mixed methods design. Treatment and Control schools were selected based on the schools qualifying as a "high need school district" a designation reflecting parent income and agreement of teachers to participate in professional development or in the Control group through a signed informed consent form approved by the university institutional review board. Two schools assigned as Controls were matched with two Treatment schools. The study was a mixed methods design since it combined formal quantitative measures with qualitative reports by teachers.

Full time teachers employed by the Treatment and Control schools from preschool through fifth grade were invited to participate. In year 2 of this study, 29 Control and 27 Treatment teachers participated in *Math Strong* and completed all pretest and post-test assessments. Teachers in both conditions were compensated for completion of all assessments. In addition, Treatment teachers received a stipend for participation in summer and after school professional development activities.

The research design was organized to answer three essential questions:

1. Did the professional development increase teacher mathematical knowledge?

The TKAS (Teacher Knowledge Assessment System (TKAS) is an online computer adapted testing system for administering the Learning Mathematics for Teaching (LMT) assessment questions. This was the primary assessment measure of teacher mathematical knowledge administered to Treatment and Control teachers. The LMT was designed to assess basic mathematical knowledge and teachers' pedagogical content knowledge in mathematics, their understanding of mathematical knowledge in the context of how to explain it to students, and to understand and respond to student misconceptions (Hill, Schilling, & Ball, 2004; Phelps, 2011). The adaptive nature of the TKAS allows adjustment of assessment items according to a teacher's correct or incorrect response on prior items. Two subscales from the TKAS were selected for the study that best matched the content of the professional development: Number Concepts and Operations (TKAS-NCOP) and Patterns, Functions, and Algebra (TKAS-PFAS). Teachers in the Treatment condition also completed a confidential online Qualtrics questionnaire to provide a qualitative self-assessment of the professional development and changes in their math content understanding.

2. Did the professional development improve teacher's classroom mathematical teaching?

Objective assessment of teacher's math instruction is incomplete at the time of publication. Future analysis based on coded assessment of video clips recorded from SWIVL may provide future data for analysis. Teachers in the Treatment condition completed a confidential online Qualtrics questionnaire to provide a qualitative self-assessment of the professional development and changes in their math instruction.

3. Did the professional development lead to increases in student mathematical achievement?

Students took valid and reliable grade aligned measures of student mathematical competence and achievement. First, Weiland et al. (2012) developed a short form of the 125 item research-based Research Early Mathematics Assessment (REMA) validated earlier by Clements, Sarama, and Liu (2008). This 19-item validated measure of preschool mathematics achievement was administered one on one to preschool students. While the original form included both number and geometric/spatial competency areas, only the number domain assessed alignment with professional development content.

Second, *DIBELS-Math* (Dynamic Measurement Group, 2016) *DIBELS® Math* is a commercial product that was selected based on the assessment of ease of measurement, long history of successful school assessment and alignment with professional development goals. *DIBELS Math* is designed to measure early numeracy, computation and problem solving skills specific to each tested grade level. *DIBELS Math* assessed student math competence both at pre-test and post-test conditions in grades K – 5. For kindergarten and first grade students, *Math Strong* staff provided one-on-one assessment. Grades 2-5 teachers following assessment protocols assessed students at pre-test and post-test periods.

Third, *STAR Math* was selected as an additional measure of student math mastery in grades 2-5. *STAR Math* is an online computer adaptive assessment of student math skills developed by Renaissance Learning. *STAR Math* was a “bonus” assessment since students in both Treatment and Control schools assessed students as part of their ongoing progress monitoring. While not ideally aligned with professional development goals, *STAR Math* provides a gross measure of classroom math achievement and progress between Treatment teacher and Control classrooms.

Last, one hundred-twenty hours of professional development was provided independently to two different Treatment schools by the research team. In addition, two math coaches were helped to manage lesson study sessions and provide individual coaching aligned with the professional development goals. Professional development was provided at different times of the calendar year and in different settings by the coaches.

For each of the two Treatment schools, four days (28 hours) of professional development were provided prior to the start of the school year in August and an additional four days (28 hours) following the last day of school. These more formalized sessions focused on both generalized math knowledge for teaching and grade specific content aligned with math standards from the state of Ohio. The primary content area focus for the before school year professional development was on building number sense through Operations and Algebraic Thinking (OA), Number and Operations-Base 10 (NBT). In addition, teachers were introduced to the TRU Math Framework. Each session included time for teachers to review prior year assessment data and identify grade level math needs. The after school year professional development was organized around Geometry & Measurement Standards, a review of Operations and Algebraic Thinking (OA) and Number and Operations-Base 10 (NBT).

Professional development was designed to engage teachers as learners of mathematics. Every professional development session included hands-on tasks and games that teachers could adapt to their classroom that provided opportunities to discuss content knowledge and student math understanding. Working together in large group and grade level teams, teachers developed professional learning communities organized around student math learning and math instruction.

A unique feature of the *Math Strong* professional development was the time devoted to a modified lesson study. Teachers were organized in grade level groups often incorporating adjacent grade level teachers. Guided by a math coach or *Math Strong* co-investigator, lesson study groups met at least once per month (often twice monthly after school). Due to time constraints, lesson study teacher groups loosely followed the activities proscribed by the lesson study cycle. Working together, teachers created a common research lesson plan with full discussion of the math content and predicted student math thinking. Teachers were also guided to consider possible student conceptual errors and strategies to scaffold learning for lower performing students. Teachers were also encouraged to use student math journals as part of their instruction to better evaluate individual and classroom understanding of the taught math content.

After the research lesson was developed, the identified teacher utilized the SWIVL video system to record and upload her lesson. Teachers within each lesson study then spent time after school or at-home observing the lesson and making annotated comments available to the entire team. When schedules or substitute teachers were available, a live observation supplemented the video record. After the lesson, teachers met to discuss the research lesson and provide feedback. Although an important part of the lesson study cycle includes lesson revision, school pacing guides made this challenging.

Math Strong Treatment teachers met with a math coach each month following an in-class observation. Math coaches helped teachers reflect on the selected math lesson mathematical content as well as student learning. In addition, math coaches used a rubric to identify instances of one or more of the 8 mathematical practices identified in the NCTM Principles to Action (National Council of Teachers of Mathematics, 2014). Less often, coaches also used the *TRU Math* rubric (Schoenfeld et al., 2014) to help teachers reflect on their lesson. Math Coaches also attended and led grade level meetings monthly as an additional embedded strategy to further develop, reflect and provide feedback on teacher and student math content understanding.

4. FINDINGS

Evaluation of the *Math Strong* Professional Development model is organized around three essential questions. Each question is repeated here with findings and analyses reported by an independent external evaluator of the *Math Strong* research.

To answer the research question on increasing teacher mathematical knowledge through professional development, two subscales from the TKAS online assessment for *Learning Mathematics for Teaching* (LMT) were administered to Control and Treatment teachers before and after a complete professional development cycle. The TKAS generates IRT scores, which are scaled in terms of variation in the original norm group in standard deviation units, with items that range (in this case between approximately -3.0 and 3.0, with a 0 score representing roughly a mean value in the original norm group). Change scores for the scales are therefore also in standard deviation units. Individual graphs are reproduced for both the Number, Concepts and Operations (NCOS) subscale and Patterns Function and Algebra (PFA) subscale. Significant increases were recorded for Treatment teachers on both subscales as reported below.

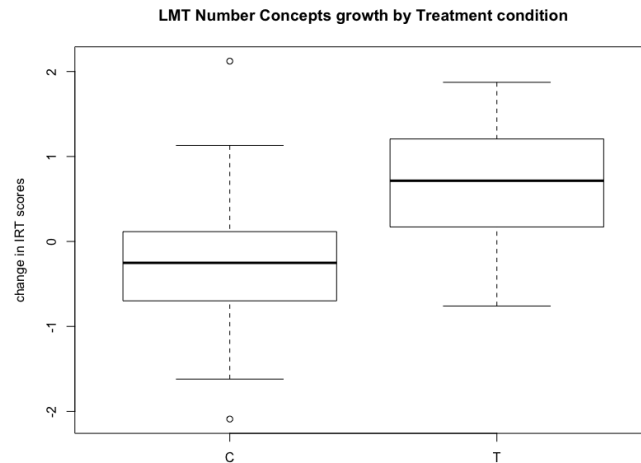
The large increase in Treatment teacher’s knowledge of basic number, concepts and operations was significantly greater than changes from pretest to post-test for Control teachers ($p < 0.0001$) as seen in Table 1. Control teachers reported a small drop in their TKAS-NCOP scores (see figure 1).

Table 1.
TKAS-NCOP ANOVA scores by group’s pre- and post- professional development training.

	<i>Df</i>	<i>Sum Sq</i>	<i>Mean Sq</i>	<i>F Value</i>	<i>Pr(>F)</i>
<i>Treatment</i>	1	9.708	9.708	16.62	0.000167***
<i>Residuals</i>	49	28.615	0.584		

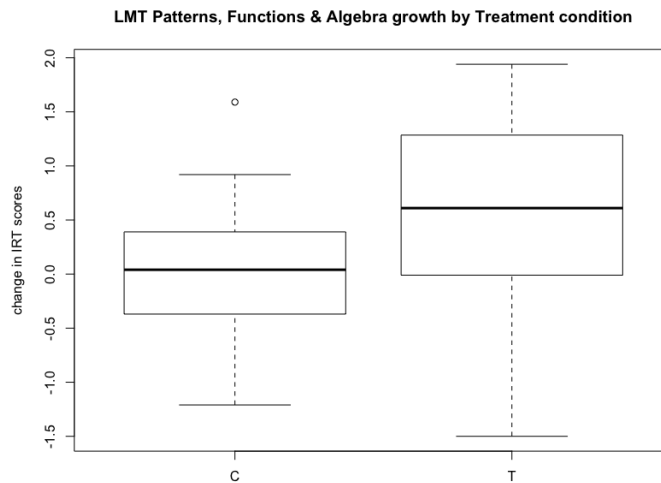
Figure 1 shows graphically the change between teacher groups as a function of IRT scores.

Figure 1.
Change in TKAS-NCOP scores in Treatment and Control groups pre- and post- professional development training.



TKAS-NCOP scores in Treatment and Control groups pre- and post- professional development training when compared with Control teachers. Reported as changes in standard deviation, the Treatment condition increased (.48 s.d.) while the Control showed virtually no growth for the Control condition (-.20 s.d.), resulting in a significant difference favoring the Treatment group ($F(1,50)= 4.45$, $p < .05$, $MSE=0.684$).

Figure 2.
Year 2 LMT – FA Res.



Teachers provided responses to the question, “*How did your participation in the professional development change your content knowledge about mathematics?*” The responses aligned into three categories, which were, increased understanding of mathematics, a better understanding of student learning of mathematics, and learning new ideas about classroom instruction.

In summary, on both subscales of the TKAS-LMT, Treatment teachers demonstrated significant growth in comparison to matched Control teachers. Qualitative assessment of anonymous responses about the impact of Math Strong professional development indicate a strong and positive teacher belief that the Treatment positively influenced their math content knowledge as well as instructional practice. From observational data, Treatment teachers from both participating schools and one Control school recorded one math lesson toward the beginning and end of the professional development process using the Swivl system. Due to the extensive period of time required to code and evaluate teacher lessons, quantitative assessment is not available at this time. Anecdotal reports by math coaches suggest that Treatment teachers made substantially greater use of the eight standards for mathematical practice. In addition, as teacher reflected on their lessons during lesson study, teachers showed an improved capacity to evaluate student errors and consider instructional strategies to improve student learning.

Qualitative data was collected from Treatment teachers who were asked how professional development changed their mathematics teaching. Teachers who participated in the professional development were asked to describe how their understanding of mathematical content had changed and how their mathematics teaching changed as a function of the professional development. First, they reported changes in how they thought about mathematics, including how to approach “tough problems”, and reviewing mathematical content that they hadn’t reflected on before. Several teachers mention an increased understanding of fractions, a key elementary school topic. Second, they reported that they increased the amount of student discussion and concomitant decreases in teacher talking. Third, they reported the use of Math Journals and rich problems as ways of promoting student discussion and cooperative work. And fifth, they reported an increased focus on math concepts and explanations. Many of the comments reported in response to how professional development changed their understanding of mathematics also apply to changes in instruction.

Without quantitative assessment of teacher videos, it is more difficult to state that math instruction has changed significantly because of professional development. However, teacher self-reports and math coach feedback provide a strong indication that professional development changed instructional practice. If math instruction changes are significant, expecting changes in student math achievement provides a more powerful coincident indicator of changed instruction.

Evaluation of the effect of professional development on student achievement with multiple measures required a separate analysis by grade level that matched achievement measures with students at specific grades. Grade level student achievement analysis reduced sample size, making it more difficult to find significant changes in Treatment vs. populations. Despite this challenge, significant and robust changes were found, particularly for younger students. Individual analyses by measures follow.

The Research-Based Early Mathematics Assessment (REMA) short form as developed and validated by Weiland et al. (2012) and Clements et al. (2008) was created to provide a validated measure of preschool and kindergarten mathematics achievement. Nineteen items from the number competency domain were administered individually to preschool teachers

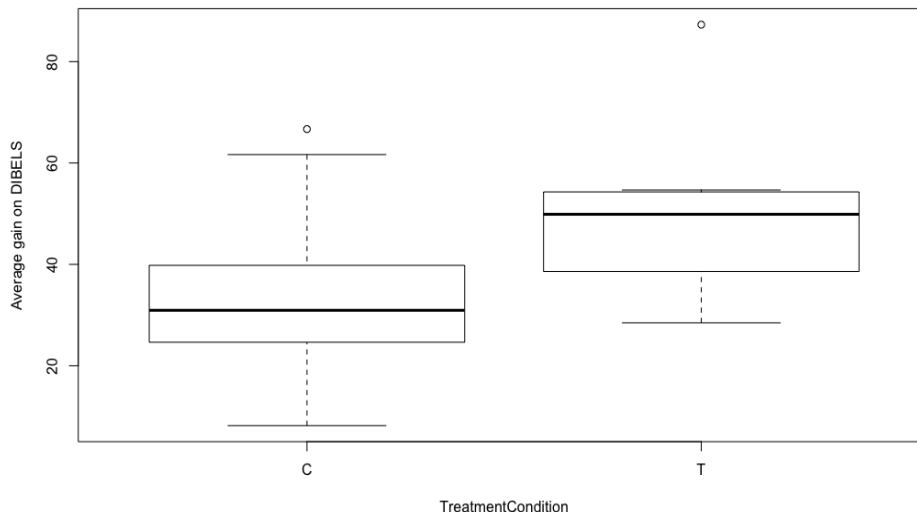
in the Control and Treatment classrooms. Data from 65 students in the Control group and 72 students in the Treatment group from which pre and post-data was available.

For Year 2, data were available for 65 students (43 with both pre- and post-data) in the Control group, and for 82 students in the Treatment group (72 with both pre- and post- data). A boxplot below shows the effect of Treatment on changes in the REMA from pre to post periods. Despite the small sample size, there was a significant difference in student improvement on the REMA test favoring teachers in the Treatment group. An ANOVA on gain scores with Treatment and Teacher as effects found a significant effect only for Treatment ($F(1,107)=8.85$, $p<.01$ ($MSE=5.46$) strongly suggesting that professional development had a substantial impact on preschool student number competencies.

Administration of *DIBELS Math* assessed grade level competencies for early numeracy, computation, and problem solving that function as indicators of the essential skills that every child must master in order to become proficient in mathematics. For this project, the Treatment and Control classrooms were from kindergarten through grade 5. Project staff provided one-on-one assessment in the early grades, kindergarten and first grade. Teachers administered *DIBELS Math* to their entire classroom in grades 2 through 5.

The *DIBELS Math* post-test administered in one school by the school in took place in nonstandard conditions. To ensure comparability of comparisons, the analyses used the other schools. This left 13 classrooms in the Control condition and 9 in the Treatment group for which we had reliable pre- and post-data. On the *DIBELS Math* test, the Treatment classes gained an average of 49.2 points on the *DIBELS Math*, compared with 32.3 for the Control classes. An ANOVA comparing the groups showed a significant difference ($F(1, 20)=4.904$, $p<.05$, $MSE=312$).

Figure 3.
Change in *DIBELS Math* scores in Treatment and Control groups pre- and post.



STAR Math data was used in Treatment and Control schools as part of routine progress monitoring of grade level student math understanding. As a global measure of grade level math competency, it is not well aligned with the professional development focus. It does provide a general indication of the generalization of professional development to a wide

range of grade level math competencies. Data from teachers in the Control and Treatment classrooms from grade 1 through 5 were analyzed. This had the effect of reducing preschool and kindergarten teachers in both groups, 11 teachers from the Treatment group and 2 teachers from the Control group. This resulted in a final sample size of 12 Treatment teachers and 27 Control teachers limiting the ability to find a statistically significant finding comparing the two groups.

The average median student growth percentile for the Treatment teachers was 61.92 compared with 54.06 for the Control teachers. As the boxplot shows, there was quite a bit of variability in each group of teachers. An ANOVA of median student growth percentile by condition showed a nonsignificant effect favoring the Treatment group, $F(1,37)=2.239$, $.10 < p < .15$, $MSE=229.3$. While the results are not statistically significant, the direction of change is encouraging. In average median growth, Treatment teacher's students showed greater gains than Control teacher's students.

Student achievement is considered a lagging indicator since changes in instruction as a result of teacher professional development increase over time. Nonetheless, significant statistical differences between Treatment and Control teacher classrooms on the *REMA* and *DIBELS Math* do demonstrate a robust effect on student math competency. Changes in *STAR Math*, while not statistically significant do show a qualitative change in the desired direction. Given the statistical challenges of small sample size, the differences observed on all three measures validate the power of professional development on student achievement. These findings also provides support for the belief that professional development as organized in *Math Strong* changed instructional practice. Ideally, a follow-up student examining changes in student achievement over time would provide additional evidence about the influence of professional development on student achievement.

5. FUTURE RESEARCH DIRECTIONS

The qualified success of the *Math Strong* professional development design is in contrast to the findings of most math professional development programs. In a rigorous recent review of 643 math professional development programs, only two programs demonstrated statistical evidence for positive gains in student math achievement (Gersten, Taylor, Keys, Rolhus, & Newman-Gonchar, 2014). The findings from the *Math Strong* professional development appear to be positive and worthy of further study.

Math Strong was a hybrid of multiple strategies including video-assisted lesson study, math coaching and whole group professional development. Within the research design, it is not possible to identify which individual factors or combination thereof provided the power to influence the statistical gains reported here. As a result, further study particularly of the promising strategy of video-assisted lesson study may be valuable in future research endeavors.

6. DISCUSSION

A review of the data and analyses from the *Math Strong* professional development program provide strong and statistically robust evidence of a Treatment effect in two specific areas: (1) gains in teacher math content knowledge for teaching and (2) improvement in student achievement/proficiency. Additional corroborating qualitative evidence further supports the gains recorded from analysis of valid and reliable measures analyzed within a quasi-experimental design with matched Controls. Quantitative evidence for changes in teacher instructional practice is incomplete at the time of publication. However, teacher and math coach reports suggest that professional development did result in changes in instruction.

Another possible factor contributing to positive results was the alignment with best professional development practices suggested earlier. These include providing focused content, incorporating active learning, supporting collaboration, using of effective practice models, coaching and expert support, feedback and reflection and sustaining duration. (Darling-Hammond, Hyler, & Gardner, 2017). Reflecting on the project it also seems important that teacher ownership for implementing instructional changes through lesson study and coaching contributed to our findings. In addition, encouragement of teachers to use math journals to make student thinking more “visible” and the frequent use of engaging activities and games that were transportable to classroom instruction contributed to the positive findings.

One final observation is the importance of alignment between valid student achievement measures and the content focus of the professional development. Measures, which are global or unaligned with the focus of professional development, may not capture changes in student math thinking and proficiency (Gersten, et al. ,2014). The findings from the *Math Strong* professional development appear to be positive and worthy of further study.

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Does it Add Up? Designing Elementary and Preschool Teacher Professional Development to
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Chapter #13

READING COMPETENCY AND SUMMARIZING SKILLS IN PRIMARY SCHOOL CHILDREN: AN EXPLORATIVE SURVEY

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ABSTRACT

In the present society, one of the fundamental objectives of school is learning to read a text. "Learning to read" is a complex process, implying not only the ability to associate the corresponding phoneme to each grapheme, but also the ability to understand the meaning of a text. It is a crucial achievement, fundament of the more general study skills, on which largely depends the educational and academic future of each student. In the recent years, learning to read has become the subject of systematic international and national evaluations, associated with recurrent requests to carry out initiatives aimed at the reduction of the poor comprehenders. Summarizing is one of the key strategies for a good reading comprehension, since learning from long texts result difficult for many students. Starting from these considerations, we evaluated the summarizing skills in a group of primary school children. We also measured the skills of text comprehension, referring to the ability of semantic and lexical inference, to the vocabulary skills and to the metacognitive skills. The aim was to investigate the relations between summarizing and students' general reading competency.

Keywords: text comprehension, primary school, summarizing, general reading competency.

1. INTRODUCTION

Nowadays, one of the fundamental objectives of school is learning to read a text, which does not end with the simple acquisition of the decoding ability. "Learning to read" is a more complex process, implying not only the ability to associate the corresponding phoneme to each grapheme, but also the ability to understand the meaning of a text. This competence, fundamental in the everyday life, is a crucial skill, one of the fundamentals of the more general study abilities, on which the scholastic and academic future of each student largely depends.

Particularly, in the present literate society, understanding a text is of paramount importance for building the store of knowledge that every man learns through reading. This ability occupies a prominent place among the competences considered indispensable for lifelong learning (Council of the European Union, 2018).

The ability to read and understanding a text is considered "a basic condition for knowledge development, for personal development and for the social integration of individuals" (European Commission, 2000).

In the last decades, this competence has been investigated both nationally (Invalsi test) and internationally, to verify individual skills in reading students. At an international level, two projects play an important role: The Program for International Student Assessment (PISA), started in 2000 and promoted by the Organization for Economic Cooperation and Development (OECD) and the Progress in International Reading Literacy Study (PIRLS). Both investigations aim to assess the reading literacy. More precisely, the term reading

literacy refers to the ability of individuals to use reading in a functional way throughout their life. It is defined as the ability "to understand, use, evaluate, reflect on and engage with text in order to achieve one's goals, to develop one's knowledge and potential and to participate in society" (OECD, 2019, p. 27). Thus, the reading literacy entails the dimensions "relating to the commitment invested by the subject in the action of reading", together with the cognitive dimensions of the reading processes and to the metacognitive ones (typical of the "levels of awareness and intentionality of one's strategies of thought") (Grance, Onorati, Revelli, & Floris, 2012).

2. READING COMPETENCY AND SUMMARIZING SKILLS

Reading comprehension is a complex skill that involves different abilities: from the linguistic ones, such as vocabulary, to more complex cognitive skills (Carretti, Meneghetti, & De Beni, 2005). This competence presumes the intervention of complex cognitive processes, which do not end in the association between the written form of the word and its lexical and semantic characteristics, but require an active construction of the content of a text (De Beni, Cornoldi, Carretti, & Meneghetti, 2003).

The purpose of understanding, as defined by Gernsbacher (1990), is, therefore, to create a coherent representation of text, also called mental or situational model (van Dijk & Kintsch, 1983). Different cognitive abilities concur in this direction and, when damaged, can hinder the understanding process and prevent the construction of a coherent and global mental model of a text (Padovani, 2006). Among the functions closely associated with the understanding of text, there are the ability to make inferences, to organize a well-formed narrative and working memory, as well as the metacognitive abilities and the ability to elaborate a correct synthesis of the story (Carretti, De Beni, & Cornodi, 2007; Cain & Oakhill; 1999). The latter represents an essential strategy, as it promotes learning and metacognitive skills, leading students to reflect and to process what they read (Westby, Culatta, Lawrence, & Hall-Kenyon, 2010). The assessment of this competence is crucial. Summarizing is a reading strategy that allows students to understand a text more deeply, being, at the same time, an indicator of understanding (Pečjak & Pirc, 2018).

As widely demonstrated by scientific literature, knowing how to summarize constitutes a competence that promotes the ability to understand a text. Summarizing means to formulate a reduced version of the text read, which restructures the entire construct while preserving its relevant elements (Brown & Day, 1983; Brown, Day & Jones, 1983; Kintsch & van Dijk, 1978). Synthesizing a text is one of the main processes of reading comprehension. Through this strategy, the student implements a series of cognitive abilities that promote learning and metacognitive skills (Wormeli, 2004). Both teachers and students benefit by using this strategy: the student has the opportunity to describe what is important within a text; while the teacher can evaluate the student's ability to select important information and to understand a text (Westby, Culatta, Lawrence, & Hall-Kenyon, 2010).

However, many students find this strategy difficult and seem not to understand its purpose. Many of them tend to use non-functional strategies, such as writing too much information, lacking important information or copying word by word, without a rework of the contents (Özdemir, 2018). To be able to summarize efficiently a text, students need to identify the most important information and write a new text, of a reasonable length, by reformulating the original work in their own words. To do this, students have to analyze each of the sentences/paragraphs, search for important words and details, exclude the unimportant information and, then, gather the essential information into a whole that makes sense (Westby, Culatta, Lawrence, & Hall-Kenyon, 2010; Pirc & Pečjak, 2018). A good summary

is, therefore, a text or a discourse made of the important things present in the text read (Calvani, 2018). Some strategies can help building a good summary (Brown, Campione, & Day, 1981; Brown & Day, 1983):

- eliminate all that is trivial;
- eliminate the material that, although important, is redundant;
- replace a list of elements or actions with a single word that contains the meaning;
- select a sentence in the text or, if not present, generate a new sentence that represents a general and fundamental meaning.

These strategies are based on the concept of macro-operations or macro-rules identified by Kintsch and van Dijk (1978), which allow the reader to analyze the text and identify the underlying theme.

As a matter of fact, those who provide a good summary prove to have understood the organization and the general theme of a text. They are also able to read between the lines, understand the main idea and make inferences about ideas and concepts that are not explicitly indicated in the text, but are essential for comprehension, discriminating among important information and irrelevant ones (Kisner, 2006). To use this strategy, students must also be aware of the explicit structure of text. The more students are aware of this structure, the more they are able to summarize it (Westby, Culatta, Lawrence, & Hall-Kenyon, 2010).

However, the summary activity is often viewed by teachers as a task that students should naturally perform even if complex cognitive processes are required. For this reason, the teaching of strategies to synthesize is neglected in every phase of education (Özdemir, 2018).

Pečjak and Pirc (2018) checked whether the skills for building a good summary could develop thanks to the direct intervention of teachers in primary school students of the fourth classes. The results of the study showed that teachers can develop summarizing skills of students by systematically training them to use these skills, but the training effects decrease if the learning environment does not encourage students to use these skills. The authors observed that the development of a metacognitive knowledge, acquired by reflection during discussions about summaries, promotes the intentional use of summarizing in different contexts. The results also show a correlation between the ability to summarize and general reading competency (Pečjak & Pirc, 2018). These results were confirmed in other studies that observed how the use of summarizing strategy, is able to influence the understanding of a text, and, consequently, the performance of students (McCulley & Osman, 2015).

In conclusion, the ability to summarize represents a fundamental skill for the process of understanding a text. This strategy, in younger students, is a multiplicative function between decoding and linguistic comprehension, which involves the lexical information and the representation of text derived from it (Pirc & Pečjak, 2018). Based on these considerations, it is useful to evaluate and promote this competence in the school environment to improve the understanding of texts and, thus, the academic performance of students.

3. METHOD

3.1. Objective

The study intends to evaluate the ability to summarize in children attending the fourth grade of the primary school. We set the following objectives:

- analyze the relationship between the ability to summarize and competences involved in the process of understanding a text, such as the capacity of making inference, the metacognitive skills and the vocabulary;
- verify if poorer scores at the Summarizing Test are associated with lower scores at the tests investigating the other variables considered.

3.2. Participants

The sample of our research consisted of 104 children attending the fourth grade of the primary school, aged between 8 and 9 years ($M = 8.80$ $SD = 0.35$), 56 females and 48 males. The sample was selected from the population of a larger project, whose main objective was to demonstrate the effectiveness of the Reading Comprehension – Reciprocal Teaching (RC-RT) program (Calvani & Chiappetta Cajola, 2019). Students with Special Educational Needs, with an intellectual disability, with specific learning disabilities and foreign students with poor fluency in the Italian language were excluded from the sample.

3.3. Materials and procedure

The tests administered to evaluate the variables object of the study are the following:

Test of Verbal Meaning-new version (Montesano, 2019). The test of Verbal Meaning - new version (P.S.V._{nv} is the Italian acronym) allows to obtain a measure of the child's vocabulary. The test was specifically tuned for this research, including items with a higher grade of difficulty compared to the standard version (Thurstone & Thurstone, 1962). It consists of 30 items, of which 15 were modified from the previous version. The time available to complete the test is 7 minutes. The score is calculated as follows: one point for each correct answer and zero points for each incorrect or omitted answer. In the presence of a double answer, half a point is attributed provided that one of them is correct. The total score is obtained by the sum of each point scored.

Summarizing Test. The Summarizing Test (ST) provides an assessment of the child's abilities to summarize, that is the identification of the most relevant information and their combination in constructs (Menichetti, 2018; Calvani & Menichetti, 2019). The test is constituted of two versions (ST_A and ST_B). For the purposes of this research we used the ST_A version. The ST_A consists of four short texts, for each of which three questions are asked. Each question presents six alternative answers: the student must identify the three answer which appear to be the best. Each correct answer is assigned a point, therefore for each text is possible to obtain a maximum score of nine points and the maximum score obtainable in the ST_A test is 36.

Test for the evaluation of semantic inferences for the third and fourth primary classes. To measure semantic inference, the "Gimmy" test was administered (Tressoldi & Zamperlin, 2007). The child is asked to read and answer 10 multiple-choice questions, which require to obtain inferential information from reading a piece.

Lexical and Semantic Inference Test (LSIT). The Lexical and Semantic Inference Test, present within the program New Guide to Reading Comprehension (criterial tests, Level A, De Beni, Cornoldi, Carretti, & Meneghetti, 2003), allows to evaluate the ability to infer information not reported explicitly in a text. The test focuses on two types of inferences: semantic inferences (concerning the meaning of unwritten information, or the recovery of information related to the topic, which help to understand what is said in a text) and lexical inferences (to recover the meaning of an unknown word based on the context in which it is

located). The child is asked to read and answer 15 multiple-choice questions. Each correct answer is assigned a point.

Metacognitive Questionnaire. The Metacognitive Questionnaire (QMeta) allows to detect the metacognitive strategies of understanding a text in the fourth class of the primary school (La Marca, Di Martino, & Gülbay, 2019). It consists of ten items related to the following dimensions: questioning, clarifying, predicting, discussing. In the questionnaire the student is invited to analyze a series of statements describing possible metacognitive strategies and to express to what extent they correspond to his personal way of proceeding, by a three-point Likert scale (0 - No, never or almost never; 1 - Yes, sometimes, 2 - Yes, often). The tool provides both partial scores, relative to the five dimensions explored, and an overall score.

The tests were given collectively in the individual classes, during school hours. The tests were provided one at a time and preceded by a moment of detailed explanation of the instructions. The total time taken to complete the work in each class was approximately 90 minutes.

4. RESULTS

Table 1 shows the descriptive statistics (mean, standard deviation) of the sample of our research.

Table 1.
Mean e SD of the scores obtained by the sample.

	Total score P.S.V. _{nv}	Total score "Gimmy"	Total score QMeta	Total score LSIT	Total score ST _A
Mean	22.65	4.12	10.2	7.79	21.61
SD	3.80	1.73	3.74	2.75	4.97

To examine the relationship between the ability to summarize and the other variables of the study, given the asymmetric distribution of some indicators (in particular, the vocabulary), non-parametric correlations (Spearman's ρ) were calculated. Significant correlations ($p < 0.01$) emerged between the ability to summarize and the variables taken into consideration. Specifically, we observed the presence of a linear and significant relationship between the ability to summarize a text, measured through the Summarizing Test, and the vocabulary ($|\rho| = 0.48$; $p < 0.01$). Furthermore, we observed the presence of a positive linear relationship between the ability to summarize and the ability to draw inferences (*Gimmy* $|\rho| = 0.27$; $p < 0.05$; *LSIT* $|\rho| = 0.43$; $p < 0.01$) and the metacognitive abilities ($|\rho| = 0.44$; $p < 0.01$).

Based on the score obtained at the ST_A we identified two groups of students: those "with good summarizing skills" and those "with poor summarizing skills". This data allowed us to verify the possible correlation between the scores obtained at the Summarizing Test and at the other tests applied. A threshold of 17 points was used to identify the group of students "with poor summarizing skills" (total score ≤ 17). We choose this threshold as it corresponded to -1.5 standard deviations from the mean, according to the normative data of Italian standardization (Mean = 24.47, SD = 4.50; Menichetti, 2018). Using this classification criterion, the group "with poor summarizing skills" consisted in 14 children, who represented 13% of the total sample.

The two groups were compared by the Mann-Whitney (non-parametric) U test for independent samples. Results showed that the group "with poor summarizing skills " had statistically lower scores than children "with good summarizing skills " in the metacognitive questionnaire ($z = -2.40$; $p < 0.01$). No statistically significant differences emerged regarding the inference making ability (*Gimmy* $z = -1.62$, $p = 0.11$; *LSIT* $z = -1.09$; $p = 0.27$) and the vocabulary ($z = -0.72$, $p = 0.08$).

5. FUTURE RESEARCH DIRECTIONS

Our results highlight the close relationship between the ability to summarize and the other variables analyzed: the vocabulary, the metacognitive skills and the ability to make inferences. The present work is only a pilot study. A desirable goal, in the future, would be to expand the study sample, in order to obtain more reliable data, representative of the Italian situation. Furthermore, future analyses should focus on the development of these skills over time and their relationship with academic success.

6. CONCLUSION/DISCUSSION

Reading comprehension is a complex skill that involves different abilities, ranging from linguistic skills, such as vocabulary, to more complex cognitive skills, such as the ability to make inferences, working memory and metacognitive skills. Among these competences, the ability to summarize represents an important metacognitive strategy to improve the comprehension of text. It promotes learning, leading students to reflect and to elaborate what they read and to focus on the main contents of a text (Westby, Culatta, Lawrence, & Hall-Kenyon, 2010).

On this basis, one of the objectives of the present work was to evaluate the ability to summarize in a sample of students attending the fourth primary class. We also analyzed the relationship among this ability and some competences involved in the process of understanding a text. Our results showed a significant correlation between the summarizing skills and the ability to make inferences. Furthermore, significant correlations emerged between the ability to summarize and lexical knowledge and metacognitive skills. These results are not surprising, as both these skills are considered fundamental in the process of understanding a text (Pečjak & Pirc, 2018; Pirc & Pečjak, 2018; Meneghetti, Carretti, & De Beni, 2006; Soto, Gutierrez de Blume, Asun, Jacovina, & Vásquez, 2018; Montesano, Iazzolino & Valenti, 2019). The synthesis strategy promotes a better text comprehension, but no understanding of text is possible if the subject is unable to understand the meaning of the words present in the text.

Another aspect analyzed in this paper is the difference between students with "good summarizing skills" and students with "poor summarizing skills ". The results showed that students with "poor summarizing skills " are characterized by poor metacognitive skills, compared to peers with "good summarizing skills ". This finding is probably linked to the close relationship between these two abilities. Also, some students may be able to explain a text, but be unable to make a correct summary, as it requires different strategies. As Palincsar and Brown (1984) reported, the ability to summarize a text can be considered one of the metacognitive strategies. In fact, asking students to summarize a text not only induces them to focus on the main contents, but also sensitizes them to self-evaluate on the comprehension of the text. Aspects that are part of the concept of metacognition. Our results underline the importance of promoting students' metacognitive skills together with the summarizing strategy. In the literature, students with poor skills of text comprehension perform worse in

tests that evaluate the knowledge and the use of appropriate reading strategies and metacognitive control (Cataldo & Cornoldi, 1998; Mirandola, Ciriello, Gigli, & Cornoldi, 2018). In particular, Mirandola, Ciriello, Gigli, and Cornoldi (2018) observed a poor metacognitive monitoring in children with reading comprehension difficulties, compared to good readers.

In conclusion, our data highlight the close relationship between the ability to summarize and the general reading skills, and the importance of the metacognitive skills. However, the present work was only a pilot study, limited to the analysis of some of the competences involved in the process of understanding. Future researches will be able to deepen these results, possibly analyzing the relationship between the ability to summarize and the academic performance.

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Chapter #14

UNDERSTANDING WHY SOME FUTURE TEACHERS FIND IT SO DIFFICULT TO FOLLOW WRITTEN INSTRUCTIONS

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ABSTRACT

A difficulty in following simple written instructions has been identified amongst university students of teacher education in Brazil. This Exploratory Practice (EP) study, conducted as part of a TEFL Practicum course at the State University of Rio de Janeiro, Brazil, aimed to understand what lies behind this difficulty. The research project was divided into two phases: an online questionnaire, answered by 16 students, and an EP activity, involving another 14 learners, all aged between 20 and 35. This specific “work of understanding” was important for them because their success at university depended partly on their ability to follow instructions. Moreover, as the learners in question were teachers-to-be, their ability to give their own students clear instructions was also a consideration. The study was initially designed as a participatory action research project with the main focus on finding solutions to the problem at hand, but it was subsequently transformed into an EP project with the main aim of simply understanding the situation and familiarizing the participating learners with the principles of EP. The participants’ and respondents’ difficulties in following instructions were found to be related to the learners themselves (e.g., lack of attention) the teachers (e.g., unclear instructions), and other factors.

Keywords: exploratory practice, understanding, written instructions, teacher education, practitioner research.

1. INTRODUCTION

In recent years, there has been a perceptible change in the profile of Brazilian university students. One of these changes is that learners seem to be encountering much more difficulty in following instructions. At first, I believed that this difficulty had to do with a lack of concentration, making it harder for them to read long instructions, but I have since noticed a similar difficulty dealing with very short exercises or exam rubrics. Moreover, as in our case we are working with teacher education, it is even more important to understand what is behind this phenomenon, because education in the future will be affected by these future teachers’ own capacity in this regard.

The study initially focused on how to solve the perceived problem, and was therefore designed as a participatory action research project (Brandão & Streck, 2006; Thiollent, 2006, 2011). However, an Exploratory Practice (Allwright 2002, 2003, 2008, 2009; Gieve & Miller, 2008; Hanks, 2009, 2014, 2017; Kuschnir & Machado, 2003; Mateus, Miller, & Cardoso, 2019; Miller, 2009) framework was subsequently adopted, as it was felt that it would be better able to shed light on what was going on in the classroom without necessarily seeking a solution. From the outset, the aim was to include the learners not only as subjects of the research, but also as participants, and to familiarize them with the concept of teacher research and learners as researchers. The initial study question was: *Why do some future teachers find it so difficult to follow written instructions?*

2. EXPLORATORY PRACTICE: WORKING WITH UNDERSTANDING

Exploratory Practice (EP) is the integration of research, teaching, and learning. Besides language development, it focuses on enhancing the quality of life in the classroom. Teachers and learners are encouraged to investigate questions that puzzle them. In this respect, it differs from many other kinds of teacher research: “Exploratory Practice (EP) recommends commencing with puzzlement, and encourages the practitioners themselves to investigate, rather than relying on external researchers, as a way of developing understandings” (Hanks, 2017, p. 107).

The main aim is not directly to solve problems or find the best methodology for language learning, but to formulate questions based on learners’ and teachers’ puzzlement. Therefore, how-to questions (designed to identify methods or solutions) are substituted by why questions (in order to develop understanding). Some examples of EP questions that I have dealt with in my career (either puzzling me or my students) are:

- *Why are some learners so demotivated?*
- *Why was this class a good one (even without following the lesson plan)?*
- *Why didn’t this particular activity work?*
- *Why do learners find it so difficult to listen to recorded materials?*
- *Why do some students learn faster than others?*
- *Why are strategies considered so important in different contexts, but are rarely worked with in the educational context?*
- *Why can’t we help those learners who need more help than others?*

The idea is to encourage learners to discuss some of their teachers’ and colleagues’ questions and to create questions of their own and think of ways of answering them in groups (collaboratively). Therefore, EP considers “teachers and learners as co-researchers investigating their learning and teaching lives” (Hanks, 2014, p. 117). These discussions are usually developed in the target language and integrated into the syllabus. In some cases, they may even become the whole syllabus (Mateus, Miller, & Cardoso, 2019; Miller, 2009).

The kind of research generated by EP is participatory, as it is not just the teacher who engages in the research, but the learners, too. Teacher and learners act as practitioners. It is common to see learners as practitioners of learning and teachers as practitioners of teaching, but with EP they both take on many different roles: each practitioner is a learner and teacher (Freire’s view), and both also become researchers of their own *puzzlement*.

The term *puzzle* here is better used as a verb than as a noun. In EP, the aim is to understand what puzzles us, rather than to solve “problems” or “challenges.” The term *problem* is always negative, but a puzzle can be seen as something intriguing, either positive or negative. One general question that essentially underpins all EP activities is: “What puzzles you about your language teaching/learning experiences?” (Hanks, 2017, p. 113). By asking this question, learners and teachers can generate their own puzzles.

The EP framework is based on seven principles for inclusive practitioner research (Allwright, 2009; Hanks, 2009, 2014, 2017):

The “what” issues:

1. Focus on *quality of life* as the fundamental issue. (quality of life)
2. Work to *understand* it before thinking about solving problems. (understanding)

The “who” issues:

3. Involve *everybody* as practitioners developing their own understanding. (inclusivity)
4. Work to bring people *together* in a common enterprise. (collegiality)
5. Work cooperatively for *mutual development*. (mutuality)

The “how” issues:

6. Make it a *continuous* enterprise. (continuity)
7. *Minimize the burden* by integrating the work for understanding into normal pedagogic practice. (integration)

These principles may be considered the backbone of EP activities for the integration of language learning, teaching, and researching in order to improve quality of life in the classroom. EP is more interested in understanding different issues that puzzle different practitioners (including teachers and learners), who work together for mutual development. The process is continuous: one puzzle may generate other puzzles. Finally, EP activities should be integrated into the syllabus and not be presented as extra work. As such, the target language is used in all the discussions, presentations, materials preparation, and other tasks.

3. OBJECTIVES

The main objective was to better understand the difficulties experienced by learners in following instructions. Additionally, it was hoped that the collaborative development of the study with other learners and teachers would give these teachers-to-be the chance to experience Exploratory Practice and become more critical, collaborative, and reflective teachers in the future.

4. METHODS

4.1. Research participants and questions

As stated before, the main objective of this Exploratory Practice (EP) project was to answer the following puzzle: *Why do some future teachers find it so difficult to follow written instructions?*

The first phase of this EP research took place in the first semester of 2019. About 100 learners were invited to answer an online questionnaire using Google Forms. The questionnaire contained the following questions:

- (a) Why do you believe some university students find it so hard to follow written instructions?
- (b) Have you ever faced this kind of problem as a teacher or student? If so, what happened?
- (c) Could you mention a situation in which you got into trouble because you failed to follow some instructions? What kind of trouble was it? What did you do? Why didn't you follow the instructions?

As mentioned above, the learners were undergraduate and graduate students from a public university in Rio de Janeiro. Initially, the idea was just to use just the questionnaires, as approximately 50 responses were expected. However, only 16 were actually received. In order to improve the response rate, the respondents were not asked to identify themselves and were not required to answer all the questions, but they all did. As fewer responses were received than expected, the decision was made to introduce Exploratory Practice to the Practicum group. Also, as the focus of the research had changed (from solving problems to working on understanding), it was also decided that a more classroom-centered study would be appropriate, which was also more in line with the principles of EP.

The group chosen for the study was taking the TEFL Practicum course, which consists of lesson observation and discussion activities online or in class. There were 14 students involved in this second phase of the study. They had been observing classes for young adults, adults, and older people at the university language center for about two months.

First, they were introduced to the concept of Exploratory Practice and invited to join an EP project. The questions from the questionnaire were read out to them and then they split into three groups: two groups of four and one group of six students. While they were organizing themselves, the questions were written on the board. They had been asked to prepare posters later on, but the preparation of their lists in groups took so long that the poster stage was skipped, and the activity moved straight on to an open discussion based on the lists. In this stage, the three groups worked together and had access to the responses received from the online questionnaire.

As the learners had been doing class observations for some time then, the discussion was very rich. Not only did they mention their own or their students' experiences, but they felt comfortable enough to mention other students and teachers as well.

It was generally agreed that following instructions is a complex task that depends not only on the people who give and receive the instructions, but also on the environment (e.g., acoustics) and the tasks to be performed. Finally, the reasons identified for difficulty in following instructions were collated into three groups: learners, teachers, and other reasons.

4.2. Research method

This qualitative study was initially conceived as a participatory action research project (Brandão & Streck, 2006; Thiollent, 2006, 2011), but was then adapted to become an EP project. These two research methodologies share the view that practitioners are the people who are most likely to conduct the most productive research in the field (Allwright, 2008, p.15). Their main difference is what they focus on.

In action research, the participants generally expect change to occur as a result of the study. However, in the case of EP, the present study included, the expected change is not in the behavior, but in the "understanding of the practitioners' own classroom" (Gieve & Miller, 2008, p. 2). The main aim of EP is not, therefore, to find "new methods," but to understand what is taking place in the educational environment. Bailey (2008) uses two metaphors, work and life, to explain the difference between EP and other kinds of classroom-based research. While in the latter, teaching/learning is seen as "work" and the researcher looks for "efficiency," in EP, the teaching/learning process is seen as "life" and the search is for a better quality of life in education.

Allwright (1983, cited in Bailey, 2008) mentions that classroom-centered research differs from other kinds of educational research because it does not concentrate on *inputs to* the classroom or *outputs from* the classroom.

It simply tries to investigate what happens inside the classroom when learners and teachers are together. At its most narrow view, classroom-centered research is in fact research that treats the language classroom not just as the *setting for* investigation but, more importantly, as the *object of* investigation. Classroom processes become the central focus. (Allwright, 1983, cited in Bailey, 2008, p. XI)

As mentioned above, when it comes to EP, teachers and learners are seen as the *practitioners* of research. In the present study, getting the learners to ask and answer *Why* questions meant they had to think about their own reality. There was no right answer. Transformation may or may not occur, but some kind of awareness would take place.

5. RESULTS & DISCUSSION

The compilation, comparison, and analysis of the students' responses indicated that they attributed learners' difficulty in following instructions to three types of causes: lack of attention on the part of learners; unclear instructions given by teachers; and factors outside the activity itself, such as deficient primary and secondary education.

5.1. Discussing the questionnaire responses

An interesting fact is that although the learners were asked only about their (and others') difficulties, they tended not only to offer reasons for these difficulties, but also to make suggestions about how to address them. The online questionnaire consisted of three (blocks of) research questions (item 4.1). As there is no space in this chapter to present a full analysis of all the answers, a few have been chosen to present the main aspects observed.

5.1.1. First Question: *Why do you believe some university students find it so hard to follow written instructions?*

This question prompted not only some suggested reasons for the difficulties (in bold), but also (in 1 and 3) some suggested solutions (in italics). The examples show that learners sometimes feel the problem is the teachers' fault (1 and 3) and other times the learners' own fault (1 and 2).

1. Maybe both because **professors may take for granted that at a university level**, students will master instructions and neglect to facilitate instruction-giving by *breaking it into parts, checking understanding, modeling*, etc. It could also be that **students are ashamed of asking for clarification**.
2. Because maybe **they didn't understand the instructions and are afraid to ask**. Another possibility that I can think of is **distraction. Not paying attention** is something common as a student. It's not on purpose.
3. Sometimes **the way it's written is not clear**, and the student gets confused. *If the professor explains in class and then send written instructions, it works much better.*

Particularly intriguing was the fact that many responses were expressed quite tentatively, using modality in a variety of forms. In examples 1 and 2, the word *maybe* (underlined) is used; in example 3, the adverb *sometimes* could be interpreted as a form of modality, meaning “not always” or “not definitely.” Therefore, one possible puzzle to investigate in the future is: *Why were some of the responses tentative?*

5.1.2. Second Question: *Have you ever faced this kind of problem as a teacher or student? If so, what happened?*

Only two learners reported never having had trouble following instructions, while two others gave only a partial response. The response given below, for example, first expresses a negative response but then immediately explains how any difficulty was circumvented. This person presents what could be considered a social strategy (asking for help) in anticipation of a possible problem.

No, I haven't, and *when the instructions are not clear I check them with the person who gave it.*

Another one was more tentative, using the word *probably*, and adding that they did not remember.

4. Probably, but not that I would remember.

Many learners mentioned that they had faced the problem, and when they did, they used the social strategy of asking for help (5 and 6):

5. Yes, as a student. *I asked for the professor's help.*
6. Yes. *I asked my superior or colleagues what I was supposed to do, as **it was not clear to me.***

Some learners who faced these difficulties as students (in bold) developed some teaching strategies (in italics) to avoid misunderstandings and help their learners (7):

7. As a student, I have had problems with following instructions due to **my lack of attention or misunderstanding** what has been asked. As a teacher facing students who had difficulties, *I had to read the instructions with them and explain several times.*

5.1.3. Third block of questions: *Could you mention a situation in which you got into trouble because you failed to follow some instructions? What kind of trouble was it? What did you do? Why didn't you follow the instructions?*

The aim of the third group of questions was to find out whether the learners had faced this kind of difficulty just at university or in other situations as well. These questions were designed to probe the respondents' personal experiences of difficulties, whereas the first and second questions could be answered by giving examples about other learners.

When narrating past experiences, only one learner did not mention having problems with instructions (8).

8. I wasn't in trouble, but I have been through a situation recently in which I believed I had some good ideas that could be better than the ones in the book. So, *I had some internal fight to decide whether I would follow the book's instructions or try to adapt them my way.*

When answering the third block of questions, the learners usually presented the problem (underlined words), the reason (in bold), and sometimes the solutions to the problem (in italics), although they were not asked to present any suggestions. Two of them (9 and 10) mention difficulties in filling out forms, although one of these (9) does not regard this as a serious issue.

9. Nothing serious, I filled out a form wrongly because **I hadn't read the rubrics properly**.
10. Once I filled a form wrongly because I made **a fast reading and actually misread what was asking**.
11. I don't remember going through such a situation at university, but I do remember seeing one of my old course book and the activity said "complete with to be" and I simply added "to be" in all the blanks. I guess **I just did what I'd been "asked"** and maybe *the instructions could have been clearer or provide a model*.
12. Yes, there was a situation once. I was taking a test and I did not turn the page and did not do the questions on that page. **I did not pay attention** and had only half the grade because of it. **I do not remember why, but I think I was in a hurry or too tired that day**.
13. Sometimes when I was in class I feel lost simply because **I lost focus on the moment**. However, I can't remember having problems due to it.
14. When I was making my first international trip, I could not understand the instructions for the baggage dispatch of the airline company that I was traveling on. As it was a flight with connections, I did not understand that there is no need to remove the luggage at the first connection, since the luggage is checked automatically. In my case **this confusion with the instructions was partly because I was doing something new, in a situation I was not used to**.

Again, many of the responses are expressed tentatively, using terms such as "I think" (12), "sometimes" (13), "I can't remember" (instead of "I did" or "I didn't") (13), and "partly" (14). It is also curious how many of them do not seem to care much about the problem. They disregard the importance of some of the situations, such as "completing the whole exercise with the word 'to be'" (11), "getting only half the grade" (12) or getting "lost" in class (13).

5.2. Exploratory practice activity

In preparation for the Exploratory Practice activity, the reasons given by the learners were organized into three groups, which largely corresponded to the reasons given by the online questionnaire respondents. The three groups were learner-related, teacher-related, and related to other factors. The reasons related to learners mentioned failing to pay attention, misunderstanding, more image-driven personality, distraction, and inefficient reading strategies. Some of them were also linked to their habits, such as greater familiarity with multiple-choice activities, a tendency to ignore instructions, not liking to read or not reading much, and lacking in patience. All these characteristics are typical of the connected generation (Cardoso 2013a, 2013b, 2015).

People from the connected generation are usually more kinesthetic and visual, which means they need visual stimuli and a lot of movement to learn. They value entertainment and games and use new technologies confidently; they read less and worse, mainly because they find it difficult to concentrate; they tend to multitask, which means they can perform many activities at the same time, are creative, and learn quickly; they are looking for a *raison d'être* and passion; they defend the environment and better living conditions; and they do not believe in hierarchical authority, but in shared leadership (Cardoso, 2013b).

Some of the learners blamed teachers for the difficulties students have following instructions. The reasons they gave included: unclear or confusing instructions; lack of models or examples, complexity of the activities; time gap between giving of oral instructions and answering of the questions; exclusive use of the target language (L2). A last problem mentioned by was that “sometimes professors take for granted that learners will master the instructions.”

The other reasons the learners mentioned included classroom acoustics, biological factors, poor primary and secondary education, and even difficulty in prioritizing tasks. When multiple tasks are to be done, it is common to think more about the task than paying attention to what is supposed to be done. This is another characteristic of the connected generation (Cardoso, 2013a, 2013b, 2015)

As mentioned before, an interesting aspect of the research is that learners themselves presented some useful suggestions; effectively, learning strategies they believed to be effective. They also suggested some useful teaching strategies to avoid problems in understanding instructions (Table 1).

Table 1.
Learners' suggestions for improving understanding of instructions.

SUGGESTIONS	
FOR LEARNERS	FOR TEACHERS
<ul style="list-style-type: none"> • Be patient. • Try to focus. • Read carefully. • Read other texts more often. • Pay attention to what is being said. • Ask the teacher or a colleague when in doubt. • During a test, don't worry about other problems. • Don't be too afraid or shy (ashamed) to ask for clarification about instructions. • Remember that other people may have the same difficulty. 	<ul style="list-style-type: none"> • Consider classroom acoustics. • Write clearer instructions. • Present models or examples. • Don't just follow the teacher's guide. • Use first language (L1) sometimes. • Explain in class and follow up with written instructions. • Try to speak more clearly (diction and pace). • In a test situation, read the instructions with the students. • Don't take students for granted. Check whether the learners understand the instructions.

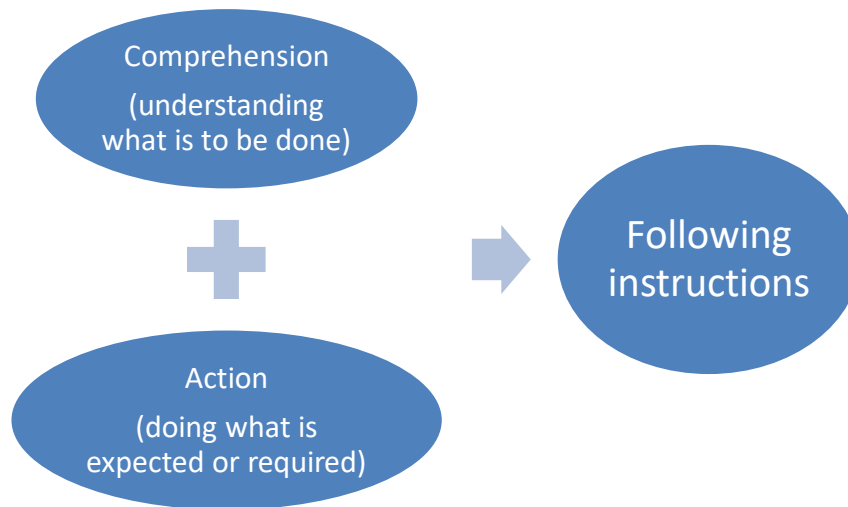
The learners were all very committed to the EP activity and mentioned that they would try to use it with their own students. Although the focus was on understanding, they also suggested some possible strategies. This suggests they are still very much linked to the *how-to* rather than the *why*. Maybe, part of the EP activity should have been a discussion

about this eagerness to rush for solutions instead of working on understanding before anything else, which itself could be transformed into a new puzzle for future study: *Why do we tend to rush for solutions without trying to understand the situation first?*

6. CONCLUSION

By the end of the EP activity, our puzzlement had changed. Our new question is: *Why is it so difficult to follow instructions?* To answer it, we searched for other studies on the same topic. Some interesting studies in the areas of speech therapy, psychology, cognition, and brain science were identified, which confirm that following instructions is a complex activity (Jaroslawska, Gaheercole, Allen, & Holmes, 2016; Waterman et al., 2017). In fact, it is an activity that requires other faculties, such as perception (hearing/vision), understanding language, attention, concentration, and retention and recall of information (working memory and, in some cases, long-term memory). All these are elements of *comprehension* (Cardoso, 2016). However, the instruction-following process involves another stage, which is the action resulting from this comprehension (Figure 1).

Figure 1.
The Instruction-Following Process.



To understand what is supposed to be done, learners must be familiar with the genre (instructions/rubrics), be aware of the context (the importance), pay attention, and know the language. As for the other part of the process, learners must be able to do and want to do what is being asked of them. Most studies focus on short-term memory capacity (part of the comprehension process), but we believe motivation, attention, and concentration should also be investigated.

Many of the points discussed here are typical of the connected generation, such as not paying attention, rushing to do things without thinking first, and finding it hard to read about things that do not interest them. However, nowadays, it is not just a matter of age, as most adults are from the connected generation (born after the 1980s) or have so much contact with high technology that their lifestyle, including the way they study and teach, has changed

completely. Therefore, some study of what Santos (2016) calls *cyberculture (digital culture)* would also be worthwhile. In the case of teacher education, it is important to understand how changes in teachers' and learners' profiles will affect the educational process when these learners become the teachers.

This study contributes to this understanding. By engaging in the research, all the participants gained a better understanding of the comprehension process (both reading and listening). Although the idea was not to solve a problem, but to understand the situation, by simply taking part in the study, these learners and teachers (including the author) had the chance to rethink the way they deal with instructions. Moreover, these (future) teachers had the chance to experience Exploratory Practice as "a viable alternative to technicism" (Allwright, 2008, p. 143) and an alternative to more conventional research. Therefore, it is hoped that in the future these practitioners will also consider their learners' characteristics when giving instructions.

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Chapter #15

GENDER DIFFERENCES BETWEEN THE PERCEPTIONS OF PHYSICS AND SCIENCE IN GENERAL AMONGST SENIOR AND JUNIOR STUDENTS AT A SOUTH AFRICAN UNIVERSITY

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ABSTRACT

It is widely accepted from literature that male students outperform their female counterparts in science, and in particular physics. Accordingly, gender differences stem from their prior backgrounds in mathematics, physics and differences about their attitudes and beliefs about the subject. To measure students' differences in perceptions regarding physics and science, use is made of a questionnaire that is comprised of two sections; A (four questions) and B (fifteen questions). In section A students were required to respond to questions that relates to their relationship between life and physics, chemistry and mathematics, while in section B, a probe is made regarding their confidence in physics and chemistry. 101 students participated in this study. Results are presented in both numeric and in percentage form. The fundamental difference between the genders is that in both groups there appears to be a strong affinity for chemistry for the female students, and even a stronger liking for chemistry by the senior analytical chemistry students. The males on the other hand shown an average liking for chemistry in both cohorts, but a slightly better liking for physics as a subject. From this anecdotal study, it appears that females show more preferences for science and chemistry than their male counterparts do.

Keywords: physics, gender, chemistry, anecdotal, questionnaire.

1. INTRODUCTION

Physics as a subject is important for any country's welfare and technological advancement (Baran, 2016). Thus, the contribution by physicist is of paramount importance for any growing scientific economy. The lack of which can be detrimental for any technological endeavors. In this case, it can be said that equal contribution by both males and females to science would be any ideal scenario. However, research points to the converse of this scenario. This stems from the fact that physics is considered a difficult subject and thus there are variations in perceptions between males and females. Accordingly, females' lack of interest in the subject, results in them showing less enthusiasm for the subject (Baran, 2016; Bamidele, 2001). Research by Visser (2007) and Ozgun-Koca & Sen (2011) revealed that males preferred physics to their female counterparts. In the same vein, research by Wei-Zhao Shi (Shi, 2012) reveals a very different scenario for Chinese students. He found that female students preferred physics learning by relating and by analysis and this correlated to their better understanding in the subject, while the males preferred to study physics by rote learning, and this resulted in a negative correlation in their performance. In comparison to research done by Kessel, Rau, & Hannover (2006), they found that male students preferred physics to their female counterparts. Because of this, they found that females were not

interested in physics and were lesser successful in the subject (Baran, 2016). This correlates well with the research done by Saleh (2014), who indicated that females experienced a higher level of difficulty in understanding physics. In the same token, research done by Zavala, Millan, Dominguez, & Gonzalez-Suarez (2015), points towards to students generally failing first year physics and mathematics courses. This unfolds because they do not see the relevance of physics and mathematics as part of their professional career progression. In terms of interest of different science subjects, research reveals that females have a higher inclination for learning biology while physics and chemistry is more preferred by males (Kang, Hense, Scheersoi, & Keinonen, 2019). These results concur with the research of Blickenstaff (2005) that biology is more preferred by females than males. The reason for such choices by females is because biology as a subject is related to caring of people and animals, whilst physics is preferred by males as it deals with things (Diekman, Brown, Johnston & Clark, 2010; Kang et al., 2019). According to UNESCO statistics, it is revealed that only 30% of the Sub-Saharan workforce in Africa are represented by women in the STEM field. The lack of interest for core science subjects has resulted in women being underrepresented in STEM careers. It is in this respect that this research aims to shed more light on students' perception of physics and science in general with respect to gender between senior and junior students at a South African university. It is hoped that this research will fill a gap in understanding of how student's pre-knowledge of physics from their high school studies would change through their progression of their studies at a tertiary level. This study is important as it will give a perspective of students' perceptions of physics and science in general from a South African point of view. Besides comparing students' perception of physics and science in general as a function of gender, this study also compares that perception of students engaged at different levels of study at a university.

1.1. Research question

The fact that differences in physics learning perception based on gender is a common occurrence in Western countries, our interest is to investigate if the same perceptions of learning physics and science exists amongst South African university students.

1.2. Background

The background for this study is taken from the work of Gasant (2011) and Shi (2012) as well as some of the references cited within the latter reference paper. The manner in which gender has influenced the participation and performance between girls and boys indicates that there is a definite disparity between the genders. Science is generally viewed as a male-dominated subject and thus the women is perpetually faced with the oppression of such a male dominated society. Schools are places for the perpetuation of gender inequalities. Further, their socio-cultural perception influences their thinking about gender and science.

There has been considerable research in Western countries that have indicated that male students outperform their female counterparts in their perceptions of physics. Feminist scholars have reported that females need to relate and connect with their object of study (Maccoby & Jacklin, 1974). On the other hand, research by Kahle & Meece (1994) have indicated that females only understand a concept if they could put it into a broader world context, while males regard physics as valuable and learn the concepts internally in a coherent way.

2. METHODOLOGY

2.1. Instrument used

This study was undertaken to measure students' perception of physics and science in general as function of gender between the junior and senior students at a South African university. To measure such perceptions, use is made of a questionnaire developed by Keith Wurtz (2007) (Chaffey College) for this study. This questionnaire consists of two parts; with section A (comprised of 4 questions) and section B (comprised of 15 questions). Section A probes the students' relationship to science (mathematics, physics and chemistry) and section B probes their confidence with respect to chemistry and physics. The students were required to respond to each of the questions of the questionnaire on a rating scale of between +1 (Disagree) to +6 (Agree). For convenience, the rating scores of the following were combined: (+1, +2), (+3, +4) and (+5, +6). The survey took no more than 10 minutes to complete.

2.2. Participants

A total of 101 students participated in this study, comprising of juniors (27 males and 37 females) from the Emergency and Medical Care and Podiatry departments, while the senior students (12 males and 25 females) came from the Analytical Chemistry department. These students were studying physics (non-major) as part of their curricular studies.

2.3. Data analysis

This research makes a comparison between junior and senior students' perception of physics and science in general as a function of gender. Results are expressed in both numeric and percentage form. Statistical analysis (t-test) was used to make comparisons between male and female perceptions about physics and science in general.

2.4. Ethical considerations

Prior to the start of this research, permission was sought from each of the above groups of students to conduct the research. Further, an explanation was provided as why such a project was undertaken.

3. RESULTS AND DISCUSSIONS

The results of the students' perception about physics and science in general are presented in tables 1 to 4, with tables 1 and 2 referring to the junior students while tables 3 and 4 refers to the senior students.

Gender Differences Between the Perceptions of Physics and Science in General amongst Senior and Junior Students at a South African University

Table 1.
Comparisons of the junior students' perceptions about their relationship between their lives and physics, mathematics and chemistry.

No	Description	Males			Females		
		+1 and +2	+3 and +4	+5 and +6	+1 and +2	+3 and +4	+5 and +6
1	I understand the relationship between my life and physics	0	2	25	0	22	15
		0%	8%	59%	0%	59%	41%
2	I understand the relationship between my life and chemistry	0	7	20	1	17	19
		4%	37%	59%	3%	46%	51%
3	Math is important to the understanding of science	0	1	26	1	2	34
		0%	4%	96%	3%	5%	92%
4	I am confident in my mathematics ability	0	7	20	2	14	21
		0%	26%	74%	5%	38%	57%

Table 2.
Comparison of the junior students' perception about their confidence in physics and chemistry.

No	Description	Males			Females		
		+1 and +2	+3 and +4	+5 and +6	+1 and +2	+3 and +4	+5 and +6
1	The parts of an atom	1	4	27	2	9	26
		4%	15%	82%	5%	24%	70%
2	Static electricity	1	10	16	4	21	12
		4%	37%	59%	11%	57%	32%
3	How atoms form compounds	1	6	20	0	16	21
		4%	23%	74%	0%	43%	57%
4	Inertia	0	5	22	2	8	27
		0%	19%	82%	5%	22%	73%
5	How iron forms rust	3	9	15	2	16	19
		11%	33%	56%	5%	43%	51%
6	Simple machines	1	10	16	2	17	18
		4%	37%	59%	5%	46%	49%
7	How atoms forms ions	1	11	15	2	11	24
		4%	40%	56%	5%	30%	65%
8	Magnetism	3	8	16	3	13	21
		11%	33%	59%	8%	35%	57%
9	The difference between organic and inorganic compounds	1	5	21	2	4	31
		4%	19%	77%	5%	11%	84%
10	The relationship between magnetism and electricity	3	12	12	2	17	18
		11%	45%	45%	5%	46%	49%
11	The different states of matter	2	7	18	1	5	31
		7%	29%	67%	3%	14%	84%
12	How sound moves through air	0	11	16	3	13	21
		0%	41%	59%	8%	35%	57%
13	Acidic and basic compounds	0	8	19	2	7	28
		0%	30%	70%	5%	19%	76%
14	How heat is transferred from one substance to another	0	11	16	1	21	15
		0%	40%	60%	3%	57%	41%
15	How batteries form electricity	2	14	11	2	27	8
		7%	52%	41%	5%	73%	22%
16	The properties of light	2	10	15	0	24	13
		7%	37%	56%	0%	65%	35%

Table 3.
Comparisons of the senior students' perceptions about their relationship between their lives and physics, mathematics and chemistry. Order of presentation is females first followed by males.

No	Description	Females			Males		
		+1 and +2	+3 and +4	+5 and +6	+1 and +2	+3 and +4	+5 and +6
1	I understand the relationship between my life and physics	1	17	7	4	4	4
		4%	68%	28%	33%	34%	33%
2	I understand the relationship between my life and chemistry	0	2	23	0	0	12
		0%	8%	92%	0%	0%	100%
3	Math is important to the understanding of science	1	6	18	0	2	10
		4%	24%	72%	0%	16%	84%
4	I am confident in my mathematics ability	2	16	7	1	3	8
		8%	64%	28%	8%	25%	67%

Table 4.
Comparison of the senior students' perception about their confidence in physics and chemistry.

No	Description	Females			Males		
		+1 and +2	+3 and +4	+5 and +6	+1 and +2	+3 and +4	+5 and +6
1	The parts of an atom	0	5	20	1	3	8
		0%	20%	80%	8%	25%	67%
2	Static electricity	1	19	5	2	4	6
		4%	76%	20%	17%	33%	50%
3	How atoms form compounds	0	4	21	1	3	8
		0%	16%	84%	8%	25%	67%
4	Inertia	0	15	10	1	4	7
		0%	60%	40%	8%	34%	58%
5	How iron forms rust	0	5	20	0	4	8
		0%	20%	80%	0%	33%	67%
6	Simple machines	1	15	9	1	6	5
		4%	60%	36%	8%	50%	42%
7	How atoms forms ions	0	4	21	1	3	8
		0%	16%	84%	8%	25%	67%
8	Magnetism	0	12	13	3	3	6
		0%	48%	52%	25%	25%	50%
9	The difference between organic and inorganic compounds	0	2	23	0	1	11
		0%	8%	92%	0%	8%	92%
10	The relationship between magnetism and electricity	0	14	11	2	5	5
		0%	56%	44%	17%	41%	42%
11	The different states of matter	0	2	23	1	2	9
		0%	8%	92%	8%	17%	75%
12	How sound moves through air	1	7	17	0	7	5
		4%	28%	68%	0%	58%	42%
13	Acidic and basic compounds	0	4	21	0	1	11
		0%	16%	84%	0%	8%	92%
14	How heat is transferred from one substance to another	0	4	21	0	3	9
		0%	16%	84%	0%	25%	75%
15	How batteries form electricity	1	10	14	2	2	8
		4%	40%	56%	17%	16%	67%
16	The properties of light	0	7	18	1	5	6
		0%	28%	72%	8%	41%	51%

3.1. Gender comparisons of the perceptions of physics and science in general amongst junior students

In table 1, we see a strong relationship between the student's life and chemistry for both genders (item 3, 96% for males and 92% for females) of this study. Because of this, everything that unfolds from this research is an inclination for chemistry related topics. This is reflected in item 2 of the questionnaire where the perceptions of both genders are given (item 2, 59% for males and 51% for females). Of note is that male students show a stronger inclination for mathematics as a subject than physics. A t-test score of the mean values was found to be 0.003, which is less than the probability $p < 0.05$, which implies that the differences between the perceptions of physics and science in general of the junior students is not significant.

In table 2, a similar trend unfolds for both males and females in that they show stronger preference for chemistry related topics. In this regard, males have a stronger preference for topics such as the "parts of an atom" (item 1, 82%) and a sound foundational understanding of the differences between "organic and inorganic chemistry" (item 9, 77%). By comparison, to the females, they also have a strong preference for the latter topic (item 9, 84%) and for a sound understanding of the different states of matter in chemistry (item 11, 84%). Both genders appear to have a moderate understanding of the relationships between magnetism and electricity (item 10, 45% for males and 49% for females) in physics. Of particular interest, for some reason males appear to have a good understanding of the topic "inertia" in physics (item 4, 82%). It is also not surprising to see students (both genders) preference for acids and bases (item 13, 70% for males and 76% for females) when their field of study is not in chemistry. For the female students, it is observed that they have a moderate preference for topics in physics, and in particular of for how electricity is obtained from battery power (item 15, 22%) and the properties of light (16, 35%). The t-test score of the mean values was found to be 0.00003, which is very much less than the probability value $p < 0.05$, which implies that the junior student's perception about their confidence in physics and chemistry is not significant.

3.2. Gender comparisons of the perceptions of physics and science in general amongst senior students

The results of table 3 indicates that senior students have a good association of chemistry and find meaning of it in their lives (item 2, 100% for males and 92% for females). They also realize that mathematics is crucial for their understanding of science (item 3, 84% for males and 72% for females). Their low preference for physics (item 1, 33% for males and 28% for females) is in keeping of their preferred choice of chemistry for their studies. In this instance, physics is regarded as an auxiliary (pre-requisite subject) subject (even at the 2nd year level). For these students doing physics is just to understand some related concepts in chemistry better. The t-test score of the mean values was found to be 0.80, which is very much greater than the probability value $p < 0.05$, which implies that the comparisons of the senior students' perception about their relationship between their lives and physics, mathematics and chemistry is significant.

From table 4, we see that female students have a strong affinity for chemistry related topics compared to the males. In particular, they have a good knowledge of "parts of an atom" (item 1, 80%) and how atoms are used to form compounds (item 3, 84%), what happens to iron when it combines with oxygen (rusting) (item 5, 80%) and the various states of matter (item 11, 92%). They also have a good understanding of how atoms forms ions (item 7, 84%). As far as the males students are concerned, their preference for these topics is quite average

(item 1, 67%), item 3 (67%), item 5 (67%) and item 7 (67%). One of the items for which both males and females have exactly the same level of preference is item 9 (males 92% and females 92%). For this item, these students appear to have an excellent understanding of the differences between organic and inorganic chemistry, which is very much in keeping with their field of study. With a good background in chemistry, they also show a strong preference for acids and bases (item 13, 92% for males and 84% for females). These topics are also done at junior and senior grades at high school. A topic in the questionnaire, which is well covered in basic or general science is the topic “heat transfer” and for this topic their knowledge appears to be good (item 14, 84% for females). Correspondingly, the male student’s preference for items 13 (92%) and 14 (75%) appears to be good as well. The t-test score of the mean values was found to be 0.10, which is very much greater than the probability value $p < 0.05$, which implies that the comparisons of the senior students’ perception about their confidence in physics and chemistry is significant.

3.3. Comparisons of the perceptions for physics and science in general between the juniors and seniors

The seniors, because of their field of study, show a higher preference for chemistry related topics than the juniors. In particular, senior females have a high affinity for chemistry compared to the males. In contrast to the juniors, the males have a greater preference for chemistry than the junior females. Whilst the seniors show limited interest in physics, the juniors appear to show a slightly better interest to physics related topics. In particular, the junior males have a slightly higher preference for science related topics than the females.

4. CONCLUSION

This study was undertaken to determine the students’ perception about physics and science in general between the genders amongst junior and senior students at a South African university. Results reveals that both juniors and seniors have a high preference for chemistry, even though the juniors are not specializing in chemistry. In addition, the senior female students have the highest preference for chemistry than both the senior male and junior students. The preference for physics by both cohorts of students is limited and is a cause for concern. In future a similar survey will be conducted amongst students who are pursuing a pure physics field of study.

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Chapter #16

GENDER DIFFERENCES IN PHYSICS ANXIETY AT A SOUTH AFRICAN UNIVERSITY

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ABSTRACT

From literature, it is known that anxiety for physics amongst female students appears to be higher than for male students. This study is carried out to determine the role that gender plays in their preference to physics and the anxiety they experience in the subject. To measure the anxiety that students experience in physics, use is made of a modified physics anxiety questionnaire. This questionnaire has a rating scale from +1 (minimal anxiety) to + 5 (very high anxiety). 64 students participated in this study. Results for this study is presented both in numeric and in percentage form. From this study, it was revealed that female students have a significantly higher level of physics anxiety compared to their male counterparts. Besides the females having a higher level of anxiety in the thought of seeing their physics assessment marks, both males and females have a similar level of anxiety for the item relating to fear of failing their physics tests or examinations. The anxiety experienced by male students is their desire to excel in the subject and thus they appear to be more focused in their physics studies, while female students are overcome by the complexity of the subject and present a higher level of anxiety in the subject.

Keywords: physics, gender, questionnaire and anxiety.

1. INTRODUCTION

Physics is feared as a difficult subject but how both males and females perceive it might be different. If the emotions of fear are not properly checked then this could lead to anxiety in physics amongst the students (Manilito, Gardo, & Elio, 2016). The net effect of all this is a lack of success and a perceived fear for the subject. Gender could be a factor in determining students' anxiety levels in physics (Manilito et al, 2016). This concept "anxiety" has a variety of meanings. According to Sapir & Aronson (1990), Scovel (1978) and Sahin, Caliskan, & Dilek (2015), anxiety is defined "as an unpleasant emotional state of uncertainty, fear, worry, discomfort, loss of control, and expectation that something bad will happen". This can impact the way one learns. In this context, anxiety is perceived as a feeling of fear or worry that something will happen. Such a variable could be responsible for their underperformance in the subject. In a sense anxiety could be their fear or discomfort in attending something challenging such as a test or an examination. Most of the time anxiety reveals itself as a positive or a negative construct. In a positive sense, anxiety can lead to an enhancement in learning (positive stress), while on the other hand, it can impede one's learning process (negative stress) (Sahin et al., 2015).

It is generally accepted, from literature, that male students significantly outperform their female counterparts in physics (Agra, Fisher, & Beilock, 2017). However, some research points towards both males and females having similar anxiety levels in physics (Brownlow, Jacobi & Rogers, 2000). A subject such as mathematics, which is the backbone of physics, is responsible for higher levels of anxiety amongst female students and can be regarded as a good predictor for gender prescriptor of anxiety levels (Devine, Fawcett, Szucs, & Dowker, 2012; Agra et al., 2017). It is of interest to note that female students outperform their male counterparts in physics in the lower grades of school but that reverses itself in high school (Labudde, Herzog, Neuenschwander, Violi & Gerber, 2000; Sahin et al., 2015). Accordingly, this is reflected as lesser levels of physics anxiety for male students. Female students generally show avoidance for science-related subjects and indicative of a disregard or disinterest they have for the subject.

Science anxiety can be defined as a vague fear that arises from many learning situations (Mallow, 1978; Sahin et al., 2015). As side from the negative perceptions of anxiety, anxiety itself can reveal itself as an “intervening self-message” (Mallow & Greenburg, 1983) and in this context a person will be constantly saying negative statements about the subject, an example of which is: “I cannot understand physics”. Negative statements like these only serves to produce more anxiety and reduces performances in the subject. Further, science anxiety can also be affected by the family, school or environmental issues. Aside from the negative thoughts arising from science anxiety, unwanted negative memories of past can be ingrained in a person. In this sense, the student maybe insulted by a science teacher in the past, memory of a science experiment that went all wrong, discouraging comments about science from a parent, etc. (Mallow & Greenburg, 1983, Sahin et al., 2015).

According to literature, there is much research on mathematics anxiety and few researches on science anxiety and lesser research on physics anxiety (Agra et al., 2017), hence the aim of this paper is to shed more light on this topic with specific reference to the impact of physics anxiety as a function of gender amongst South African students. Most South African students have done badly in the TIMMS assessment, and in particular mathematics and physics. It is in this context that anxiety in physics is explored with gender being the added variable.

1.1. Research question

What are the differences in physics anxiety amongst South African university students as a function of gender?

1.2. Background

Gender differences in STEM subjects (Shepherd, 2017) have shown that women experience more anxiety in these subjects compared to men, with physics being the core of the subjects. This is taken in context of South African students at South African universities. It was shown in 2012 that less than 30% of the female students have enrolled for STEM subjects and show avoidance for these types of subjects in South Africa. However, it can be said that more female students have enrolled for non-STEM subjects. In comparison to other subjects like psychology, men also appear tend to experience lesser anxiety compared to women (Mwamwenda, 1993).

Anxiety is an affective variable that influences one’s performance and achievement in the subject (Sahin et al., 2015). A low level of anxiety maybe associated with a positive effect on achievement and performance while on the other hand high levels of anxiety may negatively impede such performances. These sentiments are further echoed by Czerniak & Chiarelott (1984), who have indicated that science anxiety is a factor that influences

achievement and that a high science anxiety may result in a result in lower achievement in the subject (Sahin et al., 2015). Underrepresentation of women in the hard core sciences, especially physics is a cause for concern. In general, girls have a higher interest for science than males at the lower grades but that interest fades once they enter the high school phase and this has an impact on their career choices (Sahin et al., 2015). Amongst the reasons for such a behavior is their negative attitude towards the subject (Sharma, Stewart, Wilson, & Gokalp, 2013) and the anxiety they develop during their schooling (Sahin et al., 2015). According to Beyer (1991), science anxiety is an obstacle that women face and that impedes them from making important career choices.

2. METHODOLOGY

To measure students' anxiety levels in physics, use is made of a questionnaire called the "Physics Anxiety Questionnaire", downloaded from the website, which was uploaded by Jamie Bagundol on the 8th September 2016 and retrieved from SCRIBD on the 2nd May 2019. This questionnaire was ideal as it contained questions that pertains to anxiety in physics. The questionnaire was comprised of fifteen items and scored on a Likert-type scale ranging from +5 (very high anxiety) to +1 (minimal anxiety). The participants in this study have enrolled for a six-month semester module (basic science in physics) in Emergency Medical Care and Podiatry at the University of Johannesburg in South Africa. With slight modifications to the original questionnaire, this questionnaire was then administered to 27 males (42%) and 37 females (58%). Thus, a total of 64 students participated in this study. These students come from different ethnic groups (Indians, Whites and Africans) in South Africa. The questionnaire itself consisted of some anxiety questions such as: "I sweated a lot whenever I took my physics exams/tests" and "I feared failing my physics exams/tests". Besides the questionnaire being given to elicit students' anxiety levels in physics, students' anxiety levels as a function of gender is also gathered. Before administrating the questionnaire, permission was sought from the students and an explanation as to why this research is done. Participation in the survey was voluntary and the students did not have to fill in their names, except to indicate male or female. It was explained to the students that the data collected was used for scientific research. Results are presented in both the numeric and percentage form. A higher percentage is reflective of a higher response and a greater anxiety towards the subject physics.

3. RESULTS AND DISCUSSIONS

The results between the genders on the issue of anxiety levels in physics is shown in table 1 below.

Table 1.

Differences in the anxiety levels between male and female students. Note that the categories very high anxiety and high anxiety levels have been combined, as well as partial and minimal anxiety. There are a total of 27 males and 37 females. The first row within each of the rows represents the number of students, while the second sub-row represents its respective percentages.

No	Physics anxiety	Men			Females		
		Number: Very high anxiety to high anxiety	Number: Moderate anxiety	Number: Partial to minimal anxiety	Number: Very high anxiety to high anxiety	Number: Moderate anxiety	Number: Partial to minimal anxiety
1	I was worried when I was informed that physics was a requirement for my course	5	6	16	8	7	22
		19%	22%	59%	22%	19%	59%
2	I felt a lot of pressure/stress/burden in my physics subject	3	7	17	8	11	18
		11%	26%	63%	22%	30%	49%
3	I felt my heartbeat faster whenever I went to my physics class	1	1	25	3	6	28
		4%	4%	92%	8%	16%	76%
4	I was worried about being called in my physics class	2	4	21	7	3	27
		7%	15%	78%	19%	8%	73%
5	I cringed when I had to go to my physics class	4	1	22	8	4	25
		15%	4%	81%	46%	11%	67%
6	I felt uneasy when asked to recite in my physics class	2	6	19	6	10	21
		7%	22%	70%	16%	27%	57%
7	I could hardly concentrate in my physics class	2	3	22	3	6	28
		7%	11%	82%	8%	16%	76%
8	I could not do my physics assignment alone	2	2	23	4	7	26
		7%	7%	86%	10%	19%	71%

9	I had difficulty understanding physics concepts	1	2	24	7	4	26
		4%	7%	89%	19%	11%	70%
10	I could not sleep well before every physics test/exam	1	6	20	11	2	24
		4%	22%	74%	30%	5%	65%
11	I feared failing my physics tests/exams	10	3	14	14	8	15
		38%	11%	52%	38%	22%	41%
12	I sweated a lot whenever I took my physics exams/tests	3	5	19	6	7	24
		11%	19%	71%	16%	19%	65%
13	My mind seems to go blank during physics assessments	3	1	26	6	5	26
		11%	4%	85%	16%	14%	71%
14	I fear to see my assessment marks	3	6	18	13	4	20
		11%	22%	67%	35%	11%	54%
15	My fear of physics makes me unable to focus in class	3	3	22	4	4	29
		11%	11%	78%	11%	11%	79%

This study was undertaken to determine students' anxiety levels in physics as a function of gender. Analysis of the results reveals that there are gender differences in anxiety between males and females for the subject of physics. Females have a higher level of anxiety compared to the males. This concurs with the research undertaken by Mallow (1994), Udo, Ramsey, Reynolds-Alpert, & Mallow (2001) and Sahin et al., (2015). It is generally observed that male students have displayed minimal anxiety for most items of the questionnaire, except for item 11 (38%) and below a moderate level for item 2 (26%) in their anxiety levels for physics. For the females there appears to be a significantly higher levels of anxiety experienced by them in comparison to their male counterparts. In this respect, a relatively high level of anxiety was observed for items 5, 10, 11 and 14 in the questionnaire.

According to the males, their greatest fear is the fear of failing their physics tests or examinations. To a smaller extent, they appeared to worry about being informed that physics (non-major) was a requirement for their course curriculum. On a positive note, they have experienced partial to minimal anxiety for items in the questionnaire relating to their excitement in attending their physics classes (such as item 3, 92%). For the female students, a similar but to a lesser level of anxiety was experienced (item 3, 76%). Male students appear to be devoid of a cringe in their behavior when they must attend a physics class (item 5, 81%). Their physical appearance appears to be one of excitement and not walking around with

drooping heads. Such a behavior is not observed amongst the female students, where high levels of anxiety or stress was observed (item 5, 46%) when they walked to their physics classes. Despite their differences in anxiety, both males and females display a high level of concentration when they are in a physics class (item 7, males 82% and females 76%). On the aspect of understanding of physics concepts, the males take a lead in this regard and have a minimal anxiety (item 9, 89%) while the females appear to lag slightly behind with a minimal anxiety level of 70% in this aspect. In terms of working independently, male students aim to work more independently than the females and this is reflected in their comparative anxieties for this item in the questionnaire (item 8, males 86% and females 71%). A similar level of anxiety was observed for item 13, where students appear to be more focused and alert in class during physics assessments (males 85% and females 71%). Likewise, both males and female students have little anxiety when it comes to being focused in class and thus have little fear for the subject and this is a little surprising for the female students (item 15: males 79% and females 78%).

A relatively large number of female students (item 10, 30%) have sleepless nights before their physics assessments. In comparison with their male counterparts, it is observed that at least 74% of them are relatively more relaxed before such assessments. These anxiety levels amongst the females could be accountable for their underperformance in the subject. This item correlates well with item 11 for the females, in their fear of failing such assessments (38%). A relatively small number of females appear to have minimal anxiety before such assessments (41%). In this instance, at least half the male students also appear to have minimal anxiety levels before such tests and assessments (52%). Another item, item 12 indicates that both genders appear to have sweated less when they took their physics tests or examinations (males 71% and females 65%). In this respect, it means that they have experienced minimal anxiety during such assessments. A lack of sleep can be a positive or a negative factor in terms of test preparation. Some may be stressed to do well, or some may be stressed due to under preparation in the subject. In tandem to this item is item 14, where 35% of the females appear to have a lot fear in seeing their assessments marks compared to the males where only 11% of them have such a fear. Of interest to this item is that 67% of the males have a minimal fear for observing their marks compared to 54% for the females.

Further analysis of the results reveals that females have particularly minimal levels of anxiety for three items of the questionnaire and they are items 3, 7 and 15. In comparison to the males, they have a relatively much higher percentage for most of these items except for item 15, meaning lesser anxiety levels. Item 3 when compared with item 2 reveals that despite the female students having a minimal fear of being in a physics class, they still have a moderate to high anxiety of the burden and stress of being in a physics class (about 50%) compared to the males that have a minimal anxiety (63%) of being in those classes. Surprisingly, both males and females have a similar level of anxiety (78% for the males and 79% for the females) in the fear of the subject, which results in them being unable to focus. Despite all this, both males and females are always alert in class without their minds going blank during physics lessons (item 13: males 85 % and females 71%) and thereby experience minimal levels of anxiety. In terms of their confidence in the physics class, both genders appear to have great confidence in class, and this is reflected from the minimal anxiety scores between them for item 4 (item 4: males 78% and females 73%).

However, if the students were required to recite in a physics class, the males would take the lead (item 6: males 70%) and would have experienced a minimal amount of anxiety for this item compared to the females who would have rather experienced a little more stress (item 6: 57%).

4. CONCLUSION

This study was undertaken to determine the differences in physics anxiety amongst South African students as a function of gender. It is observed from this study that there are many similarities and disparities between the genders with respect to physics anxiety. Males have displayed minimal anxiety for most items of the questionnaire except for the item relating to the fear of failing their physics tests or examinations. Comparatively females have displayed higher levels of physics anxiety in this study. However, there are many items for which both genders have displayed similar levels of physics anxiety and they are: fear of being called to the front of the class, confidence in studying the subject physics, lack of concentration in class and fear of being unable to focus in class. The results of this study will contribute to a better understanding of anxiety in physics amongst genders, which is important for physics practitioners in putting steps forward to bring back the confidence of women in physics.

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Section 4
Projects and Trends

Chapter #17

FLIPPED FOR CRITICAL THINKING: EVALUATING THE EFFECTIVENESS OF A NOVEL TEACHING APPROACH IN POSTGRADUATE LAW MODULES

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ABSTRACT

Flipped classroom is a novel model that can help students develop their learning skills of critical thinking by students' engagement to enhance their learning experience through team working and pre-designed class activities with tailor-made questions. However, the literature about flipped teaching reveals that it is still underutilized and underexplored in the higher education law teaching. This study aims to fill in this gap by developing a flipped learning model that can provide a foundation in practice for higher legal education. This chapter presents a new flipped classroom model and information about how this model promotes greater critical thinking in a flipped classroom environment that was evaluated based on Module Evaluation Questionnaires and final module grades for the test of effective learning and teaching quality. Research was conducted using eleven-week-long postgraduate law modules of 'international trade law', 'international criminal law' and 'international human rights'. Data was collected from students who completed module survey and submitted summative assessment for their final module grades. Result shows that over 90% post graduate law students found the flipped classroom model to be either effective or very effective to promote critical thinking. Students were satisfied their learning experience with their counterparts and interaction with lecturers.

Keywords: flipped classroom, critical thinking, learning experience, effective learning, team working and module evaluation questionnaires.

1. INTRODUCTION

The highly-developing technologies pose multidimensional challenges to legal educators around the world. The face of legal education is ever changing and constantly evolving. In the UK, the recent trend to decentralize educational powers has accelerated an increasing need for innovation in classroom (The Dearing Report), making greater use of technology and each student should have access to a portable computer (Wallace, 2014). A growing body of literature suggests that recent advances in high technology is shifting the law teaching and learning into a new direction in high education. Advances in high technology have led to a number of "blended learning" (Bergmann & Sams, 2012; Orsini-Jones & Smith, 2018) and "hybrid learning" (Wolff & Chan, 2016) initiatives which combine classroom and online learning across the global and in the United Kingdom. These initiatives are now seen as playing an increasingly more influential role in the way today's law students assimilate information and learning within an educational setting. It is submitted that blended learning can help maximize lecturer efficiency, increase student engagement, enrich students learning experience, and improve retention rates. One of the applications of blended learning that has been widely recognised by scholars and practitioners (Baker, 2000; Bates & Galloway, 2012; Lage, Platt, & Treglia, 2000) is the flipped classroom.

Flipped-mastery approach can reach every student in every class every day (Bergmann, & Sams, 2012). The flipped classroom is a new pedagogical teaching and learning approach that can help students develop their learning skills of critical thinking in postgraduate law program. The most common features of the flipped classroom involve providing instructional resources for students to use outside of the class with the aid of social media and online networking and freeing up class time for more engaging activities facilitated by lecturers.

Attitudes towards the flipped classroom differ among different authors. Supporters of the 'flipped classroom' describe it (Millard, 2012) as a creation of a video lecture, screencast, or vodcast that teaches students the concept, freeing up class time for more engaging and often collaborative activities typically facilitated by the lecturer. Miller (2012) defends flipped classroom by addressing "students prepare for class by watching video, listening to podcast, reading articles, or contemplating questions that access their prior knowledge." Others advocate flipped classrooms for learning flexibility, which is consequently in line with recent trends in higher education (Wolff & Chan, 2016). Conversely, critics claim that there were some gaps in the area of this pedagogical design, including the lack of a comprehensive research model, insufficient discussion of digital learning platforms, and lack of design guidelines for course activities (Orsini-Jones, & Smith, 2018; Baker, 2012; Driscoll, 2012; Fulton, 2012). Some scholars have criticised the flipped classrooms saying that "it privileges the educator's view and ignores the student's point of view" (Chen, Wang, Kinshuk, & Chen, 2014), other argues that the flipped classroom "lacks specifications about individual learning space (both formal and informal) and learning platform (Hamdan, McKnight, McKnight, & Artstrom, 2013) and there is no standardized understanding of the notion of flipped classrooms (Wolff & Chan, 2016).

Yet, none of these views identify how many dimensions/aspects should be included in a flipped classroom implementation for law teaching, and what learning skills students are expected to develop under the different dimensions. Therefore, my flipped classroom model will fill in this gap by flipping the traditional in-class lectures and contents outside of the classroom with self-directed home learning and collaborative activities, and freeing up classroom time for active learning, including group presentation/debate, tutor's clarification and knowledge application. The driving force of this study was to train students to be active learners, promoting a "student-centred learning" approach - learn by doing, not by reading the instruction manual or listening to lectures (McNeely, 2005).

Thus this study aims to provide a foundation for further research and practice for flipped learning in higher education of law teaching with a threefold dimension focusing on i) different communicative learning stages, ii) engaging experiences, and iii) final grade. The principal aim of flipped classroom is to help students develop study skills of critical thinking, which will be of crucial significance for law students. The development of critical thinking could, on the one hand, hinge on students' final module grades and facilitation of their learning experience by more effectively interact with and learn from their peers. On the other hand, the lecturer was given more flexibility to cover a wide range and depth learning materials, provide in-class applied learning opportunities based on problem-solving activities and offer timely feedback and guidance to students. The Module Evaluation Questionnaires were positive that over 90% post graduate law students felt empowered by improving both lecture-student interaction and peer collaboration, which helped students' deep learning experience. Flipped classroom allowed me to teach students develop learning skills of critical thinking for their future career. Yet in my study, the flipped learning approach had its fair share of challenges, which were largely dependent on the use of and management of IT technology on Moodle module website. Despite these challenges, the flipped classroom is an effective teaching approach at the postgraduate level setting for developing the learning skills of critical thinking.

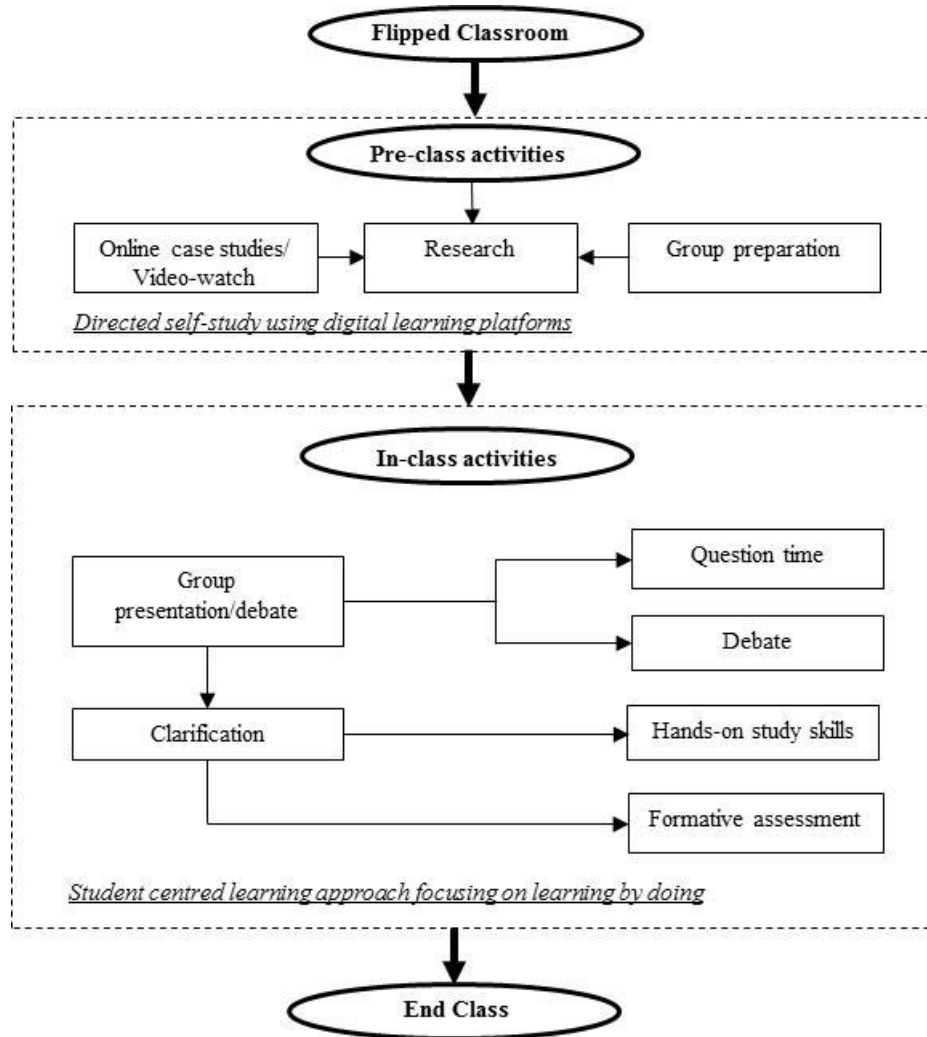
2. STRUCTURE AND SETTING OF THE FLIPPED CLASSROOM

The objective of the postgraduate law flipped classroom was twofold: i) to help students develop learning skills of critical thinking and; ii) to promote student's self-responsibility for their studies by fully engaged in the learning experience with the aid of technology. It is well acknowledged that 'learning habits and learning preferences of modern students are very different from those of their educators who have not experienced a digitalised socialization' (Wolff & Chan, 2016). The flipped classroom with the aid of technology has improved or can improve law students' learning experience" (Wolff & Chan, 2016) through an orientation to learner-centred approaches, personal relevant instruction and transparent teaching practices for the perceived learning flexibility (Wallace, 2014).

To this end, my flipped classroom was designed into two stages with four components. Two stages are in-class and outside class stages. The four components are pre-class activities, in-class activities, tutor's clarification and knowledge application with the aim to promote a positive learning environment so as to stimulate flexible learning, intentional contents, self-responsibility and team work environment. The setting of my flipped classroom emphasized a "learning cycle" (Gerstein, 2011). Students prepared for class individually by conducting out-of-class activities at home with tailored questions directed by the lecturer to facilitate the 'students-learning centred' approach. In order to make meaningful connections between homework and in-class activities, students were assigned into adversary groups preparing for their presentation after individual activities. The pre-class learning pedagogy improved students' communication skills by working with their study groups conducting research and preparing for class, which provided students with opportunities to tackle and resolve problems in the topic, to identify legal issues of the case under discussion, and be able to work effectively with culturally diverse individuals. In class, students were allocated into adversary groups for group presentation and debate in order to promote their skills of critical thinking. After the students' presentation and debate, the lecturer clarified the issues relating to the subject matter under discussion to enable students to comprehend the subject matter in great depth.

Noticeably, my flipped classroom contained a cycle beginning with an-individual-online-case study or individual-home-video watch on the Moodle module website; followed by a period set aside to work in teams and then a session of clarification from the lecturer. The final and crucial component of my flipped classroom was the knowledge application to test the efficiency and effectiveness of learning experience. The mode to conduct such a test was to ask students to write a case note in a manner of formative assessment directly relevant to online cases or video watch. The top concern of the flipped classroom served to emphasize every learning process – pre-class digital aid learning activities, in-class student-lecturer interactive activities and knowledge application as shown in Figure 1 below.

Figure 1.
A typical flipped classroom showcases a learning cycle for critical thinking.



In this pedagogical design, students researched the norms or principles of the topic they came across while studying online cases or watching online videos, and they are more competent, active and self-became motivated. To boost pre-class activities, online discussion was launched for students to share their views of the topic under discussion, and the Moodle lecturer-student communication platform was also adopted in order to answer students' enquiry timely and build a real base of support for pre-class activities. The figure 1 above best demonstrated that my flipped classroom promotes student-centred leaning approach supported by high technology (Hess, 2013) through both in-class activities and pre-class activities. Modern students learn surrounded by technology - relying on online resources rather than printed materials when conducting legal research (Wolff & Chan, 2016).

When designing the pedagogical law modules for flipped classroom, the top priority was given to new knowledge discovery, creation and research in order to promote greater critical thinking. Students not only needed to understand the topic under discussion but also needed to generate new knowledge from it and apply the knowledge to solve problems and legal issues. The postgraduate law flipped classroom excelled in the flexible learning environment, classroom culture, lecturer's steering gear and learning by doing, characterized as following:

- To support a flexible learning environment, a variety of learning modes has been launched to enable students choose where and when they learn - reading online case studies or video watching at home, in campus, on the train and so forth.
- The classroom culture shifts from a lecturer-centred learning approach to a student-centred learning approach, freeing up valuable class time for exploring topics in depth via group presentation/debate, thus creating rich learning opportunities.
- The lecturer gears in-class presentation/debate to clarification by prioritizing legal issues in order to help students develop the learning skills of critical thinking.

The above components for pedagogical design facilitated "learning by doing" (McNeely, 2005; Dewey, 1916) and deep learning, which computer platforms playing an important role as students participated in and evaluated to their learning supported by high technology. The term "Learning by doing", in Jones' (Jones, Ferreday, & Hodgson, 2008) view, means "Learning by Networking", where students rely heavily on social media and online networking as a supplementary learning tool (Orsini-Jones, & Smith, 2018). Both "Learning by doing" and "Learning by networking" reflect a current trend in higher education emphasizing the activities-oriented nature of flipped learning - allowing students to choose between a synchronous setting, where participants are present at the same time (though not necessarily at the same location) or an asynchronous setting when participants are not present at the same time, or place (Hrastinski, 2008). During the formulation and implementation of the flipped classroom, lecturers must ensure students are ready and willing to switch to new forms of learning on the one hand, and on the other, lecturers should be familiar with the flipped classroom that is activity-oriented by shifting the focus of classroom from "lecture-day" to "activity-today" (Chen et al., 2014). There needs to be more focused on what sort of activities should be completed and how these activities should be delivered (Chen et al., 2014).

Students preferred the flipped classroom because of the individual learning pace and learning platforms, where students learned using any device, at any location, and through a multitude of competing platforms (Chen et al., 2014). The lecturer adjusted his/her methodology to accommodate students who might be reading online cases or watching videos from different parts of the UK. For instance, the postgraduate law flipped classroom adapted to students by using Moodle module online discussion, resources and communication platforms to communicate assignments for active learning and promoted students fully engaged in the study experience.

The noticeable feature of the flipped classroom promoted classroom culture for critical thinking. The shift from a lecturer-centred culture to a student centred culture aimed to enrich the student learning experience and keeps students alert, enthusiastic, and engaged in knowledge acquisition and construction. The student learning experience is a crucial factor for gauging whether a new learning method is successful (Teng, Chen, Kinshuk, & Leo, 2012) because how students experience their education determines the effectiveness, efficiency and success of flipped learning. In Dewey's (1963) view, a "Professional Educator" may still fail to engage students that student learning experience is neglected. It is generally recognized that if a lecturer fails to track the effectiveness of his/her students' self-learning sessions of pre-class activities in the flipped classroom, he will not be able to transform his classroom

successfully and be unable to stimulate student's interests in the subject. Therefore, keeping students alert, enthusiastic, and engaged in a flipped classroom determines the success and effectiveness of a flipped classroom. Thus to ensure effective learning, teaching requires more than just transmitting information, but must give priority to assist students to construct their own knowledge (Le Burn & Johnstone, 1994).

The issue remains: when students watch video at home in a flipped classroom, the transactional distance (Moore, 1993) is high because a student has no way to communicate with the lecturer, and the lecturer does not know how much the student has absorbed the topics through out-of-class activities. Since the high transactional distance may frustrate students' motivation and engagement in flipped classroom, the pedagogical flipping design must increase dialogue between lecturers and students, and decrease the pre-determined structure. To minimize the transactional distance, online group discussion, WhatsApp students-lecturers dialogue and individual self-directed home learning activities have been launched, which stimulate students actively involved in knowledge acquisition and construction and promote positive learning environment.

3. ADOPTING THE FLIPPED CLASSROOM

To combining flexible learning environment with digital learning platforms, the flipped classroom used a technique for enhancing lecturer-students communication through Moodle module website. The lecturer used Moodle module website to introduce students to the topic of each class supplemented by hyperlink case studies, video watch and reading list; students responded by conducting self-directed study activities. To engage students, the lecturer observed online activities and offered online feedback, and responded to online discussion. The lecturer also provided academic support to individual students who were confused.

In each synchronous class session, the lecturer followed a specific course plan and provided related online resources including reading list, cases, journal articles and videos. The lecturer also used the Moodle webmail to send emails to students to announce upcoming events, class updates, assignments and assessment criteria to enable students to prepare beforehand. Although each class activities were different, there were some similarities in its format. Table 1 demonstrates a sample of flipped classroom schedule for a three-hour class session.

Table 1.
A sample of flipped classroom schedule for a three-hour class session.

Class session	Time	Details
Group presentation	25 mins	Students present the topic under discussion
Class debate	30 mins	Students debate on the topic to offer different views of the topic.
Sharing, feedback, reflection	25 mins	Lecturer and students share thoughts, lecturer respond to student feedback and reflection, and group leader submit group discussion report orally
Clarification	20 mins	Clarifying legal issues of the subject matter under discussion
Class break	20 mins	Whole class breaks and prepares for the next session
Knowledge application	15 mins	Lecturing on how to write a case note
<ul style="list-style-type: none"> • Workshop • Assessment 	45 mins	Students take a formative assessment - Writing an outline of a case note addressing key legal points of the topic and supported by statutes, cases and scholars' view.

From the start my flipped classroom was a collaborative design. The collaborative learning was brought to the front of learning experience to strengthen study skills of critical thinking. The priority concerns were given to the students-lecturer interaction and shared resources to emphasize “learning cycles”. My LLM flipped classroom were hands-on, open and collaborative by design, constituting over Moodle networks support a wide range of collaborative learning activities – hyperlink case studies, Moodle video watch, discussion platform, webmail communication and lecturer-geared in-class activities brighten every feature of the LLM flipped classroom.

To stimulate students interests in the subject, I always studied student’s feedback to promote a broader repertoire of teaching skills and develop a greater awareness of student’s learning needs. The flipped classroom served to emphasize every learning process to stimulate students’ interests in the subject and help students develop the skills of critical thinking. The critical thinking skill can be stimulated by inputs from both lecturers and students. Simply a more robust model of flipped classroom must include students and lecturers’ perspectives – lecturers content planning and activity design and students contribution to their point of view of the topic through pre-designed in-class and out-of-class activities to support deep learning, thus develop critical thinking skills. This has to be designed and operated by the proper combination of structure, dialogue, transactional distance and students’ autonomy (Moore, 1993). Moore’s transactional theory was summarized by Caulfield (2011) to get students’ engagement in their learning experience so as to promote active and deep learning for the development of critical thinking.

4. PARTICIPANTS AND DATA COLLECTION

The participants in the study were 65 postgraduate law students who were attending the modules of either “international trade law” or “international criminal law” and “international human rights law” at Coventry Law School in the academic year 2017/18 and 2018/19. Data collected from students who completed Module Evaluation Questionnaires (MEQ) during the period of studying these modules and submitted summative assessment for their final module grade. MEQ surveys were administrated to students in class with an online survey code through an independent module survey team and teaching staff was required to leave the room for a 15-minute survey while students were filling in the forms of MEQ. Data collection was on the same day in class, normally in week 7 of each term in November 2017 and 2018 respectively. Participation in this study was voluntary with no tangible incentives provided to the students. Participant anonymity was maintained throughout the MEQ. This survey code will be returned to teaching staff after the survey team completed data analysis and teaching staff was required to provide feedback on the Moodle module website. The survey contained 22 questions in total, 20 of which were selected response range from definitely agree, mostly agree, neither disagree nor agree, mostly disagree to definitely disagree and 2 were open-ended questions. To serve the aim of this study, the questions of MEQ shown in Table 2 were those relevant to effective learning, irrelevant questions were not included. Open questions were for students’ feedback on flipped classroom, which communicated to students at the beginning of the MEQ.

MEQ is used by Coventry University to obtain students feedback on teaching quality and effectiveness. The study survey mainly used Likert-scale questions that asked students to rate the effectiveness of different elements of the modules. Students rated elements in the three postgraduate law modules. Table 2 of Module Evaluation Questionnaires shows the survey result based on 65 students who completed the MEQ. The survey questions are listed on the first column, and the second-to-the-sixth-column demonstrates the percentage of student’s feedback on the modules, ranging from agree to disagree. The numbers in brackets are the reflection of student’s agreement with the survey questions.

Table 2.
Module Evaluation Questionnaires.

Module Evaluation Questionnaires/No.	Definitely agree	Most agree	Neither disagree nor agree	Most disagree	Definitely disagree
<u>1. I have had the right opportunities to work with others to enhance my learning</u>	50% (33)	37.5% (24)	12.5% (8)	0	0
<u>2. CU Online is used effectively to support my learning?</u>	42.9% (28)	42.9% (28)	0	14.2% (9)	0
<u>3. I have received helpful and timely feedback on my work</u>	37.5% (24)	62.5% (41)	0	0	0
<u>4. This module is intellectually stimulating</u>	45.5% (30)	54.5% (35)	0	0	0
<u>5. This module has provided me with opportunities to apply what I have learned</u>	80% (52)	20% (13)	0	0	0
<u>6. This module has challenged me to achieve my best work</u>	81.8 (53)	18.2 (12)	0	0	0
<u>7. This module has prompted me to explore ideas and concepts in greater depth</u>	72.7% (47)	27.3% (18)	0	0	0
<u>8. Sufficient academic advice and guidance are available on this module</u>	54.5% (35)	36.4% (24)	0	9.1% (6)	0
<u>9. I feel part of an academic community of staff and students</u>	63.6% (41)	36.4% (24)	0	0	0
<u>10. I have achieved helpful and timely feedback on my work achieve my best work</u>	20% (13)	80% (52)	0	0	0
<u>11. Moodle and/or other online learning environments are used effectively to support my learning</u>	54.5% (35)	36.4% (24)	0	9.1% (6)	0

The rate of satisfactory shown in Table 2 is very positive as most of the questions achieved a nearly 100 percent students satisfactory except questions 2, 8 and 11. One student wrote in the open-ended questions, saying ‘The flipped classroom increased my learning skills of critical thinking and helped me understand the practice of law’. The other student wrote that ‘the flipped classroom increased my analytical and problem-solving skills’. MEQ results relating to the flipped classroom showed a positive perception. Two major changes were noticed in students’ learning experience, namely students taking more responsible for their learning and reflecting more on the assigned topics before coming to classes. The student-lecturer interaction, active learning and technology are better than the traditional in-class lectures and contents as students showed preference to take another course using the flipped classroom in the future. My flipped classroom promoted critical thinking and students ‘wanted more classroom to be flipped’ (Slomanson, 2014).

5. ASSESSMENT OF THE MODULES

At the beginning of each term, a module guide of course syllabus was provided to students that concisely introduced them to the nuances of the flipped classroom while clearly articulating the assessment aspects for the module. In this study, the flipped classroom used both formative and summative assessment of students' learning.

The formative assessment was predominantly centred on in-class assessment as articulated in the preceding section. The in-class formative assessment permitted students to be purposively engaged in their own learning by consulting lecture notes, books, statutes and cases while it enabled the tutor to provide real-time guidance, and as appropriate fill in the students' gap in knowledge. The formative assessment was composed of one title for students to write on. The priority concern of formative assessment is to provide feedback to students to enable them to write a high quality coursework for summative assessment. My policy is to point out what strengths of the formative assessment first, then moving on to the weakness of the coursework and suggestions for improvement, and finally to award marks.

The summative assessment was consisted of two topics for students to choose: one is an essay and the other one is a case study, which assessed the students' ability to critically read, extract, footnote and analyse information and encouraged students to use higher critical thinking and reasoning skills that reflected the learning outcomes and skills of the modules.

The blending of both summative and formative is good to develop reflective practice in our students and encourage them to revisit completed work for their further development. I always give feedbacks to students in four forms: a general-in-class feedback, individual supervision, online feedback and constantly refer to key points in class so that students can reflect on the comments and move forward. Students make progress dramatically from failed in their formative assessment up to around 50/60 marks, some students achieve a mark up to 70 marks in their summative assessment for the modules.

Students performance on the final assessment significantly improved compared to performance of students the previous years who completed the same modules in a traditional classroom setting. Students' opinions of law modules actively and the flipped classroom instructional model were most positive. Implementing a flipped classroom model to postgraduate law modules resulted in improved student performance and favourable student perceptions about the instructional approach. Some factors may have contributed to students' improved scores included: student mediated contact with the course material prior to classes with their peers, benchmark and formative assessments administered during the modules, and the interactive class activities. Noticeably, formative and summative assessment demonstrated that student learning outcomes are improving year by year in the past two years.

6. CONCLUSION

Undoubtedly, the flipped classroom brings student's different learning styles into play and improves their study skills of critical thinking and self-responsibility for their studies as they participate in and evaluate their learning. Students responded positively to postgraduate law flipped classrooms where online case studies and home-videos-watch targeting the legal principles and knowledge were pre-uploaded onto the Moodle module website, preserving class time for active learning exercises focusing on students-centred learning approach to reflect the concept of "Learning by doing" (Schank, 1995; Ryder, 2006) for critical thinking. My flipped classroom does not only accomplish teaching goals, it also helps to 'close the gap between the strongest and weakest students in class' and 'improve class performance as a

whole' (Upchurch, 2013). In order to improve my flipped classroom to promote students' learning skills of critical thinking and get students fully engaged in their learning experience in the future, I shall carry out more research to identify learners' perceptions of flipped classroom, which must be addressed in my teaching practice.

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Chapter #18

DEVELOPMENT OF INTERDISCIPLINARY INSTRUCTION USING INQUIRY BASED SCIENCE EDUCATION

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ABSTRACT

The task of the current educational system is to give all pupils competences they will need to prosper in the global economic competition. However, pupils very often consider learning content to be useless for their everyday life. In the context of natural sciences, this is not only about the choice of learning content but also about how science subjects are taught. Pupils are not usually able to connect knowledge from individual natural science subjects and to solve interdisciplinary problems so typical for everyday life. This could be one of the essential reasons for the lack of pupil interest in the study of natural sciences. An interdisciplinary approach to teaching could be the way to solve this situation. However, teachers usually lack training in interdisciplinary instruction, and they do not know the appropriate educational methods supporting interdisciplinarity. It is vital to educate them on how to carry out interdisciplinary instruction to satisfy pupil requirements. This study introduces inquiry-based science education as a suitable educational strategy for efficient interdisciplinary instruction. Research findings confirming the effectiveness of pre-service teacher education in interdisciplinary instruction using inquiry-based science education are presented.

Keywords: interdisciplinary instruction, inquiry-based science education, teacher education.

1. INTRODUCTION

Education plays a vital role in developing and improving the quality of human resources. Therefore, the current educational systems of developed countries have many tasks depending on the priorities of individual countries, and the demands on them are evolving fast. However, the main ones include providing all pupils with the competences they will need to prosper in the global economic competition during their professional life and to equip them for solving everyday problems (Csapó, & Funke, 2017). Scientific knowledge develops and grows very quickly, and subsequently, scientific progress influences the everyday lives of people. Natural sciences are an essential discipline which significantly affects people in many aspects.

Contrary to this fact, natural science educators, especially in Europe and USA, face a decline of interest in the study of natural science and technology (OECD, 2006; Kires & Šveda, 2012). Educational experts and researchers attempt to find reasons for this phenomenon (Bolte, 2006; Dostál, 2015). Unsuitable educational methods appear to be one of the main factors leading to this situation (Rocard et al., 2007). According to the PISA findings, only 15% of European pupils are satisfied with the quality of natural science teaching/learning in schools, and nearly 60% of them state that natural science teaching/learning is not attractive for them (Ministry of Education, Youth and Sports CR, 2010). One of the significant reasons for pupils' lack of interest in the study of natural sciences could be traditional educational strategies which very often prioritise acquisition of separate knowledge such as data, formulas, equations, and theories, which pupils only

memorize without understanding and forget them very easily (Ministry of Education, Youth and Sports CR, 2010).

Another reason for lack of interest in natural sciences may be that pupils consider natural science subjects to be useless. Based on our research findings, even though pupils think natural science educational contents are essential for society, on the other hand, they consider them unnecessary for their everyday lives (Trnová, 2012). The cause could be the way of teaching, which lacks an interdisciplinary approach. Pupils are not usually able to connect knowledge from separate natural science subjects and to solve interdisciplinary problems typical for everyday life. This situation suggests that there is a gap between how science subjects are taught and how they are perceived in society (e.g., on television and in other media). There is also an argument for the need to implement into science subjects contemporary teaching/learning methods that can reduce this discrepancy (Osborne, 2007). Therefore, it is necessary to look for innovative teaching/learning methods that will lead to more effective science education and an increase in pupil motivation for science. According to research findings (Trna & Trnová, 2014) inquiry-based science education (hereafter IBSE) is appropriate for interdisciplinary instruction of natural science subjects.

2. BACKGROUND

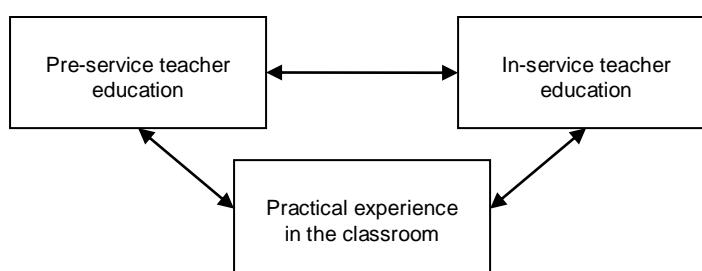
Teachers are a significant factor affecting pupils' learning outcomes (Darling-Hammond, 2000; Osborne, & Dillon, 2008). Therefore, it is crucial to pay attention to their education, beginning in pre-service education and ongoing throughout their continuous professional development (hereafter CPD). It is necessary to educate them on how to carry out interdisciplinary instruction to satisfy pupil requirements for linking teaching/learning to everyday life. They are not often aware of educational strategies suitable for interdisciplinary instruction, or they are not able to implement them into natural science instruction. Teachers sometimes struggle with the design of interdisciplinary instruction. The first step, understanding what interdisciplinary instruction is, can be difficult, let alone designing activities that support interdisciplinarity. Inappropriate application of interdisciplinary attitudes into science instruction may not produce the expected positive results, and the disappointed teacher goes back to the traditional style of teaching (Darling-Hammond, 2000). To avoid this and to make interdisciplinary instruction effective, teachers must have the professional competence to apply this way of teaching/learning, so they should acquire a set of specific skills.

Teacher professional competences have to be created through three main parts: pre-service education, in-service education, and practical school experience (see Figure 1). The high educational level of the three components mentioned in Figure 1 and their linking are necessary conditions for quality teacher education. Teachers take part in this educational system in five possible roles: teacher as a learner, teacher as a teacher, teacher as a reflective practitioner, teacher as a leader and teacher as a researcher. The role of teacher-learner is typical for teacher candidates. This role is often underestimated and neglected during continuous professional development (CPD); however, it is vital. According to experts, teachers are strongly influenced by their own school experience as learners, and many teachers have minimum experience with interdisciplinary teaching/learning from their schooling.

The role of teacher-teacher is connected with the teacher's classroom practice, and university students (pre-service teachers) go through this role during teacher training at schools. The role of the teacher-reflective practitioner is based on experience and it is expected within CPD. Teacher-leader is involved in teacher training management.

Experienced teachers or education specialists (e.g., an expert in didactics, educationalist) usually fulfill this role. The role of teacher-researcher has gained importance recently based on the popularity of research in this field. Researchers from our University have been engaging in-service teachers (some pre-service teachers as well) in action research as much as possible. This is beneficial for both sides - university experts and teachers.

Figure 1.
A diagram of systematic teacher education (Trna & Trnová, 2014).



2.1. Interdisciplinarity

Interdisciplinary instruction is generally defined as the integration of two or more disciplines. The term "interdisciplinary" is applied to a variety of curricular arrangements and has a variety of synonyms (thematic teaching, integrated learning). The degree of integration and what will be integrated is important to consider. Relan and Kimpston (1991) arrange interdisciplinary approaches to the curriculum along a continuum of operational schemes, indicating the degree of integration. Thus, one extreme of the continuum would be structuring the curriculum plan around each separate subject, with the opposite extreme being an "eclectic" or "problem-oriented" approach. Techniques such as the intermingling of disciplines (sometimes called "multi-disciplinary") or the integration of across-the-domain skills like problem-solving or writing across the curriculum are between these opposite poles.

It is necessary to understand that interdisciplinary instructions affect pupils and teachers differently. Teachers face challenges to cover knowledge from various subjects. For improvement of the interdisciplinary approach, teamwork among all involved science teachers is beneficial to develop a quality interdisciplinary curriculum (Jones, 2009). The interdisciplinary approach requires the knowledge of didactics of particular subjects whose contents are integrated to prevent pupils from incorrect learning processes. Also, knowledge of pedagogy is required to implement the interdisciplinary contents into the educational procedures correctly. Pupils are called to be successful in an interdisciplinary approach; thus, they need carefully structured experiences and instructional support from teachers. Also, pupils often need to understand the learner-centred attitude; they have experienced only the traditional way of teaching in which a teacher maintains the leading role.

An interdisciplinary approach has many advantages, as well as disadvantages (Jones, 2009; Cai, & Sankaran, 2015). Based on our long-time experience, we specify the essential advantages of interdisciplinary instruction:

- (i) Motivation.
- (ii) Greater curriculum understanding to connect findings from various subjects.

(iii) Development of competences which are necessary for everyday life (problem-solving, critical thinking, forming conclusions and their defence).

(iv) The possibility of an individual approach to solving problems based on the abilities of pupils in particular subjects.

(v) The saving of time in the curriculum of particular subjects.

Teachers in the Czech Republic were recommended to utilize the interdisciplinary approach and not implement the same learning content into several subjects. In the end, this intention did not move forward because of lack of experience of teachers in how to create the required interdisciplinary curriculum. To form the interdisciplinary curriculum is hugely time demanding, which is one of its disadvantages. There are also higher requirements for teachers (also for pupils) than the teaching of particular subjects. Nevertheless, this way of teaching brings high-quality outputs in the way of understanding and utilizing necessary competences. Based on our experience, the requirements increase with the curriculum difficulty, thus, with the requirements on expertise.

In the Czech Republic, pre-service teachers are educated in two separate subjects of their choice, and interdisciplinary instruction is not involved in the university curriculum. However, the current interdisciplinary paradigm of natural science education requires an integrated approach. The Faculty of Education, Masaryk University in Brno is solving this deficiency in the pre-service teacher education by establishing the course Didactics of Natural Sciences, which aims at interdisciplinary instruction. Students (teacher-candidates) acquire educational strategies appropriate for interdisciplinary instruction. First, they get to know them theoretically and they then apply them in practice at schools.

2.2. Inquiry-based science education (IBSE)

IBSE is one of the strategies which is relatively new in the Czech Republic, and therefore students (teacher candidates) and teachers have usually minimum experience with IBSE instruction, and they have to gain it. According to research findings (Trnová, 2012) teachers can implement IBSE in an appropriate way when they acquire it in both roles (teacher as a learner and teacher as a teacher) under supervision. Afterwards, they can develop their acquired professional skills in further roles. However, it is necessary to show teachers how to develop interdisciplinarity within IBSE. Not every IBSE learning content includes an interdisciplinary dimension. Interdisciplinarity places demands on teachers not only in the field of didactics but also in other sciences that they do not have in their teaching qualifications. Teachers themselves must understand the interdisciplinary issues that pupils should learn through IBSE. Teachers must learn to collaborate with colleagues to prepare interdisciplinary instruction using IBSE. Teamwork is essential for quality interdisciplinary teaching/learning, and it enriches all participants in the educational process.

To develop interdisciplinarity with the use of IBSE, teachers need to master this innovative educational strategy. IBSE is an excellent motivation for all different types of pupils, those who are talented and also those with special educational needs, as well as for teachers. The most critical motivational element of this method is the connection between the curriculum and everyday life (Trna & Trnová, 2014). Nevertheless, it is logical that IBSE is age-specific when applied to science education. Application of IBSE needs a large ensemble of activities that constitute “doing science.” These activities include conducting investigations, sharing ideas with peers, specific ways of talking and writing, mechanical, mathematical, and computer-based modelling, and development of representations of phenomena. This type of science education involves active learning, and it takes advantage of children's curiosity by increasing their understanding of the world through

problem-solving. To develop skills in natural science, pupils have to gain the opportunity to participate in this full range of activities. It would be wrong to assume that young pupils in primary science can conduct scientific research independently and from the beginning as do pupils in secondary science courses, or even as real scientists do. The teacher needs to develop individual skills gradually and systematically and lead the pupils to some extent according to their abilities, even in IBSE. Banchi and Bell (2008) defined four IBSE levels (see Table 1) according to the degree of the teacher's guidance (help in the process, asking guiding questions and the formulation of the expected output).

Table 1.
Four IBSE Levels.

IBSE levels	Questions (defined by teacher)	Procedure (defined by teacher)	Solution (defined by teacher)
Confirmation	Yes	Yes	Yes
Structured	Yes	Yes	No
Guided	Yes	No	No
Open	No	No	No

(i) Confirmation inquiry: This is based on confirmation or verification of laws and theories. The confirmatory inquiry is appropriate at the beginning of IBSE implementation when the teacher aims to develop the observational, experimental, and analytical skills of the pupils. When conducting experiments, pupils follow the teacher's detailed instructions under his/her guidance.

(ii) Structured inquiry: The teacher significantly influences the inquiry at this level and helps pupils by asking questions and providing guidance. Pupils look for solutions (answers) through their inquiry and provide an explanation based on the evidence they have collected. The teacher defines a detailed procedure of experiments, but the results are unknown in advance. Pupils show their creativity in discovering laws. However, they are guided by the teacher's instructions in the research. This level of inquiry is significant for developing pupils' abilities to perform a high-level inquiry.

(iii) Guided inquiry: The third level of IBSE changes the role of the teacher dramatically. The teacher becomes a guide for pupils. He/she cooperates with pupils in defining research questions (problems) and advises on procedures and implementation. Pupils themselves suggest procedures to verify the inquiry questions and their subsequent solutions. Pupils are encouraged by the teacher much less than in the previous two levels, which radically increases their level of independence. Pupils should have previous experience of lower levels to be able to work independently.

(iv) Open inquiry: This highest level of IBSE builds on the previous three inquiry levels, and it resembles real scientific research. Pupils should be able to set up their inquiry questions, methods, and procedures of research, record and analyse data and draw conclusions from the evidence. This way requires a high level of scientific thinking and places high cognitive demands on pupils, so it is applicable for the oldest and/or gifted pupils.

These four IBSE levels correspond to different age levels of pupils and their abilities. However, it is possible to apply different levels of IBSE to the same age group during group instruction depending on pupils' abilities. Similarly, we can choose the appropriate level of IBSE according to the demands of the science course.

The education of teachers based on IBSE must be implemented in the graduate and postgraduate phase of professional preparation because the development of the ability how to choose and prepare a curriculum in the IBSE form and implement it into the teaching practice correctly requires time. During the graduate phase, teachers gain the beginning level, which includes especially knowledge and the first experience with teaching. These students are not able to implement the next level in IBSE in their teaching. Nevertheless, the students get more experience in their teaching practice and studies, so they reach the proficient level, and they know how to apply IBSE in all its levels.

2.3. Interdisciplinary instruction using inquiry-based science education

Interdisciplinary instruction and IBSE methods are demanding educational strategies which require teachers to use new approaches. However, teachers do not have enough experience and professional competences. Moreover, they do not know how to utilize IBSE. Both strategies have many advantages and also disadvantages described in published literature related to this topic (Jones, 2009; Cai, & Sankaran, 2015; Trnová, 2012). The advantages of these strategies are connected, and they intensify within the proper design of interdisciplinary introduction. Our research confirms the development of motivation and students' understanding of coursework based on practical activities of IBSE. Also, both the mentioned advantages of interdisciplinary instruction conform with the implementation of IBSE into teaching. The support of the development of competences such as problem-solving, critical thinking, forming conclusions, and their defence is typical for interdisciplinary instruction and IBSE. The four levels of IBSE enable the individual educational approach depending on pupils' abilities. (Banchi, & Bell, 2008). To eliminate the disadvantages, teachers need to identify and avoid them or at least minimize them. High-quality pre-service teacher education is beneficial for reaching this.

At the Faculty of Education, Masaryk University in Brno students (teacher candidates) learn the necessary skills within the frame of the course Didactics of Natural Sciences. They create interdisciplinary teams; members are experts in individual natural sciences, and they collaborate in preparing quality interdisciplinary topics and design of IBSE. University teachers, experts in natural sciences, didactics, and pedagogy have the role of mentors. This interdisciplinary teaching/learning can facilitate students in learning about approaches, theories, and methodologies from various disciplines of the social and natural sciences.

The course Didactics of Natural Sciences is taught for 2 hours per week during one semester (24 hours in total). However, students (pre-service science teachers) work not only during lessons but also outside of these lessons. They create proposals for topics and designs of interdisciplinary instruction using IBSE. During the period the research described below was carried out, students prepared the interdisciplinary topic "water", which corresponded with the Czech curriculum and was suitable for interdisciplinary instruction using IBSE. In the first stage (12 hours during the course and around 10 hours outside of it), they worked on the design of the teaching/learning to meet the curriculum requirements and the IBSE and interdisciplinary approach. University teachers were mentors at this stage. In the second stage (approximately 10 hours), the students prepared the school environment for interdisciplinary education using IBSE. Experienced school teachers who were supervising teachers for the students' teaching practice had the role of mentors. In the third stage, the students taught the selected topic "water" in the form of interdisciplinary instruction using IBSE at school (5 hours). University teachers and experienced school teachers observed the process of interdisciplinary instruction using IBSE. In the last stage (approximately 3 hours) university teachers and experienced school

teachers gave feedback to the students (pre-service science teachers) and these students performed self-assessment. This last stage was very important for correction of possible inaccurate or inappropriate procedures. The pupils (participants of interdisciplinary instruction using IBSE) gave feedback to the students (pre-service science teachers) in the form of a questionnaire on their views on the completed lessons. The students (pre-service science teachers) were satisfied with the course Didactics of Natural Sciences and considered it to be very useful for their practice.

3. METHODOLOGY

The research aimed to verify the development of interdisciplinary instruction of natural science subjects using IBSE. The research was focused on education of in-service teachers, pre-service teachers, and pupil educational outcomes. It is necessary to take into consideration the limited scope: this study presents only research findings connected with the education of pre-service teachers. Therefore, the research question is:

How does IBSE implementation in pre-service teacher training influence the development of interdisciplinary instruction?

The research sample was composed of 36 students (pre-service science teachers) from the Faculty of Education, Masaryk University, the Czech Republic. These students were preparing for interdisciplinary instruction using IBSE in the course Didactics of Natural Sciences. During this course, students gained experience with interdisciplinary instruction using IBSE first in the role of learners. This means they carried out the inquiry, and fulfilled the tasks as pupils in order to be able to better imagine the feelings or learning problems of children. In this role, they also acquired the necessary pedagogical knowledge and skills for teaching. After that, the students in the role of teachers undertook interdisciplinary instruction using IBSE under the guidance of experienced teachers during their teaching practice at schools. Pre-service teachers built up their pedagogical knowledge, skills, and competences using their own experience from the role as learners and after during their teaching practice at schools as teachers, they connected pedagogical theory and practice, which is known as teacher constructivism (Magoon, 1977). The university teachers of natural science subjects had the role of teacher-leader and teacher-researcher.

There was used a research-method of triangulation (semi-structured interviews, questionnaire, and analysis of teachers-candidates' products) as a specific method to answer the above mentioned research question. First, semi-structured interviews were carried out with all (36) research participants and questions were focused on the professional competences connected with the development of interdisciplinary instruction using IBSE. Based on the answers of the research participants, items of the questionnaire were created using a Likert scale (Půlpán, & Kulička, 2015). The verification of the research findings was completed using the analysis of educational products created by the research participants. The collected data were analysed. The research was carried out in the period 2016-2017.

4. RESULTS

As mentioned above, the questions in the semi-structured interviews were focused on the competences of pre-service science teachers connected with interdisciplinary instruction using IBSE. The research participants stated what professional competences connected with interdisciplinary instruction using IBSE they had acquired during the course. In the next

research tool – questionnaires - research participants expressed their subjective assessment of the extent of acquired professional competences. To determine the level of acquisition, the 5-point Likert-type rating scale was used (1-Very weakly, 2-Weakly, 3-Normally, 4-Strongly, 5-Very strongly) to measure the development of their professional competences. Table 2 provides an overview of the leading professional competences mentioned by pre-service science teachers. Subsequently, analysis of teachers-candidates' products and verification of collected data were performed.

The results of the questionnaire are presented in Table 2. The collected data showed that the primary pre-service teacher professional competences for interdisciplinary teaching were developed significantly. If we consider only the highest category, very strongly, of the Likert scale, this option was chosen by more than a half of respondents for four professional-pedagogical competences necessary for interdisciplinary instruction (*to motivate pupils, to encourage pupils to solve interdisciplinary problems, include interdisciplinary topics from everyday life relevant to pupils, to develop lifelong learning skills*).

Table 2.
Questionnaire of pre-service teachers - data.

Using IBSE in interdisciplinary instruction I am able to:	(1) Very weakly (%)	(2) Weakly (%)	(3) Normally (%)	(4) Strongly (%)	(5) Very strongly (%)	Mean values (1)–(5) N = 36
motivate pupils for natural science	0	0	0	31	69	4,69
encourage pupils to solve interdisciplinary problems	0	0	0	42	58	4,58
include interdisciplinary topics from everyday life relevant to pupils	0	0	3	39	58	4,56
develop lifelong learning skills	0	0	8	36	56	4,47
develop skills of pupils to connect information from different natural science subjects	0	0	0	58	42	4,42
integrate natural science and social issues in interdisciplinary instruction	0	0	20	36	44	4,25
develop pupil interdisciplinary experimentation	0	0	8	73	19	4,11

The significant development of most of the respondents' monitored professional-pedagogical competences is even more apparent when the category is combined firmly and very resolutely. In this case, apart from “integration of natural science and social issues in interdisciplinary instruction,” pre-service teachers noted significant development of their professional competences for interdisciplinary instruction. This was confirmed by the research findings of pupil educational outcomes and analysis of educational products created by the research participants.

The research findings prove that the quality of teacher education is reflected in the quality and effectiveness of education (Pellegrino, & Hilton, 2012; Osborne, Simon, & Collins, 2003; European Commission, 2004). According to experts, teachers are the significant factor influencing the learning outcomes of pupils (Darling-Hammond, 2000; Osborne, & Dillon, 2008). Based on these facts and the presented research findings, it is possible to answer the research question: *How does IBSE implementation in pre-service teacher training influence the development of interdisciplinary instruction?* Because teacher competences were developed, it is possible to confirm the development of interdisciplinary instruction using IBSE. IBSE implementation in teaching/learning supports the development of interdisciplinarity. Our other research results (pupil outcomes and analysis of educational products created by research participants) confirmed this conclusion as well.

5. CONCLUSION

In the frame of the course Didactics of Natural Sciences the advantages and disadvantages of interdisciplinary instruction were discussed. Significant advantages are seen in Table 2. The main disadvantages are the time required to prepare this type of instruction and the limited number of suitable topics. Pre-service teachers were directed to reduce the impact of the disadvantages and to use the advantages effectively. IBSE was confirmed as an appropriate strategy for the development of interdisciplinary instruction. The text above describes the main advantages of interdisciplinary instruction using IBSE, and Table 2 lists the developed competences of teachers. It is necessary to highlight the development of lifelong learning skills that are essential to pupils' future education as well as their lives and future success and to increase pupils' ability to solve interdisciplinary problems. According to the outcomes of the course, the advantages of interdisciplinary instruction for teachers are collegial environments, high level of innovativeness, high levels of energy and enthusiasm, support for personal growth, and learning.

Considering that the quality of teachers is the fundamental factor affecting learning outcomes, it is necessary to pay great attention to their education, especially in the area of innovative educational strategies. It is necessary to implement innovations already into pre-service teacher education to increase the effectiveness of science teacher education. Teacher-candidates need to construct their professional pedagogical skills based on experience acquired first as learners and later as teachers with the support of experienced teachers and experts. This method of teacher constructivism connects teachers' experience from instruction with pedagogical knowledge and skills and creates high-quality professional-pedagogical competences.

The presented research findings confirm that a properly implemented innovative component in pre-service teacher education can improve the quality of professional competences and teachers are then not afraid of its implementation in their teaching. During pre-service training, students should have the possibility to acquire core knowledge and skills connected with innovative educational strategies, which they currently do not experience during their studies. The presented pre-service teacher education in the course Didactics of Natural Sciences could be an example of how to educate future teachers of natural science subjects.

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Chapter #19

CHALLENGE BASED LEARNING (CBL)

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ABSTRACT

A new education for the 21st century requires comprehensive training by students. An education focused on the development of cognitive skills, abilities, and attitudes that allow them to approach and design solutions for the main social challenges. This change in the educational paradigm demands the incorporation of new teaching and learning methodologies. In this chapter, Challenge-Based Learning (CBL) is presented as a pedagogical proposal to favor the development of transversal and disciplinary skills, collaborative work, leadership, research, critical and reflective thinking. CBL allows students to be involved in real teaching contexts so that through the design and implementation of projects, they generate proposals for solutions to the main social challenges. This paper describes the background, the characteristics, the teaching process, and the methodology, in its different stages for developing CBL, as well as its main differences with other active methodologies that are used to develop problem-solving skills. Finally, the CBL stages are exemplified within a university experience and its implementation through the project called Social Reconstruction. This project allowed the participation of students and teachers in a multidisciplinary and collaborative way for the social transformation of two Mexican communities affected by the earthquake of September 19, 2017.

Keywords: experiential learning, challenge based learning, social transformation.

1. INTRODUCTION

Within the framework of an education that is required in the 21st century, comprehensive training strategies for students, in higher-level educational institutions, are becoming more indispensable due to new demand for skills-based training for them to solve complex problems (Davidson, 2017). The New Education Agenda 2030 states that it is necessary to emphasize the development of high-level cognitive and non-cognitive skills, such as problem-solving, critical thinking, creativity, collaborative work, communication skills, and conflict resolution. These should apply to different professional contexts that allow students to face the challenges of local and global order (Martin & Jabonero, 2017).

The approach of a new education implies a restructuring of the curriculum and a revolution in the educational process. One of the most important competencies to develop in this new vision of education is problem-solving, understood as the ability to identify, analyze and define the significant elements that constitute a problem to develop proposals for its solution with defined criteria and in an effective way (Villa & Poblete, 2007).

This approach suggests the use of active methodologies in teaching and learning and that is focused on the student to favor the development of problem-solving competence in them and the analysis and design of proposals for solutions to the main social challenges. Among the methodologies, the following are proposed: Problem-Based Learning, Project-Based Learning, Challenge-Based Learning, Service Learning, Case Method, Research-Based Learning, Relationship-Based Learning, Simulation-Based Learning, Team Working and Action Research (Table 1).

Table 1.
Active methodologies.

METHODOLOGY	CHARACTERISTICS	COMPETENCES DEVELOPED
Problem-Based Learning (Sánchez, 2016).	Student-centered. Approach to real or simulated situations described in problematic scenarios. Open, structured, contextualized problems related to the purposes of the subjects.	<ul style="list-style-type: none"> • Analytical Thinking • Investigation • Self-directed learning • Social and communicative skills • Problem-solving
Project-Based Learning (Tobón, 2010).	Design of multidisciplinary projects based on context analysis. Dynamic learning environments, interactive and focused on problems and challenges of the context. Vision of learning as a useful, and relevant process.	<ul style="list-style-type: none"> • Project management • Self-reflection • Analytical thinking • Social and ethical commitment • Entrepreneurship
Challenge-Based Learning (Instituto Tecnológico de Estudios Superiores de Monterrey, 2015).	Collaborative approach to social challenges through immersion by students in real formative contexts. Based on the detection of the challenges, multidisciplinary projects are analyzed, designed, executed and evaluated.	<ul style="list-style-type: none"> • Design and project management • Investigation • Collaborative work • Social and solidarity commitment • Leadership • Creative thinking • Problem-solving • Self-reflection
Service Learning (Díaz-Barriga, 2006).	Community projects that favor service activities linked to the curriculum. Authentic on-site experience	<ul style="list-style-type: none"> • Collaborative work • Social responsibility • Thoughtful and critical thinking • Moral, social and civic awareness.
Case Method (Servicio de Innovación Educativa UPM, 2008).	Part of a real problem through which students analyze the context and the variables involved in the case. Consensus is reached through dialogue and discussion and informed decisions are made.	<ul style="list-style-type: none"> • Information management • Investigation • Decision making • Analytical thinking • Autonomous work • Collaborative work
Research-Based Learning (Karlsruhe Institute of Technology, 2018).	Link the teaching process with research. Research activities and projects become integral components of the learning process. Students apply investigative techniques and skills to solve context problems	<ul style="list-style-type: none"> • Self learning • Problem-solving • Scientific thought • Analytical thinking • Reflective thinking • Creative thinking

<p>Relationship-Based Learning (Robinson, 2017).</p>	<p>Educational proposal for teaching and learning and that puts relationships as the driving axis of the class and activities in the context. Human connections as the basis of personal, professional and social development. It is based on 3Cs: Connect, collaborate and cultivate.</p>	<ul style="list-style-type: none"> • Collaborative work • Reflective thinking • Social skills • Social commitment • Creativity
<p>Simulation-Based Learning (González, 2018).</p>	<p>Teaching with environments that mimic aspects of reality, through simulated or virtual contexts. It allows the reproduction of a certain procedure or technique and allows everyone to apply a standardized criterion. It can also be used for evaluation processes of skills and abilities.</p>	<ul style="list-style-type: none"> • Analytical thinking • Decision making • Digital skills • Autonomous learning • Collaborative work • Complex problem-solving
<p>Team Working (Parmelee, Michaelsen, Cook, & Hudes, 2012).</p>	<p>Methodology for active learning through work teams. It is based on the instructional design of sequential activities of individual, collaborative and feedback work.</p>	<ul style="list-style-type: none"> • Collaborative work • Collegial thinking • Social skills • Problem-solving
<p>Action Research (Peleteiro, 2007).</p>	<p>Methodology that contemplates in its basic principles the following postulates: it is oriented to the solution of problems, centered on the subject-person, it is a challenge of the status-quo and generator of experiences related to daily and professional life.</p>	<ul style="list-style-type: none"> • Reflective inquiry • Scientific thought • Deep and analytical thinking • Reflective thinking • Design and project management • Problem-solving • Social commitment

2. BACKGROUND

Challenge-Based Learning (CBL) was originated in 2008 within a project of the Apple company called Apple Classrooms of Tomorrow-Today. CBL, as a pedagogical proposal, is based on the experiential learning of John Dewey, Jean Piaget, William Kilpatrick, Carl Rogers, and David Kolb. This seeks to encourage students to propose solutions to problems related to their environment, through their immersion in real training contexts and the design of multidisciplinary intervention projects. In these contexts, students recognize some issues of their interest, which they become for them a challenge to address, analyze, discuss and solve methodologically and collaboratively. In addition to the above, CBL awakens in students' sensitivity towards local problems that most affect society. In such a way, the development of various competencies is favored, among which the following stand out problem-solving, communication skills, research, use of

technology, collegial thinking, emotional competencies, analytical thinking, reflective thinking and social commitment (Nichols, Cator, & Torres, 2016).

CBL creates a space where students can direct their research and think critically about how to apply what they learn. At the center of CBL is a call to action that inherently requires students to make something happen. This methodology was designed to promote creativity and risk-taking within a framework that assures the students have both a fertile topic to explore those skills, as well as the freedom to do so (Johnson & Adams, 2011).

In CBL, students have the opportunity to recognize the relevance of the contents they have learned in the classroom, through their active, intellectual, creative, social and emotional involvement. The above is done in projects of global significance with local actions to attend critically and positive some problems of its surroundings, they get involved directly in the context of the problem to solve. Indeed, the development of problem-solving competence is not typical of CBL since it resembles Problem-Based Learning (PBL) and Project-Based Learning (PL). CBL, unlike the first, uses real environments for the problematization of the contents, while in PBL the simulation of the problems is allowed (Sánchez, 2016). Concerning its relationship with PL, the design of integrating projects is one of the characteristics they share. However, in CBL the designed projects must be implemented, evaluated and disseminated.

3. DIDACTIC PROCESS IN CBL

The teaching process in CBL is characterized by having a common thread to the challenge itself. This thread is strengthened with the knowledge that is transmitted through the teaching of learning modules, intensive periods of approach to the challenge and an evaluation process through the generation of performance pieces of evidence that allow the individual and integral evaluation of the level of mastery of the skills that students develop (Torres & Ayala, 2019).

The teaching process of the CBL starts from the following premises:

- There is a profile of students' graduation skills.
- The challenge is chosen or designed with the clear intention of impacting the development of the competencies of the graduation profile.
- The challenge is divided into stages specific to its characteristics and needs.
- The knowledge, skills, and attitudes that the student wishes to develop are defined for the best possible performance at each stage of the challenge.
- A period of total immersion to the challenge is included, that allows students to experience.
- An evaluation process is designed that includes: a diagnostic evaluation, an evaluation of the level of mastery of competencies at each stage of the challenge, an integrative evaluation that allows determining the level of development of competencies at the end of the academic period.

Within each content module that accompanies the stages of the challenge, it is necessary to include active and consistent methodologies with the model of challenges among which are: Team Working, Case Method, Project-Based Learning and Problem- Based Learning.

4. CBL METHODOLOGY

CBL starts with the approach of the general theme to work, which is called in this method the Big idea, a concept with far-reaching significance, such as biodiversity, sustainability, pollution, poverty and migration. Indeed, in this phase, the teacher as a facilitator of the process, together with the students define the theme of global relevance and possibilities of local action to work. In this first stage, the essential question of the process is also established and characterized by being a general question which allows linking the issue to be addressed with the problem to be solved (Apple, 2011).

Afterward, students, once they have selected the challenge they want to address, they establish a series of guiding questions to work on their research process. The challenge is framed to bring the big idea and essential question home with a local call to action. When defining the challenge, students' approach to the problem environment is a key element; not only to sensitize them about the need for social transformation, but also allow them to measure the needs to be resolved, the actions to be established, and the possible scope of their intervention. Based on the research, they systematically plan the key activities to execute and define the resources necessary to address the challenge, through a dynamic group session of the students with the guidance of their teacher. The purpose of this phase is that through research, activities and collaborative work sessions, students have sufficient knowledge to generate innovative solution proposals for the selected challenge.

The next phase of the methodology is the construction of a proposal for a solution to the challenge, this proposal is described through the design of an intervention project. The project considers a multidisciplinary vision of the solution, as well as its realization of intangible deliverables. These deliverables must be prepared during the implementation of the project and they seek to demonstrate the lessons learned and the skills developed by the students, the above contributes greatly to their training process-oriented to social transformation. Finally, the learning evaluation mechanisms and the impact of the project are established, as well as the strategies for disseminating the results obtained.

The evaluation process requires the selection of the strategies and instruments necessary for the collection and recording of the information that is generated in the different planned phases. Concerning the dissemination, students with the support of their teacher, agree on the best way to share the experience, both with the recipients of the project and with the academic community. This last stage allows identifying the progress in the fulfillment of the expected objectives, achievements, and learning achieved by the students and the impact on the transformation of the attended reality (Table 2).

Reflection, formative evaluation, and feedback are an important part of the process at each stage, as they reinforce learning and prepare students for similar situations in their professional future.

Table 2.
CBL methodology.

Phase 1. BIG IDEA		
Essential question		
Phase 2. DEFINITION OF THE CHALLENGE		
Phase 3. PLANNING STAGE		
Guiding questions	Key activities	Necessary resources
Phase 4. SOLUTION		
Proposal, design and implementation		
Phase 5. EVALUATION		
Strategies and instruments		
Phase 6. DIVULGATION		

5. CBL EXPERIENCE: SOCIAL RECONSTRUCTION PROJECT

To exemplify the CBL process, the experience of UPAEP is described below, whose educational model poses an educational vision that mobilizes and transforms society from the person, through the generation of significant experiences. The educational model uses active methodologies in teaching and learning processes, achieving this way, the formation of leaders transforming social realities.

The purpose of this university experience with CBL was to involve students and professors in a collaborative and multidisciplinary way within a social intervention project, generated from the earthquake juncture of September 19, 2017, in Mexico, which brought with it the destruction of homes in rural communities. Next, the actions carried out in the project called Social Reconstruction are described, considering the stages of the methodology (Table 3).

Table 3.
University experience of the CBL employment.

Big idea	Social reconstruction
Essential question	How could the university help rebuild communities affected by the earthquake?
Challenge definition	Rebuild the communities of Tepapayeca, municipality of Tlapanalá and San Francisco Xochiteopan, municipality of Atzizihuacán, both in the State of Puebla.
UPAEP participants	Students and professors of the Faculties of Medicine, Nutrition, Architecture, Civil Engineering and Environmental Engineering UPAEP High School Students. University Life Area Humanist Training Area Entrepreneurs Area

Strategic allies	Puebla Community Foundation, Estrella Roja, Mapfre Foundation and Beck Foundation.
Activities performed	<p>Installation of a university collection center.</p> <p>Visit to the communities of Tepapayeca and Xochiteopan in order to dimension the problem and define the needs to be addressed.</p> <p>Brigades for the supply of food, demolition and debris removal.</p> <p>Health and nutritional diagnosis.</p> <p>Community integration activities with families, children and youth.</p> <p>Proposals of architectural designs.</p> <p>Establishment of strategies for educational, cultural, family and community strengthening.</p> <p>Advice on the economic recovery process.</p> <p>Design and construction of one house for each affected family.</p>
Evaluation	Preparation of evidence of the intervention through the capture of photographs and videos. Similarly, interviews and feedback sessions were conducted by students, teachers and community representatives through the focus group methodology.
Divuligation	<p>The progress and results obtained in the project were shared with the university community and with the inhabitants of the affected communities, through internal means of communication and follow-up visits.</p> <p>There is a portfolio of evidence prepared by students and a video was recorded. The video explains the experience of students in the construction of a house for a family in the community.</p>

6. CONCLUSION

The incorporation of innovative pedagogical strategies, in the educational process in response to the need for comprehensive training of university students, requires reengineering of the teaching, learning and evaluation processes. This should be oriented towards the establishment of systematized, collaborative and multidisciplinary educational actions that allow the linking of disciplinary content with the main social challenges.

UPAEP has incorporated CBL in its pedagogical model and thus has been able to realize its educational proposal through the generation of community intervention integrating projects. Therefore, UPAEP has carried out actions related to various agents of

change, such as government agencies, companies, organizations and foundations of civil society; influencing the transformation of social realities.

With the use of CBL in academic programs and from the perspective of social innovation, curricular content not only had meaning for students but, above all, made sense in their comprehensive training and the development of generic, disciplinary skills and professional skills such as teamwork, research, social sensitivity, problem-solving, community intervention project design, empathy, social commitment, reflective thinking, and analytical thinking.

The experience with the project of Social Reconstruction under the process of CBL methodology, allowed students and university professors, not only to become aware of the short-term problem of the communities affected by the earthquake but also allowed them to participate directly in the various activities derived from the project, promoting the development of social commitment and citizenship skills in students.

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Chapter #20

DEVELOPMENT AND EFFECTIVENESS OF “CONTENT-FOCUSED ACCESSIBLE E-LEARNING MATERIALS” FOR ENGLISH LEARNING TARGETING VISUALLY IMPAIRED UNIVERSITY STUDENTS

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ABSTRACT

Visually impaired students need to have printed learning materials converted into media such as enlarged print and braille, and they need enhanced ICT environments such as sound and screen magnification. These modifications are known as “technical” accessibility to information. However, these enhanced learning materials are not always sufficient. This study presents pioneering attempts to modify printed learning materials into content-focused accessible e-learning materials that help visually impaired students to learn English independently. The original materials used in this study are self-learning exercise books for remedial English grammar study. The students used the modified e-learning materials and provided feedback from the following perspectives: 1) effectiveness of the materials, 2) suggestions for improving/revising materials, and 3) suggestions to further develop the materials for student autonomy. The study then analyzed students’ grades before and after using the modified materials. Study results revealed that the modified materials were more effective, especially for students with severe visual impairment. This finding is significant as it provides new insights that will help facilitate visually impaired students’ self-learning.

Keywords: visually impaired university students, content-focused accessible Materials, e-learning effectiveness of the materials.

1. INTRODUCTION

Students with visual impairment are not always able to effectively use printed books and learning software. The amount of learning materials incorporating braille characters is considerably less materials than printed materials. Moreover, magnification-capable learning materials and e-materials for students with visual impairment in higher education are not commercially available. Students with severe visual impairment must usually request the creation of braille materials and/or text data for their self-learning, but these can take some time to complete. As a result, many students may lose important opportunities for learning at a time when they are motivated and interested in engagement.

Several publishers are involved in producing online language learning materials. However, as Adobe Flash Player is usually the platform used for screen transitions, it is impossible to magnify screens using screen magnification software. In many cases the screen reader does not support the text-to-speech function. In essence, a self-learning environment for students with visual impairment has not yet been fully realized.

Generally, two methods are used for students with visual impairment to learn English: (i) media conversion to enlarged print or braille characters; and (ii) ICT environments that use text-to-speech or screen magnification software. However, in many cases, sufficient

progress cannot be made using these methods. Several studies have focused on the ICT environments applied to question formats for sighted students (Aoki, Kato, Kobayashi, & Kondo, 2003a, 2003b; Aoki, 2009), but these do not apply to visually impaired students.

There is a baseline requirement for students with visual impairment to attain basic university-level English skills. Focusing on the points mentioned above this study considers accessibility to information via media conversion of learning materials (e.g., enlarged print or braille characters) as well as ICT environments (e.g., text-to-speech and screen magnification software), technical accessibility to information. Cases where modification attempts are made to ensure that learning materials can be used by students with visual impairment are what this study terms “content-focused accessible e-learning materials.” This study aimed to construct a comprehensive e-learning system, in which both technical and content-focused accessibility e-learning materials were added to self-learning exercise books for sighted students.

The goals of the study were to:

1. Create content that considers the characteristics and requirements of disability
2. Develop various materials for English self-learning systems for students with visual impairment and publish these widely within and beyond the National University Corporation of Tsukuba University of Technology (hereafter NTUT)
3. Implement a handicapped-accessible system that allows for character sizes, layout, and backgrounds changes for students with low vision
4. Establish the concurrent use of sound output and braille characters for students with severe visual impairment

2. BACKGROUND

The students at the Faculty of Health Science at NTUT have various kinds of visual impairment such as blindness, almost complete loss of sight, severe low vision, low vision, narrowed visual field, central scotoma, arcuate scotoma, night blindness, and light aversion. Some visual impairments are congenital and others are acquired. Some students who have congenital visual impairment are able to read braille even in English because they have undergone early training in braille reading skills. On the other hand, students with severe acquired visual impairment (e.g. blindness, almost complete loss of sight/severe low vision, etc.) have difficulty reading braille since they did not have enough time to be trained in the skill prior to entering university. Since mastering Japanese braille takes a long time, some students with visual impairment give up on mastering English braille, as it requires considerably more time and effort.

Students with visual impairment need various types of support such as braille, enlarged print, and digital data versions of learning materials, as well as the use of a loupe (a magnification apparatus for reading), and similar devices. However, prolonged use of this equipment can induce mental and physical exhaustion and even pain. In many cases, it is remarkably difficult for students with visual impairment to utilize technical accessibility to information in English learning, depending on the type of questions used in the study materials (e.g., multiple choice, fill-in-the-blanks). However, many students are required to have a basic knowledge of English in order to keep up with their required English classes. In addition, as some students aspire to enter graduate school, teacher-training courses at other universities, or take English certification examinations (STEP Test, TOEIC, etc.) for gaining employment, there is a substantial demand for the acquisition of at least basic English skills.

In this study, focusing on the background presented earlier, content-focused accessible e-learning materials were developed so that self-learning exercise books for sighted students could be modified for visually impaired students. An e-learning system that supports self-learning was constructed synergistically with technical accessibility to information, so that existing problems could be solved to a significant degree.

3. PREVIOUS STUDIES

There are very few earlier Japanese studies of a similar nature that analyze or develop different kinds of support systems for visually impaired people. Some existing studies (Aoki et al., 2003a, 2003b; Aoki, 2009; Saito, 2009a, 2009b) examine support systems for visually impaired students that make use of ICT. However, these are all within the scope of technical accessibility to information, which by itself is insufficient for visually impaired students, as will be explained.

Aoki et al.'s work (2003a, 2003b) developed software called readKON in order to encourage low vision students with relatively low-level recognition of English words to be more skillful readers. The software development and subsequent research proposed a way to support visually impaired students to read more efficiently. It uses a system that helps them to first recognize one word, then two words, and gradually phrases. This system proved that technical support is useful for visually impaired students in reading English sentences. However, in reality, English self-learning exercise books contain various types of questions (e.g., multiple choice, fill-in-the-blanks, writing tasks). Simply improving reading skills is not sufficient for dealing with learning question types, and learning materials that prepare students for tests also comprise various types of questions.

Saito (2009a, 2009b) developed an effective, barrier-free English learning software program that offered various ways to enable both visually and auditory impaired students to study English. However, her study adopts a method of reordering paragraphs, which is quite difficult for blind students, as it requires them to remember long sentences. Furthermore, she proposes only two auditory methods for visually impaired students—the native-speaker mode and Japanese. For students with severe visual impairments (blindness, almost complete blindness, severe low vision), the native-speaker mode is not always necessary, especially when they are attempting to comprehend the content of English sentences or when they are learning grammar. There remains some doubt as to whether students can learn English effectively in this manner.

A few non-Japanese studies (Hunt, 2002ⁱ; Kashdan, Barnes & Walsh, 2005; Marek, 1999ⁱⁱ; Wiazowski, 2000ⁱⁱⁱ) mention the relationship between learning English and visual impairment. However, there seems to be no reference in previous studies to the *content* of learning materials; all of them refer to technical devices for students with visual impairment. For example, Saito (2009a) points out that Hunt (2002) claimed that IT for learning English is necessary for visually impaired students; however, the communicative approach is better since audio information is more useful for these students. Visually impaired students cannot be exempt from evaluation of grammar, reading, and writing skills. In fact, there is greater reason to do so, as the possibilities for their participation in a globalized world increase as IT develops.

Thus, it is necessary to develop learning materials that are more accessible for students with various kinds of visual impairment that can be used as preparation for English tests.

4. METHODOLOGY

4.1. Creating computerized data of the learning materials

First, materials for self-learning were examined with respect to their effectiveness in fulfilling student needs. A Memorandum of Understanding for Licensing stating that these materials would only be used for the creation of computerized data of the learning materials at NTUT was executed with Pearson Kirihara K.K^{iv}.

Moodle was used as the e-learning platform. It is an online platform that has been used by many higher education institutions, including NTUT. Moodle allows for the creation of various question formats, such as multiple choice, writing tasks, and fill-in-the-blanks, as well as calculation practice tests. The platform is well known as the most easily customizable learning management system. Web pages were created with Moodle. Screen reader operation checks were performed with PC-Talker7.

First, printed learning materials were scanned to create computerized data. Falsely recognized characters with similar forms or shapes were checked and modified against the original printed materials (e.g., “...,” and “.,,”; “m” and “n”; “l” [lower case letter L] and “I” [capital letter I]).” This ensured the accuracy of the text data. Second, data were categorized based on the type of question (i.e., fill-in-the-blanks, writing tasks, and multiple choice). The information was transcribed into Excel files based on the classification of question passage, choice of answer, correct answer, Japanese translation of question passage and choice of answer, and explanation in Japanese. The results were used as the basic data. Taking into account the cases where similar content would be created in future, relevant forms were determined, with consideration for the data types to be inserted in each column.

4.2. Batch conversion of computerized data into XML data format on Moodle

Next, the study developed a software operation on Moodle that allowed for the batch conversion of data from text into XML format. To identify the types of questions included in the Excel files, relevant information was extracted into formats classified in Moodle. This ensured that no erroneous conversion or omission of conversion would occur through manual operation, even if columns included identical types of questions, and this allowed for efficient conversion of files into XML data.

5. MODIFICATIONS

In this study, various methods were added to the technical accessibility to information (e.g., screen structure) and learning materials to ensure ease of use by students with visual impairment. The process for creating content-focused accessible e-learning materials is described below.

5.1. General Modifications

5.1.1. Students with severe visual impairments (blindness, almost complete blindness/severe low vision, extremely narrowed vision field)

As the system could not be designed for mouse users, the author set up buttons associated with sounds representing choices from the answers supplied. In addition, both sound and braille character outputs were used concurrently.

C. Ota

5.1.2. Students with other visual impairments (low vision, narrowed vision field, central scotoma, arcuate scotoma, night blindness, light aversion, and other types of visual impairment)

The materials allowed students to change print character size, layouts, background colors, character colors, and other screen features.

5.2. Modification of the learning materials

The process for modifying and enhancing the materials is described below.

5.2.1. Forest first access (6th Edition) (2010, Pearson Kirihara K.K.)

This textbook provides the foundation for basic English grammar for junior high school students. Questions are roughly divided into three types: (i) fill-in-the-blanks, (ii) multiple choice, and (iii) writing tasks. The modifications of the original content for each question type is described in detail below.

(i) Fill-in-the-blank Questions

■ Original Question

“Fill in the blanks in English sentences with a suitable word from among the choices within the parentheses.”

I saw ____ at the station yesterday. (she, her, hers)

The original format showed entire sentences, including the blanks, followed by the answer choices. Students had to memorize all the choices, before returning to the blank space to provide an answer from the options. If students could not remember one of the words, they would have to go back to view the choices again.

■ Improvement

A drop-down menu was added to indicate choices for the blank space. In this system, students could answer and fill in the blank when they read or listened to the sentence, without having to return to the options after reading or listening to the entire sentence.

Figure 1.
Screen for Fill-in-the-blank Question 1.

中学英文法復習問題集

Home > マイコース > 2018中学英文法復習問題集 > トピック1 > 2 文のなりたち(2) 【目的語・補語と修飾語】 > プレビュー

例題

例) 空欄に適切な語を(A)、(B)、(C)から選び、英文中の空所を埋めなさい。
 ※動詞の後に置かれ、「～を」や「～に」を表す語を目的語といいます。
 例) I know () very well.

(A) he
 (B) his
 (C) him

⇒ I know him very well.

問題 1

()から適切な語を選び、英文中の空所を埋めなさい。

I saw (A) she at the station yesterday.

私はずきの駅で彼女に会った。

ここに注目!!
 文の中でもっとも重要な「だれ(何が)」「どうした[する]」にあたる「主語・動詞」の部分ですが、すべての文が「主語・動詞」だけで成り立っているわけではありません。
 この章では主語・動詞に続くものとして、目的語・補語と修飾語について学習しましたが、「主語・動詞」の後に何が続くのかは動詞の意味によって決まります。修飾語は話し手が伝えたい内容に応じてつけ加えるものなので、修飾語の部分を外しても文の骨組みが残り文の意味は劇的に変わります。文の意味がよくわからない場合は文の要素を意味のまとまりごとに分類し、それぞれの語句がその文の中でどのような働きをしているかを考えてみるとよいでしょう。

(ii) Multiple Choice Questions

■ Original Question

“Fill in a suitable answer for the next sentences with the correct symbol selected from choices (a) through (e).”

- 1) Must I go with you ()
 - 2) Shall we go to see a movie tonight? ()
 - 3) Will you come to the party ()
 - 4) May I sit next to you? ()
 - 5) Shall I open the window ()
- (a) Yes, let's! I want to see the new comedy.
 (b) Yes, I'm looking forward to it.
 (c) No, my friend will be back soon.
 (d) No, you don't have to. Wait for me here.
 (e) No, thank you. I'll do it.

C. Ota

In the original format, students had to return to the multiple choice question after reading all the questions and choices.

■ Improvements

The format was changed so that it showed all the choices for each question. A new feature was also built in to enable students to answer questions by pushing a radio button.

“Fill in a suitable answer for the next sentences with the correct symbol selected from choices (a) through (e).”

1) Must I go with you

- Yes, let's! I want to see the new comedy.
- Yes, I'm looking forward to it.
- No, my friend will be back soon.
- No, you don't have to. Wait for me here.
- No, thank you. I'll do it.

2) Shall we go to see a movie tonight?

- Yes, let's! I want to see the new comedy.
- Yes, I'm looking forward to it.
- No, my friend will be back soon.
- No, you don't have to. Wait for me here.
- No, thank you. I'll do it

In this format, students can choose the suitable answer immediately after reading or listening to the question, without returning to each multiple choice question each time they read or listen to the same answer choices.

Development and Effectiveness of “Content-Focused Accessible E-Learning Materials” for English Learning Targeting Visually Impaired University Students

Figure 2.
Screen for Multiple Choice Questions.

中学英文法復習問題集

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問題 18
不正解
0.00 / 100
問題にコメントを付ける
問題を再検する

次の文の答えとしてふさわしいものを選択しなさい。

Must I go with you?

1つ選択してください

(A) Yes, let's! I want to see the new comedy.

(B) Yes, I'm looking forward to it.

(C) No, my friend will be back soon.

(D) No, you don't have to. Wait for me here.

(E) No, thank you. I'll do it.
不正解です。

私はあなたといっしょに行かなければなりませんか。—いいえ、その必要はありません。ここで私を待っていてください。

ここに注目!!
can, may, must, shall, willなどの助動詞を使うと話し手が実際に見た現実や事実そのものではなく話し手が頭の中で考えたことや懸念していることなどを表すことができます。それぞれの英文をもつて見直して話し手のどのような気持ちがつけ加えられているのかを考えてそれぞれの助動詞の持つ意味を確認してみましょう。
問題5の英文のような助動詞を使った疑問文では、相手の気持ちをたずねることができます。
正答: (D) No, you don't have to. Wait for me here.

問題 19
正解
100 / 100
問題にコメントを付ける
問題を再検する

次の文の答えとしてふさわしいものを選択しなさい。

Shall we go to see a movie tonight?

1つ選択してください

(A) Yes, let's! I want to see the new comedy.
正解です。

(B) Yes, I'm looking forward to it.

(C) No, my friend will be back soon.

(D) No, you don't have to. Wait for me here.

(E) No, thank you. I'll do it.

今夜映画を見に行きませんか。—ええ、そうしましょう。私は新しいコメディ(映画)を見たいです。

ここに注目!!
can, may, must, shall, willなどの助動詞を使うと話し手が実際に見た現実や事実そのものではなく話し手が頭の中で考えたことや懸念していることなどを表すことができます。それぞれの英文をもつて見直して話し手のどのような気持ちがつけ加えられているのかを考えてそれぞれの助動詞の持つ意味を確認してみましょう。
問題5の英文のような助動詞を使った疑問文では、相手の気持ちをたずねることができます。
正答: (A) Yes, let's! I want to see the new comedy.

(iii) Writing Task Questions

■ Original Question

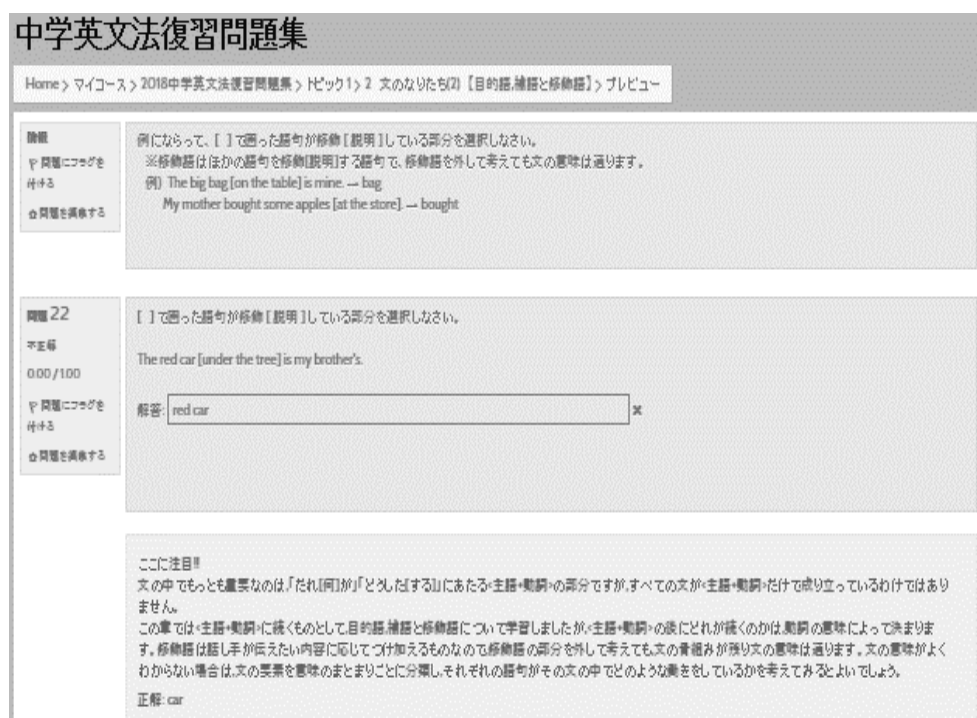
“Circle the modifier in the underlined portion.”
The red car parked under that tree belongs to my brother.

■ Improvement

Students with severe visual impairments (e.g. blindness, almost complete blindness/severe low vision, loss of almost entire visual field) who were unable to use a mouse could not encircle specific words or phrases on the screen, therefore, the word “underlined” was changed into a readable symbol “【】,” and the phrase “underlined portion” was altered to “portion enclosed in ‘【】’.” The old format was changed into one in which the modifier related to the underlined portion was described by learners as follows:

The red car 【parked under that tree】 belongs to my brother.

Figure 3.
Screen for Writing Task Questions.



5.2.2. Overview English grammar in 30 lessons (for 7th Edition) (2015, Pearson Kiriwara K.K.)

This textbook covers comprehensive English grammar for high school students and is very suitable for remedial education on English basics. The questions in the book were also

roughly divided into (i) fill-in-the-blanks, (ii) multiple choice, and (iii) writing tasks. The nature of modifications of the original content for question types is described below.

(i) Fill-in-the-blank Questions

■ Original Question

“Choose the right word from []. Some questions have more than 2 suitable answers.”
She has a violin [who/which/that] was made in the 18th century.

As shown in the example, the original format displays the entire sentence, including the answer choices, in one place. Students sometimes had to return to the answer choices to select the right answer from all the available choices after understanding the meaning of the sentence. If students did not remember one of the options from the choices, they would have to go back to view the choices again.

■ Improvement

The new system shows the entire sentence, including the answer choices. Original attempts allowed the use of a drop-down menu that indicated answer choices in the blanks. In this system, students fill in the blank(s) immediately as they read or listen, eliminating the need to return to the choices after reading or listening to the whole sentence.

Figure 4.
Screen for Fill-in-the-blank Question 2.



(ii) Multiple Choice Questions

■ Original Question

“Choose the correct usage of present tense from ①～③ and fill in the number.”

[①present status ②present repetitive motion ③general fact or truth]

1) Mr. Smith understands Japanese. ()

C. Ota

- 2) Water boils at 100°C. ()
3) My brother plays soccer with his friends on Sundays. ()
4) Lisa often talks to her Japanese friend on the phone. ()
5) Mary resembles her mother very much. ()

In the original format, students had to go back and forth between the question and answer choices, or they had to remember all the answer choices.

■ Improvement

The format was changed so that it showed all the choices for each question. The new format also adopted a radio button. In addition, the underlining was changed into a readable symbol “【】” so that students with severe visual impairment could listen via the text-to-speech screen reader function.

“Choose the correct usage of present tense from ①～③ and fill in the number.”

1) Mr. Smith 【understands】 Japanese.

- present status
 present repetitive motion
 general fact or truth

Figure 5.
Screen for Multiple Choice Questions.

高校英文法解説・演習

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問題

【】内の動詞の現在形の用法を1～3から選び、記号で答えなさい。

問題1

Mr. Smith 【understands】 Japanese.

正解

100/100

1つ選択してください

1 現在の状態
正解です。

2 現在の反復動作

3 一般的な事実や真理

正答: 1 現在の状態

問題2

Water 【boils】 at 100°C.

不正解

0/00/100

1つ選択してください

1 現在の状態
不正解です。

2 現在の反復動作

3 一般的な事実や真理

正答: 3 一般的な事実や真理

(iii) Writing Task Questions

■ Original Question

“Change the order of the words so that they correspond to the Japanese meaning. Note that there is one unnecessary word in each sentence.”

私は彼をととても親切だと思った。

(him / I / kind / very / thought / kindly) .

■ Improvement

It takes a lot of effort for students with visual impairment to see both a wide area and scan back and forth at the same time. The old format was changed so that each word was put into a drop-down menu. In the new system, students could choose the suitable answer immediately after they read or listened to the question without returning to each word every time.

Figure 6.
Screen for Writing Task Questions.



6. RESULTS

With the improvements, questions and answer choices can be read in the “English mode” of PC-Talker (i.e., a native-speaker or katakana-reading mode), and explanations on grammar can be read in Japanese, after the questions are answered. A user can operate the system while using screen magnification software. The system also allows for braille character output. Students can opt for self-learning via any PC on or outside of the campus.

In this study, e-learning materials that allow students with visual impairment to study were developed with a focus on content-focused accessible e-learning materials as well as technical accessibility to information (i.e., screen magnification software and screen reader). Text-to-speech software was used to make modifications to the learning materials, thereby

offering more than reading of e-learning materials for sighted students. These modifications were the first of their kind in Japan.

Judging from student feedback, the participants became more independent learners through this learning experience, and this was the result that the author had tried to achieve in accordance with Hewett, Douglas, McLinden, and Keil (2018) suggestions.

7. ASSESSMENT

The author conducted an assessment of the content-focused accessible e-learning materials to confirm the educational effect of the materials for visually impaired students. The process is described below.

In their first year, NTUT students take an English placement test (EIKEN Institution Based Assessment (EIKEN IBA)) just after entering university. The author gave 25 first-year students with visual impairment an assignment to use the content-focused accessible e-learning materials and provide feedback based on the following questions:

- 1) Analyze your present English skills based on the EIKEN IBA score
- 2) Use one of the content-focused accessible e-learning materials that you find helpful for studying at least ten grammatical items
Provide feedback both on what is effective and what needs to be improved/revised
- 3) Provide feedback on your development of autonomy for studying English
 - a. Did the materials develop active opportunities for you to study English?
 - b. Did the materials develop your frequency of studying English ?
 - c. To what degree have your English skills been improved by using the materials?
- 4) Provide information about your visual impairment (voluntary disclosure)

Further, the author compared the students' grades before and after using the materials. The before data was provided by the EIKEN IBA score, the after data came from the score of the final examination in the first semester. The students' visual impairments are as follows (student total numbers):

- blind (4)
- almost blind (3)
- severe low vision (6)
- loss of most of visual field (4)
- low vision (10)
- narrowed visual field (3)
- central scotoma (1)
- night blindness (3)
- light aversion (1)

Many students had combined symptoms of several visual impairments. Students were classified into five categories as follows:

- 1) users of braille (6)
- 2) users of text-to-speech function (6)
- 3) users with almost complete loss of visual field (4)
- 4) other users (low vision, narrowed visual field, central scotoma, night blindness, light aversion) (18)
- 5) users who can read printed learning materials without major difficulties (5)

An additional important factor to consider in students’ learning environments is whether their visual impairment is congenital or acquired. Students whose visual impairment is both severe and acquired recently have greatest difficulty (2 students). Their feedback was important to this study.

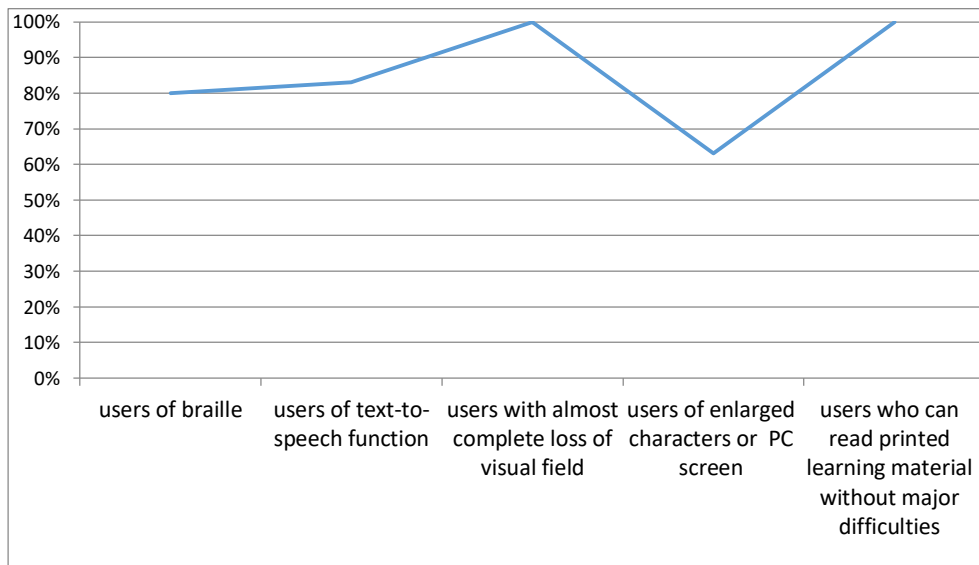
The author analyzed the students’ feedback from the following perspectives:

- 1) effectiveness of content-focused accessible e-learning materials
- 2) suggestions to improve/revise content-focused accessible e-learning materials
- 3) development of autonomy for learning English after using content-focused accessible e-learning materials

Further, the author analyzed the students’ grades before and after using the materials. The students’ feedback revealed four interesting results:

- 1) Approximately 92% (12/13 students) students with severe visual impairments (blindness, almost complete blindness, users of text-to-speech functions and/or braille, almost complete loss of visual field) found content-focused accessible e-learning materials very useful^v (Figure 7).

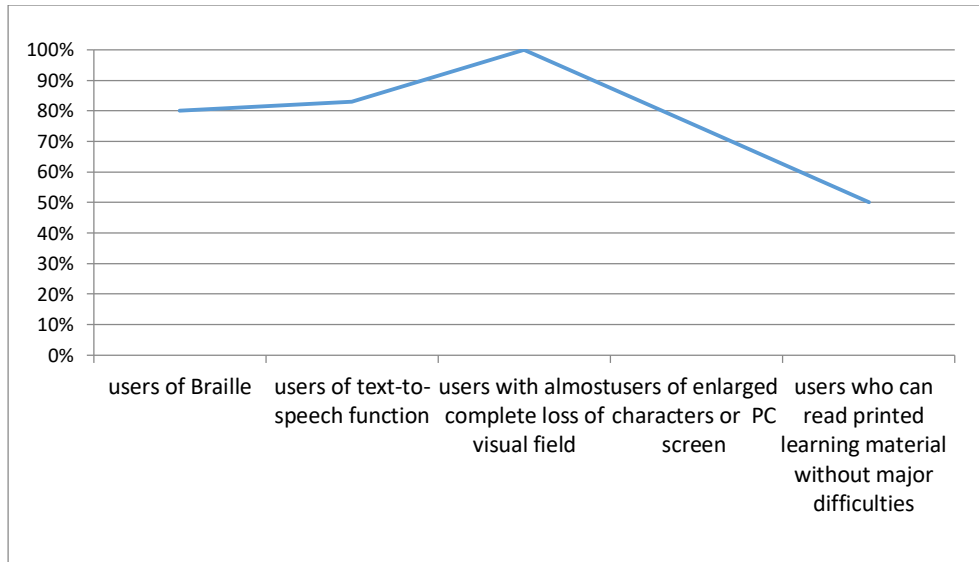
*Figure 7.
Effectiveness of Content-Focused Accessible E-Learning Materials.*



- 2) Those with severe visual impairment provided both positive feedback and more detailed suggestions for improvement/revision of the materials.
- 3) Approximately 92% (12/13 students) of the students with severe visual impairment significantly developed their autonomy for English learning after studying materials developed for this study^{vi} (Figure 8).

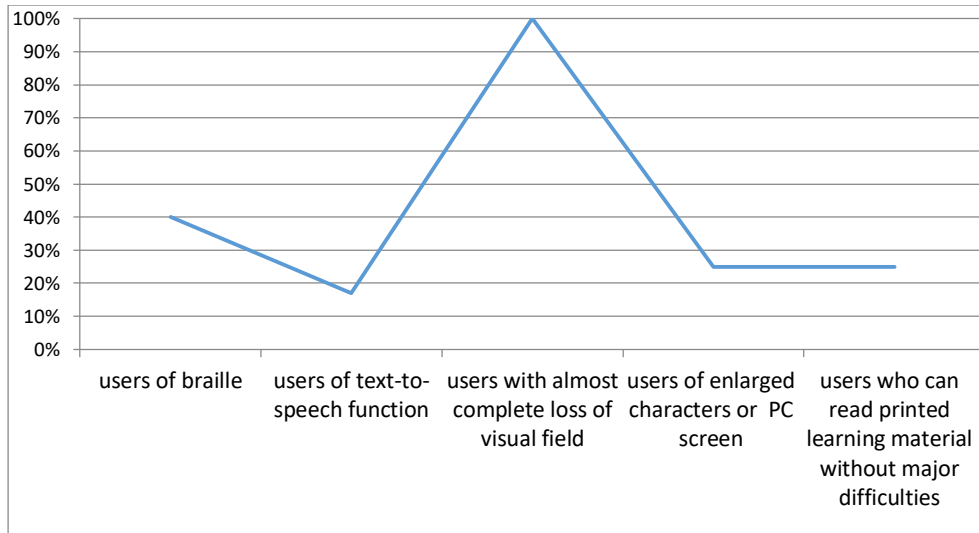
C. Ota

*Figure 8.
Development of Autonomy for Learning English after Using Content-Focused Accessible
E-learning Materials.*



- 4) Finally, about 44% (4/9 students) of students with severe visual impairment at low-to-middle English proficiency levels improved their grades at the end of the first semester after using the study materials (Figure 9). Furthermore, 100% (9/9 students) answered that their autonomy developed through using the materials.

Figure 9.
Improvement of Students’ Grades After Using Content-Focused Accessible E-learning Materials.



The results in all figures demonstrate the effectiveness of content-focused accessible e-learning materials as self-learning activities, especially for students with severe visual impairment. The findings are convincing, as students with severe visual impairment require more intensive accessibility modifications than those with relatively lighter visual impairment.

As described in 2) above, those with severe visual impairment provided both a lot of positive feedback and more detailed suggestions for improvement/revision of the materials. This is also a convincing result as they experienced the effectiveness of content-focused accessible e-learning materials to a greater degree and showed significant improvement in autonomy for learning English after using materials developed for the study. Their positive opinions and suggestions to improve/revise the materials are as follows:

- ◆ “A drop-down menu inserted in the middle of the question sentence is very useful, and has really reduced our frustration as compared to commercially available learning materials. We cannot deal with the form when lots of words are at the end of the question sentence.” (blind student)
- ◆ “I use commercially available on-line applied learning materials that do not use sounds. I have found the (study) materials very effective, especially for those who lost their vision later on in life.” (user of text-to-speech function)
- ◆ “Difficulty and unwillingness for English study has been significantly reduced as compared to using printed learning materials.” (student with almost complete loss of visual field)

Conversely, the feedback from students with light-to-moderate visual impairment was positive and but did not refer to the effectiveness of the materials:

- “There is no problem in using these materials. I could use it very easily.” (student with normal visual field, low vision)

C. Ota

- It is a little troublesome to have to access Moodle because I can read printed learning materials.” (congenital cataract)

On the whole, comments from these students tended to be shorter than those with severe visual impairment. The most common comments are summarized here:

- Concurrent output of braille characters is very useful. (blind students)
- Radio buttons are easy to find for those who are not able to use a mouse. (blind students, low vision students)
- Drop-down menus make learning comfortable. (blind students)
- Writing tasks sometimes cause learners to make spelling mistakes even if they know the correct answer. (blind students, low vision students)
- Explanations were shown even when we chose the correct answers, which is very useful. (blind students, low vision students and other visually impaired students)
- I had difficulty seeing the whole sentence when I widened the screen. (central scotoma students)
- The navigation windows were very useful for confirming where I was. (users of text-to-speech function)

About 32% (8/25 students) of the entire group and about 73% (8/11 students) of those with severe visual impairment had improved grades on the final examination of the first semester. Furthermore, 100% (13/13 students) of those with severe visual impairment answered that their autonomy improved when using the materials.

8. STUDENTS' ENGAGED LEARNING

Based on students' feedback mentioned above, the author finds that most visually impaired students are actively engaged in self-learning as reported by their self-analysis. This finding is significant as it provides new insights that will help facilitate visually impaired students' self-learning.

Students with visual impairment do not tend to have opportunities to review their English skills, as they have to make a greater effort to keep up with daily tasks (e.g., required English classes). The author found it significant that visually impaired students analyzed their own English skills and decided which content-focused accessible e-learning materials they needed, without guidance, help, or suggestions from anyone else. Students could analyze their weak points and future needs very precisely. Finally, one student chose content-focused accessible e-learning materials that were different to the ones recommended by the author, so it is meaningful to develop these materials as they might inspire students with visual impairment to engage in self-learning, something that can be difficult.

9. DISCUSSION

As indicated by the students' comments, there were some issues that impeded accessibility for students with all types of visual impairment:

- 1) Some students could not see the whole screen and navigation bar on the edge of it when it was widened, and they occasionally could not understand which question they were working on.
- 2) Some students with visual impairment face difficulty in seeing ordinal color contrast. Most of them typically use a black-white inverted screen.

- 3) In writing task questions, it is difficult for users of text-to-speech function and those with severely low vision to discern half-width word spaces. Some questions require half-width word space for a correct answer, which becomes a factor influencing learning motivation.
- 4) Originally, the number of university students with visual impairments is few. In addition, the learning materials discussed in this study could only be used by NTUT students due to copyright reasons, so the participant numbers were low. However, the author is currently able to further observe students at NTUT, and all of them have various kinds of visual impairment. For this reason, the NTUT setting is highly advantageous for developing this type of study.
- 5) The effectiveness of content-focused accessible e-learning materials and the students’ development of autonomy in learning English seem to have naturally developed. It will be important to verify the relationship between students’ improvements and these learning materials. However, establishing and exploring the impact of the learning materials on student autonomy will involve challenges, such as the number of participants, their English proficiency and background, and whether or not they have visual impairments. It is likely to take a considerable period of time to carry out this research, as Hewett (2019) and Hewett, Douglas, McLinden, and Keil (2017) studies have proven. Educational assessments of this type are complex tasks, involving a range of challenges.

Doubtless these problems cannot be solved only through technical accessibility to information; moreover, they may lead to a reduced willingness on the students’ part to learn.

By publicizing this study and its impact, it is hoped that there will be possibilities that allow Japanese students with visual impairment at other higher education to undertake independent English learning.

10. PROPOSALS FOR FURTHER RESEARCH

The author is currently working on addressing the problems mentioned in section 9. Points 2) and 3) can easily be dealt with by further modifications. Furthermore, these improvements/revisions would meet the needs of both students with severe visual impairment as well as those with low vision conditions, so the improved/revised materials would apply to all types of visual impairments. As for point 1), careful improvement/revision would be required to address all types of visual impairment.

In the near future,

- 1) Work will continue on the development of a new version of content-focused accessible e-learning materials for all types of visual impairment and address the problems that students found.
- 2) It is hoped that Japanese students with visual impairment at other higher education institutions can be reasonably accommodated to learn English independently.
- 3) It is hoped that students with visual impairment can acquire competency to make effective transitions into further education, jobs, and to continue studying throughout their entire lifetime.
- 4) It is hoped that an additional longitudinal study can be carried out to discover whether the participants who have developed autonomic attitudes toward learning English and other subjects have become more confident about self-learning and retain this ability after graduating, as they build their careers.

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- 5) It is hoped that this learning experience will enable visually impaired university students to understand their special needs fully and to ask for the consideration and support they need in inclusive educational situations and society.

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ⁱ This has been requoted from Saito (2009a), since this bachelor’s thesis was unobtainable.

ⁱⁱ This has been requoted from Saito (2009a), since this article was unobtainable.

ⁱⁱⁱ This has been requoted from Saito (2009a), since this article was unobtainable.

^{iv} Prior to the creation of the e-learning content and subject to reproduction for persons with visual disabilities, etc. under Article 37 (3) of the Copyright Act, a Memorandum of Understanding for Licensing was executed for the use of computerized data provided by Pearson Kirihara K.K.

^v The remaining student (one student) stated that she had long ago established her own way of studying English in braille and that her English skill was high.

^{vi} The same student for the same reason mentioned above

Chapter #21

POSITIVE AND NEGATIVE FEELINGS OF LEARNING WITH DIGITAL TECHNOLOGIES AMONG HIGHER EDUCATION STUDENTS IN GHANA

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ABSTRACT

A scan of research literature that targets the experiences of students in Ghana when they use digital technologies for learning, shows that little is known about student experiences of learning with technologies, or how negative they feel when doing this. The Joint Information Systems Committee's (JISC) digital experience insight survey offers insight into how students are using technology in the higher education learning environment. The survey has four dimensions, "digital life of students", "digital at the university", "digital at course level" and "student attitudes to digital". Therefore, in this study, students in three dual-mode HEIs were targeted to complete the survey instrument. The responses of 1937 students were captured by means of an online questionnaire, and the data were disaggregated by mode of study. While these data confirmed that students have positive feeling towards the use of digital technologies in their subject discipline, they also suggested that fulltime (residential) students are more positive towards digital technologies for learning than distance learners. They also have less negative feelings toward digital learning than distance learners in managing online information. Therefore, it becomes clear that dual-mode institutions need to take additional measures to scaffold distance learners appropriation of digital technologies (tools and skills) for learning.

Keywords: digital technology, negative feelings, positive feelings, higher education, Ghana, online learning experiences.

1. INTRODUCTION

Statements about the increasing use of digital technology for teaching and learning in higher education institutions only state facts about use, not the negative feelings toward teaching and learning with digital technology. For instance, research supports that, in the academic context, digital technologies can be used to support interactivity, collaboration and sharing (Churchill, 2017; Ge, Yang, Liao, & Wolfe, 2015; Rich, Cowan, Herring, & Wilkes, 2009; Wegerif, 2015), problem-solving (Ge, Yang, Liao, & Wolfe; Ng, 2015), data collection, connectivity and individuality (Klopfer, Perry, Squire, & Jan, 2005). Other studies report of the use of digital technologies to engage students, sustain learning, to help participation (communication, collaboration and community) and deep learning (Crook, Harrison, Farrington-Flint, Tomás, & Underwood, 2010). They can also be used to motivate students (Crook et al., 2010). Similarly, Ng (2015) identified, reflection, brainstorming, and thinking skills among students as affordances of digital technology in the learning environment.

Further, literature supports that in the higher education learning environment, digital technologies are used to provide teaching and learning online or to augment face-to-face learning and teaching (McCutcheon, Lohan, Traynor, & Martin, 2015). According to Henderson, Selwyn, & Aston (2017), an effective and well-designed digital learning environment can “enhance the diversity of provision and equity of access to higher education” (p. 1), improve digital skills and also allow students to personalize their learning (Beetham & Sharpe, 2013). Therefore, the students’ expectation is for higher education institutions to incorporate digital devices and resources into their learning. Consequently, many undergraduate students own and use technologies such as smartphones and laptops to support their learning.

While the use of digital technology is creating opportunities for higher education institutions and teachers (Dahlstrom, Walker, & Dziuban 2013), it is important to recognize the positive attitude of students toward digital technology on their course and also how negative they feel about learning with the technologies (Henderson, Selwyn, & Aston, 2017). The success of digital integration is dependent on a number of things such as access to personal and institutional digital infrastructure, the teachers’ pedagogical beliefs, students’ attitude towards digital technology, the subject area, level of study, mode of study and delivery mode (Beetham, Newman, & Knight, 2018a; Henderson, Selwyn & Aston, 2017). In this study, more attention is paid to the difference in students’ attitude towards the use of digital technology on their course by mode of study.

With these issues in mind, the paper aims to determine the positive attitude students have toward digital on their course as well as how negative they feel about the same. To achieve this, we will briefly outline students’ positive attitude towards digital learning. We will also unpack the negative attitude towards digital learning. We then describe the research methods that were used to conduct the survey. The JISC¹ digital experience Insight Survey was used to collect data from students enrolled at three higher education institutions in Ghana. The results of that survey will be computed and analysed. Finally, we will use the results of the survey to make recommendations for student digital capability development.

2. LITERATURE REVIEW

Digital technology is impacting knowledge, teaching and learning in these modern times. Digital technologies such as smartphones, laptops, social networking used by teachers and students are developing and generating new education approaches to transferring and acquiring knowledge rapidly. In the years ahead, emerging technologies such as robotics and virtual reality, augmented reality and internet of things will likely have an even greater influence, not least on teaching and learning. Furthermore, learner success in the 21st century requires students to demonstrate competencies in collaborating and communicating ideas through an immersive digital environment. Higher education institutions need to look seriously at the positive and negative attitudes students attach to learning with digital technologies.

2.1. Students’ positive attitude towards digital technology on course

Research on students’ positive attitudes toward the use of digital technologies to support learning is found to be generally positive due to the huge impact of technology on their lives (Kapoor, Tamilmani, Rana, Patil, Dwivedi, & Nerur, 2018). Students are enthusiastic about having technology to support learning. They value the convenience and

¹ JISC is a membership organisation, which provides digital solutions for UK education and research.

flexibility that technology provides. In other words, technology makes learning more relevant, better and understandable to them (Henderson, Selwyn & Aston, 2017; Mueller & Strohmeier, 2010). Some opine that digital technology on their course allows them to personalize their learning experience and fit learning into their lives more easily (Beetham, Newman & Knight, 2018a). Among the students, some said they feel more connected with peers and lecturers in a digital learning environment, and that. Others mention that they feel cared for and supported in the digital learning environment (Duncan & Barczyk, 2013).

It is obvious that future jobs will be digitally supported. If students are well-versed in using technology to collaborate and communicate, create, think critically and solve problems, they will not have trouble fitting in or finding jobs in the future, competing in the global economy and becoming lifelong learners. Having the opportunity to access, use and update their digital skills is necessary to be successful in the future workplace. In this regard, modern-day students are required to seek educational experiences which are authentic and correspond to the real-world capabilities (Huang & Liaw, 2018). In this context using technology helps them to develop the skills they need for employment. Some students say that digital technologies allow them to experience the technologies as they use them in their everyday life/activities (Anagnostopoulou & Parmar, 2009). These encourage them to double the amount of time they spend in using their personal device for learning and to develop professional skills in their chosen career (Galanek, Gierdowski, & Brooks, 2018). They, therefore, need a substantial amount of digital skills on their subject discipline that will build their confidence in using digital technologies safely to learn and to solve problems in academic and professional settings (Ventimiglia & Pullman, 2016). Further studies show that students are positive about digital learning and expect higher education institutions and faculty—not others—to train them to effectively use the technology (software and hardware) in their chosen career (Dahlstrom, Walker, & Dziuban 2013).

2.2. Students' negative feelings toward digital technology on course

Apart from the positive feeling students have toward the use of digital technology for learning, one needs to observe the negative feeling students have toward digital teaching and learning. The negatives associated with students' use of digital technology for learning include distraction, classroom disconnectedness, information overload, isolation among others (Attia, Baig, Marzouk & Khan, 2017; Brooks & Pomerantz, 2017; Galanek, Gierdowski, & Brooks, 2018).

According to Attia, Baig, Marzouk and Khan (2017), students' use of digital technology in the classroom causes distraction. Consequently, there has been an increased attempt by some faculty to impose rigid policies on the use of technologies such as smartphone and tablets in classrooms (Brooks & Pomerantz, 2017). "In some cases, faculty ban or discourage devices in classrooms on the basis of research that simply confirms their biases against those digital devices. Among the concern raised by teachers are that digital technologies are distracting, student device usage implies disrespect or a lack of attention, or that students are not taking good notes. This approach can do real, if unintended, harm" (Galanek, Gierdowski, & Brooks, 2018, p.13). It is a real threat when, 87% of teachers opine that digital technologies are creating a distracting generation with short attention spans than helping them academically (McCoy, 2016). Of course, this difficulty is smaller in case of higher education students. In their study among higher education students in the UK Beetham, Newman and Knight (2018b) identified that only 23% agreed that they are distracted by digital technology.

Digital collaboration is an essential skill required by every student. However, it is argued that being behind a screen provides students with a layer of isolation that they don't experience with face-to-face interactions. In other words, digital collaboration cannot be like physical collaboration in terms of feelings and emotions that teachers bring to the learning environment. By connecting more with technologies such as learning management systems (LMS) chat rooms, texts, forums and social networking reduce students' physical contact and limit social interaction (Kaya & Bicen, 2016). With this high use of technology, the learning environment is becoming more individualized and even isolated from that face-to-face interaction. Beetham, Newman and Knight (2018b) conducted an Australia and New Zealand study based on students experiences with digital technologies in the learning environment. The students disagreed (52%) that they feel isolated when digital technology is used on their course. Only 17% agreed.

Having technology in many forms through social networking sites and email for teaching can be overwhelming. More accessibility to technology can be a dependency issue to students (Kadli & Hanchinal, 2015). Technology can take students away from direct student-teacher and students-students interaction (Duncan, & Barczyk, 2013). By relying more on digital technology than physical contact with fellow students and teachers, some students may find themselves withdrawing and becoming increasingly disconnected from the people in their learning ecosystem (Kaya & Bicen, 2016). According to Beetham, Newman and Knight (2018b) students (28%) of students in Australia and New Zealand agreed that they are less likely to attend class when digital technology is used more on their course. This view contradicts with an earlier study by Ofsted (2009) which suggests that digital integration on course will not stop students from receiving face-to-face instruction.

An essential ingredient to being successful in learning with technology is the ability of the learner to manage the information available to them. Some studies have established that students lack the ability to manage online information. According to (Synnot et al. 2016) students are sometimes wary and are sceptical about the quality of information they find online. Kadli and Hanchinal (2015) emphasise that students "face the problem of information overload on the internet and lack of skills to search for information." Digital technologies have facilitated the smooth and systematic transformation of learning resources including textbooks, handouts and lecture notes into digital format. This has changed the process of access, retrieve and use of information by students and researchers (Kadli & Hanchinal, 2015). In addition to this, students look online for information to support their learning or give answers in class. Access to reliable information according to Kadli and Hanchinal, (2015) can also create an information overload. The ability to manage digital information is a skill essential for the 21st century. Students, therefore, will need the information literacy skills to able to recall, manage the information by themselves without overlying on digital technology (ibid).

In Ghana digital technologies have invaluable advantages for students. A study by Armah and Westhuizen (2018) revealed that students in Ghana especially distance learners are more receptive to digital learning. Earlier studies, however, indicated that Ghanaian students do not respond favourably to digital learning for example online discussion and ill-based activities (Asunka, 2008). Kotoua, Ilkan & Kilic (2015) emphasised that most of the students have a negative perception about the digital learning environment. He continued that they prefer face-to-face classroom teaching.

Higher education institutions, therefore, need to understand the positive attitudes students attach to digital technology on the course learning and the negative attitude they have when learning the technologies.

3. METHODOLOGY

The aim of this study is to survey students at three dual-mode higher education institutions in Ghana of their feelings about digital learning. The aim is to understand:

1. How positive students in Ghana feel about teaching and learning with digital technology in the higher education learning environment?
2. How negative students in Ghana feel about teaching and learning with digital technology in the higher education learning environment?

3.1. Questionnaire

The questionnaire used for this study is an intact survey designed by JISC to collect quantitative data. "The survey is based around a concise core set of questions that have been intensively tested with students in further education and higher education institutions in the UK, Australia and New Zealand" for relevance, readability and ease of response." (Beetham, Newman & Knight, 2018b, p 2). The items on the instrument were clustered around four dimensions, viz 'digital lives of students', 'digital in the university', 'digital at course level' and 'student attitudes to digital. In this work, responses to the fourth dimension were targeted. The items cover issues that are important to learners about the positive feeling and the negative feelings they have when learning with technology. There are two core closed questions set in this dimension. The first set of questions consisted of six Likert items that respond to the first research question one. The second question set answers research question two and is made up of five Likert items. The questions were delivered online through the JISC online surveys system.

3.2. Sampling

Census sampling technique was used to draw and gather detailed information about all or most members and small groups of the population (Lavrakas, 2008). The survey was distributed among students in three leading dual-mode universities located in two regions (Central and Ashanti) in Ghana. These three universities are charged with the responsibility to spur Ghana's technological development and to produce educators for basic and higher education institutions in Ghana. The link to the questionnaire was distributed among 32,175 final year and postgraduate students via their email, social media groups and through SMS at the beginning of the second semester. Final year students were targeted because we believe that these group of students had experienced the university digital technologies for a long time and are in the position to give insight into how they feel about learning with technologies. The smallest participating university had a total of 7,706 fulltime and distance learners at the undergraduate final year and postgraduate level; the largest had 13,001. University students totalling 1,937 (6%) students from different disciplines answered the questionnaire regarding their opinions on the matter. The respondents were made of 57.3% Male and 42.7% female students. The response was from almost all subject disciplines. Majority of respondents offered education studies (30.8%), followed by students in the Business disciplines (21.5%). The rest were 9.9% Engineering students, 5.4% Psychology students, 5.1% Agricultural students, and 4.5% Liberal Arts and Humanities students. Biological and Medical science, as well as Physical science, represented 4.2% respectively, Computer Science 2.8%, Legal studies 2.7%, Architecture and Communications and Journalism. Other minority groups were Computer science (2.1%) and Visual and Performing Arts (1.3%). Fulltime students (residential students) were 54% while distance learners represented 46% of the respondents. Most of the respondents were Final year undergraduate students (86%), only 14% postgraduate students. The age of participants ranged from 17 to 62 years ($M = 27.17$ $SD = 6.02$). The age of the participants was skewed,

with skewness of 1.65 (SE = 0.56) and kurtosis of 3.55 (SE = 0.11). The high average age is a result of the response from distance learners². Table 1 disaggregate the age data further by mode of study.

*Table 1.
Age distribution by Mode of Study.*

	N	Mean	Std. Deviation	Median	Mode	M in	Max
Distance learners	886	30.79	6.64	29	30	19	62
Fulltime students	1051	24.07	2.853	24	24	17	41

As expected, the average age of distance learners was between 19 and 62 years (Median = 30) compared to that of full-time students whose average age was between 17 and 41 years (Median = 24). Given that digital technology in higher education has become a truly global phenomenon, it is valuable to take a broad view and consider the views of students from different learning modes, 54.3% of the respondents were full-time students and 45.7% were distance learners. Both the full-time and distance learning students use digital technology to support their learning providing a rich setting in which to explore the phenomena.

3.3. Data Analysis

The online survey system presents information in frequency tables, bar chart or pie chart. However, the data was exported into IBM SPSS version 25 for further analysis. Percentages and Pearson Chi-square independent test were used to calculate the students' response to the phenomenon.

4. RESULTS

Six positive statements were asked about the use of digital technology on course. This was to determine the degree to which students agree with the statements. Table 2 presents data regarding the positive feeling students have about learning with digital technologies.

*Table 2.
Students positive attitude to digital learning.*

	Disagree	Neutral	Agree	Mdn
I understand things better	183(9.5%)	522(27.1%)	1223(63.4%)	3,00
I enjoy learning more	169(8.8%)	551(28.6%)	1205(62.6%)	3,00
I am more independent in my learning	248(12.9%)	642(33.4%)	1031(53.7%)	3,00
I feel more connected with other learners	279(14.5%)	674(35.1%)	966(50.3%)	3,00
I can fit learning into my life more easily	255(13.3%)	611(31.9%)	1049(54.8%)	3,00
I feel more connected with my lecturers	380(19.7%)	766(39.8%)	780(40.5%)	2,00

² Distance learners in Ghana are mostly adults who combine work and family. They seek higher education in order to upgrade their skills, for promotion or to secure their positions at the work place

Table 2 shows results of the students' positive attitude towards digital learning. The perception statement "Increase academic performance" (Mdn = 2.0) had the lowest median score which corresponds with the rank neutral, which indicate that students' interviewed in the survey have no strong connection with lecturers when digital technology is used on their course. However, statements "I understand things better", "I enjoy learning more", "I am more independent in my learning" "I feel more connected with other learners" and "I can fit learning into my life more easily" have Mdn of 3.00 respectively. Meaning that the students agree to the statements (Mdn=2.83).

The results were further disaggregated to reveal the pattern of the students' response by mode of study. The results are shown in Table 3. A summary of their responses revealed that about 707(68.0%) of the fulltime students said they understand things better when digital technology is used on their course compared to about 512(58.1%) of distance learners. The result also shows that about 720(69.2%) of the fulltime students enjoy learning with technology, and about 484(55.1%) distance learners enjoyed learning with technology. Independent learning was one value students attached to digital learning by about 581(56.0%) of full-time students and about 445(50.7%) of distance learners. The students agreed that they feel more connected with their fellow students than lectures when digital technology is used on their course. Distance learners, 366(41.6%) are convinced that technology helps them to connect more with their teachers compared to full-time students 411(39.5%). Fulltime students 537(51.7%) on the other hand, said they feel connected with fellow students compared to distance learners (48.7%) when digital technology is used to enhance learning. Fulltime students 612(59.0%) and slightly less than half of the distance learners 433(49.7%) agreed that digital technology allows them to fit learning into their life more easily.

Further analysis using the Pearson-Chi-square of independent test revealed (see Table 3) a significant difference in the value students attach to digital on course by fulltime students compared to distance learners. Fulltime students were more likely to understand things better $X^2(2, 1921) = 50.449, p = 0,000$, enjoy learning with technology $X^2(2, N= 1918) = 59.043, p = 0,000$, more independent in their learning $X^2(2, N=1914) = 22.846, p = 0,000$, feel more connected with other learners $X^2(2, N=1912) = 16.938, p = 0,000$ and are able to fit learning into their life more easily $X^2(2, N=1909) = 41.173, p=0,000$ compared to their distance learning counterparts

No statistically significant difference was found in the mode of study and students-lecture connectedness when digital technology is used on course, $X^2(2, N= 1919) = 4.793, p = 0,091$.

*Table 3.
Percentage difference of Value of digital technology on students learning by mode of study (N=1937)*

	Mode of study	Disagree	Neutral	Agree	Pearson Chi-Square	sig
I understand things better	I am a full-time student	54 (5.2%)	279 (26.8%)	707 (68.0%)	50.449 ^a	0,000
	I am a distance learner	127 (14.4%)	242 (27.5%)	512 (58.1)		
I enjoy learning more	I am a full-time student	51 (4.9%)	269 (25.9%)	720 (69.2%)	59.043 ^a	0,000

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	I am a distance learner	117 (13.3%)	277 (31.5%)	484 (55.1%)		
I am more independent in my learning	I am a full-time student	99 (9.5%)	357 (34.4%)	581 (56.0%)	22.846 ^a	0,000
	I am a distance learner	148 (16.9%)	284 (32.4%)	445 (50.7%)		
I feel more connected with my lecturers	I am a full-time student	192 (18.5%)	437 (42.0%)	411 (39.5%)	4.793 ^a	0,091
	I am a distance learner	185 (21.0%)	328 (37.3%)	366 (41.6%)		
I feel more connected with other learners	I am a full-time student	119 (11.5%)	382 (36.8%)	537 (51.7%)	16.938 ^a	0,000
	I am a distance learner	158 (18.1%)	290 (33.2%)	426 (48.7%)		
I can fit learning into my life more easily	I am a full-time student	92 (8.9%)	334 (32.2%)	612 (59.0%)	41.173 ^a	0,000
	I am a distance learner	162 (18.6%)	276 (31.7%)	433 (49.7%)		

Also, five items targeted the negative feelings students have toward the use of technology for teaching and learning. The overall result is shown in Table 4. The student reported a neutral score for the statement “I find it harder to manage all the information” (Mdn = 2). The average score for the statements “I am more easily distracted”, “I feel more isolated”, “I find it harder to motivate myself” and “I am less likely to attend class” was 1.0, which means that the students disagreed with the statements.

Table 4.
Students’ positive attitude to digital learning.

	Disagree	Neutral	Agree	Mdn
I am more easily distracted	1013(52.5%)	551(28.6%)	364(18.9%)	1.00
I find it harder to manage all the information	917(47.6%)	693(36%)	317(16.5%)	2.00
I feel more isolated	1062(55.3%)	693(30%)	282(14.7%)	1.00
I find it harder to motivate myself	1031(53.7%)	618(32.2%)	270(14.1%)	1.00
I am less likely to attend class	1084(56.4%)	529(27.5%)	364(16%)	1.00

The data was further disaggregated to reveal the pattern of the students’ response by mode of study. Table 5 presents data regarding students’ difficulty of learning with technology. Approximately 545(52.2%) of full-time students and 466(52.7%) of distance learners disagreed that they are more easily distracted with digital on their course. About 517(49.7%) of the fulltime students disagreed that they find it harder to manage all the digital information available to them and about 398(45.2%) disagreed to the statement. Some 579(55.5%) of full-time students and 478(54.6%) of distance learners disagreed that digital on their course made them more isolated. More than half of the students disagreed that they find it harder to motivate themselves when digital technology is used on their course. Fulltime students 588(56.5%) and 439(50.3%) of distance learners disagreed to the

statement. Only 172(16.6%) of full-time students and 134(15.3%) of distance learners agreed that they are likely to skip classes when digital technology is used on their course.

The chi-square analysis (see Table 5) revealed that students equally did not have difficulty learning with technology. Only distance learners are more likely to face a slight problem with managing information when digital technology is used on their course compared to fulltime students, $X^2(2, N=1920) = 7.362, p = 0.025$. The Bonferroni adjustment test indicated that a greater percentage of distance learners (51.1%, this is above the average percentage of 45,8%) agreed that they find it harder to manage all the digital information presented to them in the classroom.

However the proportion was not significant (adjusted residual = 2.1, $p=0,040$).

Table 5.
Percentage difference of difficulty of learning with Technology by mode of study.

	mode of study	Disagree	Neutral	Agree	Pearson Chi-Square	sig
I am more easily distracted	I am a full-time student	545(52.4%)	289(27.8%)	206(19.8%)	1.762 ^a	0,414
	I am a distance learner	466(52.9%)	260(29.5%)	155(17.6%)		
I find it harder to manage all information	I am a full-time student	517(49.7%)	369(35.5%)	154(14.8%)	5.677 ^a	0,059
	I am a distance learner	398(45.2%)	321(36.5%)	161(18.3%)		
I feel more isolated	I am a full-time student	579(55.8%)	322(31.1%)	136(13.1%)	4.703 ^a	0,095
	I am a distance learner	478(54.6%)	253(28.9%)	145(16.6%)		
I find it harder to motivate myself	I am a full-time student	588(56.5%)	316(30.4%)	136(13.1%)	7.362 ^a	0,025
	I am a distance learner	439(50.3%)	300(34.4%)	133(15.3%)		
I am less likely to attend lectures	I am a full-time student	588(56.6%)	278(26.8%)	172(16.6%)	1.033 ^a	0,597
	I am a distance learner	492(56.2%)	250(28.5%)	134(15.3%)		

5. DISCUSSION

With regard to the students' positive to digital on course, we established that full-time students have a more positive feeling towards digital learning than distance learners. For example, a significant proportion of fulltime students opined that digital on course makes them more independent learners. They also agreed more that they enjoy learning, understand things better and are able to fit learning into their life when digital technology is used on their course. This suggests that distance learners in Ghana do not respond favourably to digital learning. Wolcott (2003) blame distance learners' adverse feeling or attitude to digital learning on lecturers. Some lecturers in dual-mode institutions who may have the pedagogical and technological skill to integrate the technology view the distance learning department as part of assignments and ultimate whilst the majority sit on the wall to watch. In other words, the distance sector lacks the qualified staff to integrated

technology into the learning activities. Such situations put the effectiveness of distance learning in question for the promotion of equivalency (Wolcott & Betts, 1999).

It was also identified that slightly significant proportion of distance learners find it more difficult to manage all the information when digital technology is used on their course. These findings are similar to those indicated by Synnot et al. (2016) and Kadli and Hanchinal (2015) in the literature concerning students' scepticism of quality information and information overload. They, therefore, prefer the institutions to continue to support them with face-to-face lectures. The finding also confirms an earlier study by Ofsted (2009) and Beetham, Newman and Knight (2018b) which stated the use of digital on course will not stop students from attending classes. It also contradicts with earlier studies which suggest that over-reliance on digital technology (such as chat rooms, text, forums and social networking) for learning are a danger and as well discourages and ceases students from attending face-to-face lectures (Kaya & Bicen 2016). The results show that the students', generally, have a positive feeling to digital learning. They (students) value the convenience and flexibility that technology provides and therefore are enthusiastic about having digital technology to support their learning as suggested by Barker and Gossman 2013; Beetham, Newman & Knight, 2018a) and that accessibility to the personal and institutional digital technology will not take them away from face-to-face interactions with their teachers and other students.

6. CONCLUSION

The study explored Ghanaian students' positive and negative feelings towards the use of digital technologies in teaching and learning. We learned from the findings that generally, students in Ghana – irrespective of the mode of study in the institutions - are self-motivated and do not feel distracted or isolated when digital technology is integrated into their learning. However, full-time students are more likely to find digital technology useful in their learning as compared to distance learners. These findings indicate that although students in Ghana prefer to learn with technology, fulltime students are more likely to feel positive toward the use of technology to support learning compared to distance learners. They are also less likely to have a negative feeling towards learning with digital technology. The results also indicate that dual-mode institutions in Ghana should continue to support distance learners with the integration of technology. The lecturers' pedagogical approach should allow students particularly distance learners to use their devices to support their learning more. Students find it difficult to 'manage all the information they find online'. We there support research that recommends faculty to continue to support students on information literacy skills. This will help to improve students' skills in searching and managing digital information.

The study sample and questionnaire are the limitations of the study. First, the sample consisted of final-year undergraduate and all postgraduate students in three public universities in Ghana. The study did not consider students in private institutions, which could have yielded a valuable student perspective. Consequently, the result may not be generalised to students in private higher education institutions in Ghana. Also, final year and postgraduate students responded to the questionnaire, which also means that the result cannot be generalised to students in the first, second and third years of their study. The questionnaire used for the data collection is an intact survey developed in the UK, which is one of the most developed nations; therefore, its suitability in the context of a developing country like Ghana, it may be argued. Some respondents may not be familiar with the language (terminology) while completing the survey. A future study could explore students

in private universities in Ghana: including students in the first year and middle years undergraduate level of their study. The questionnaire adopted for future study should be adaptive to students in developing countries, specifically sub-Saharan Africa. The language of the questionnaire and terminology should be similar to the language of instruction in Ghana.

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Chapter #22

STUDENTS' AND TEACHERS' VIEW ON SCHOOL-DEPENDENT FACTORS THAT AFFECT STUDENTS' ASSESSMENT PERFORMANCE

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ABSTRACT

The paper attempts to name, define and evaluate various factors that may influence the assessment of students. The idea behind an exam for students is to determine to what extent students have learned (assimilated) the course content. The exam is also a type of summative assessment that is designed to determine whether students can select and apply effective study strategies and whether they know how to prepare for and perform during the exam.

Both scientific publications and the authors' experience show that in many situations, students do not achieve an exam result that matches OR is in line with their skills. In this chapter, the authors focus only on factors that may depend on the strategy of the university, such as stress management, examination techniques, understanding of tasks etc.

The authors collected data to investigate what kinds of study and examination strategies students use and how these strategies satisfy student assessment results using qualitative and quantitative methods. The results were used to identify which factors have the greatest impact on student performance. The chapter presents some suggestions on how schools and universities can support students to be more prepared and more aware of themselves in such situations.

Keywords: evaluation, study strategies, examination strategies, students, assessments.

1. INTRODUCTION

Defining education as only formal education is a gross oversimplification (Michalos, 2017). In today's culture, it is expected that many things will be learned in many ways and in many contexts, but the word "education" is only associated with formal education from government schools and universities. Education today needs to "*expand academic quality in all aspects, right from the curriculum to the learning-teaching process to examination and evaluation systems*" (Aithal & Kumar, 2016, p. 7). Times are changing and higher education institutions need to create a learning model that keeps the curriculum in line with the changing environment, the adoption of technology, the changing demands of industry, the changing aspirations of students and the changing expectations of society (Aithal & Kumar, 2016).

Norway is a welfare state with mostly small differences between social classes, especially in the education system. In Norway, access to education is a human right and everyone is accepted, but many of them do not complete their studies. The authors' experience shows that students learn more during the semester than what is shown on their

final assessments. By “assessment” in this chapter, the authors mean the final assessment at the end of the semester. Such an assessment may be a written or oral examination, but it may also be the submission of one or more assessments or another method that is used to assess a student in each subject. The authors’ experience shows that many students who correctly respond to classes and write good papers during the semester do not achieve good results in the final exam and do not receive a well-deserved grade.

The aim of the paper, which is an extension of a previous paper (Fojcik, Fojcik, Stafnsnes & Pollen, 2019a), is to identify and analyse the factors that may affect student performance on assessments, and to discuss to what extent those factors correspond with the teacher’s experience and the student’s comments. The authors looked for factors that do not depend on society, economic differences or gender, but on the university strategy, the preparation of teachers and the students themselves, which are the factors that can be influenced by teachers and universities to help prepare students for a better academic assessment.

In this paper, the authors will present the theoretical basis and previous research on this topic in Section 2. Section 3 will present the methodology that was used for the data sampling in this project. In Section 4, the results will be presented and commented on. In Section 5, the authors will discuss some controversy about the results and different approaches to help students improve their performance and in Section 6, they will discuss and offer conclusions from these studies.

2. BACKGROUND

2.1. Academic performance

Academic performance, which consists of much more than reading, listening or memorising facts, is the final part of learning and studying. The final method of evaluating students’ knowledge and skills is a summative assessment, which means “*a judgement which encapsulates all the evidence up to a given point*” (Taras, 2005, p. 468). The purpose of such assessments is to objectively organise and rank students’ knowledge and skills in each subject *via* the learning outcomes that are defined in the subject description. Nevertheless different personality traits can definitely influence student performance (Poropat, 2009).

In psychology, researchers have systematised personality traits, and the current models consist of five recurrent personality factors. Tupes and Christal classified these factors as “*surgency*”, “*agreeableness*”, “*dependability*” “*emotional stability*” and “*culture*” (Tupes & Christal, 1992, p. 225). The current five-factor model of personality can classify major personality traits into openness (being creative, sensible, broad-minded, open to new things and ideas), conscientiousness (being persistent, dependable, prepared, structured and having the will to achieve), extraversion (being active, social and the centre of attention), agreeableness (being reflective, cooperative, caring and friendly) and emotional stability/instability, which is also called neuroticism (often being stressed, upset, dramatic, unconfident, anxious and having adjustment issues) (Digman, 1990; Phillips, Abraham, & Bond, 2003; Poropat, 2009; Zhou, 2015).

Poropat (2009) found that there is a strong relationship between academic performance and three of those personality traits: agreeableness, conscientiousness and openness, and he argues that it is conscientiousness that has the strongest association with academic performance of all of the five-factor model dimensions. While the effect of openness on academic performance is strongly discussed, the role of conscientiousness is

also commonly acknowledged by researchers (Chamorro-Premuzic & Furnham, 2003; O'Connor & Paunonen, 2007; Phillips et al., 2003; Zhou, 2015). The research of Zhou (2015) found that students with lower levels of self-determination are more influenced by the five-factor model than students that are highly motivated and self-determined. This means that a student's motivation is not only a driving force of learning, but that it also influences a student's performance as well. Chamorro-Premuzic and Furnham (2003) discovered that there is significant negative correlation between neuroticism/emotional stability and extraversion on student performance. This means that students that are emotionally stable and introverted have a 15% greater chance to perform better in an academic examination.

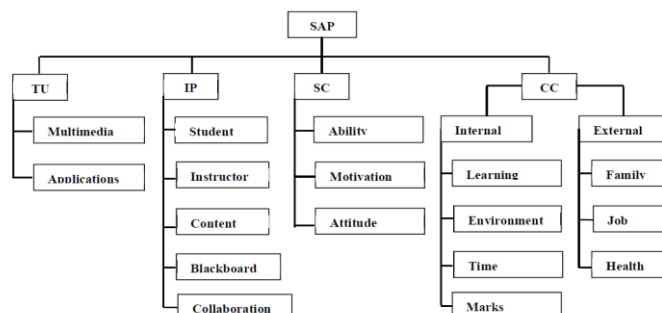
2.2. Factors that affect student performance in the literature

There are many different factors that can affect student performance on summative assessments. In literature there are already some previous studies with similar goal, to identify factors that affect student performance that this chapter is based on. One is the research of Al-Zoubi and Younes (2015), who in their research mapped and discussed the definition and causes of academic failure. In their studies, they found six internal and mental factors that can result in academic failure:

1. Lack of a Clear Plan.
2. Medical and Psychological Reasons such as:
 - a. Major Depression Disorder,
 - b. Generalized Anxiety Disorder,
 - c. Exam Phobia,
 - d. Obsessive Compulsive Disorder,
 - e. Attention Disorder,
 - f. Learning Disabilities and Slow Learning.
3. Reasons Related to the Learner:
 - a. Lack of enthusiasm,
 - b. Lack of experience and hasty in getting the results,
 - c. Lack of abilities,
 - d. Fear of failure
 - e. Lack of self-confidence.
4. Parental and Educational Reasons.
5. Exam Anxiety.
6. Lack of Motivation for Success.

In a different study, Ismail, Mahmood and Abdelmaboud (2018) used a different way to present the factors that affect the academic performance of students, Figure 1. Their model, SAP, which stands for Students Academic Performance, is based more on the schematic structure of the main factors and subfactors. There are four main factors: TU – Use of Technology, IP – Interaction Process, SC – Student Characteristics and CC – Class Characteristics. This model analyses both the internal and external factors that can affect the learning process from the technology being used in the classroom by the teacher, to personal characteristics such as attitude and motivation. Major factors such as the environment, family and jobs are also included.

Figure 1.
Suggested factors that affect student results (Ismail et al., 2018, p. 171).



There are many ways to define the factors and many situations and variables to consider, which can act differently in different situations. The aim of this paper is to try to distinguish the factors that have the greatest impact in a small-town university college (HVL) in the STEM courses. This paper shows some practical elements that it is possible to change in an academic environment. Through a teacher's experience, an analysis of the assessment results for 12 years and feedback from the students, the authors want to elaborate on some of the factors presented above.

Research hypothesis:

It is possible to select some factors that can most affect student performance on assessment. Changing (improving) these factors would result in a visible improvement in grades.

3. METHODS

To answer the research question proposed in this study, the authors researched students with different backgrounds. Participants in this study were STEM students in different years of a Bachelor's degree programme. The data was collected using a variety of methods. The quantitative survey and examination results from pass years were statistically analysed in the paper (Fojcik, Fojcik, Stafsnes, & Pollen, 2019b). In addition to a survey, the authors wanted to interview students at several stages of their studies in order to determine whether there were differences in their study techniques, and how they reflected on their own ways of dealing with final assessments, exams and exam preparation. This chapter combines previously discussed factors with qualitative interviews in order to better understand the perspectives and behaviour of students. Combining and analysing the joined results resulted in some contradictory factors, which will be discussed in Section 5. They showed that the results from the survey and habits/teacher's experience did not always fit with the explanations that were given in the interviews.

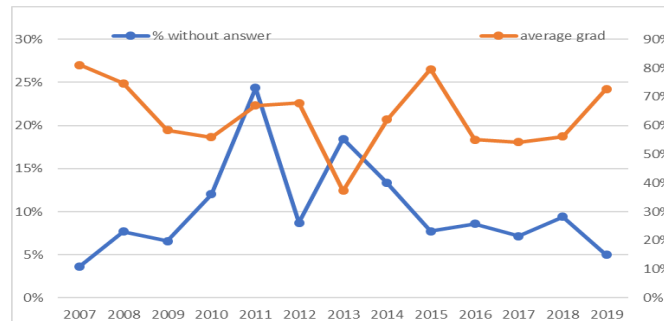
The authors interviewed 66 teachers and 44 students: four first-year students, three second-year students and two third-year students. The students were first informed about this research project through an online learning platform, then the researchers visited their classes in order to tell them more about the project and to find volunteers.

All of the data were voluntarily collected. The students agreed to the interviews and signed a statement of consent to be part of this project. Each interview was based on a semi-structured guide, which was approved by the Norwegian Centre for Research Data, NSD.

4. EXPERIENCE OF TEACHERS, STATISTICS AND SURVEY RESULTS

The authors began this project by analysing the anonymised statistics of the final assessments from the last 12 years for the 2nd-year engineering course: “*Electronic and Computers*”. The teachers observed that (statistically) the students that were able to solve problems on exercises or laboratory did not even try to do so on an exam. In other words, the students' level of knowledge seemed to be higher in the exercises than in an exam. The statistics, Figure 2, show that there is a relationship between the average grades of students and the number of unanswered questions on an exam. It is clear that many students did not even try to answer all of the questions on an examination. The most significant correlations were in 2011 and 2013, which was when the teachers began to pay more attention to how to prepare students for examinations. This preparation consisted of motivational talks, sharing and discussing strategies and techniques on taking an exam and exercises on time management. After this, the students got slightly better and answered more questions on exams.

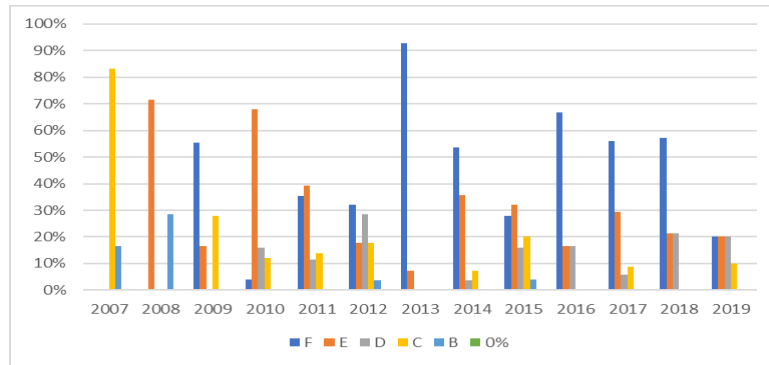
Figure 2.
Comparison of the number of unanswered questions and the average grade.



In the further analysis of the statistics, the authors found a different kind of correlation between the grade and unanswered questions. Prior to 2013, the students that did not answer some of the questions were still able to achieve better grades. After 2013, when the teachers began to address this problem, and tried to teach students not to leave questions unanswered, there was a change in the pattern and from that time the students that did not answer questions achieved low grades. Figure 3.

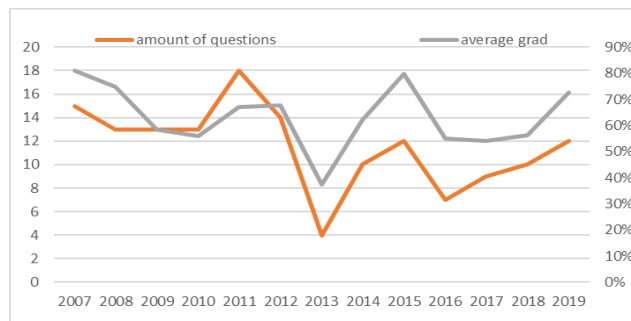
Students that received grades from F to B did not answer some of the questions on the final assessment. After 2013, this was mostly students with an F grade (Fail) that had problems with answering questions.

Figure 3.
Grades of students that did not answer all of the questions.



Another observation in the statistics was that the grade was dependent on the number of questions. If there were too few questions on an exam, the students did not perform well, which was also true if there were too many questions. This part of the analysis found that the students achieved the best average grade when there were 10-13 questions on an examination in this course, Figure 4.

Figure 4.
Number of questions versus achieved grades.



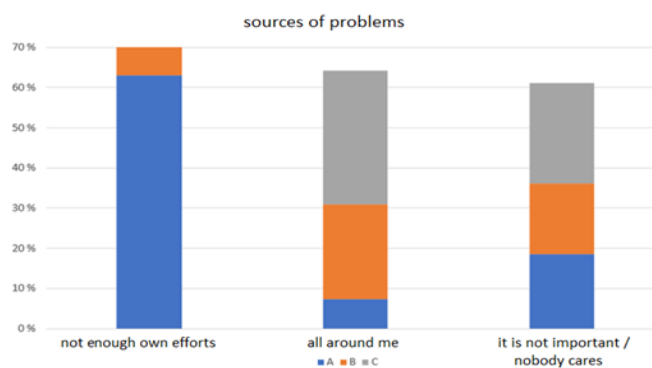
To explain this and to find the cause of this problems and any correlations, the authors conducted a survey. Students were asked about the main factors that affected their performance on an exam. The results that were obtained from the survey indicated that many factors can influence the learning and evaluation process of students. There were two clearly visible elements that affected students: stress and expectations. The biggest problem that affected students before an assessment was anxiety and stress, which was mentioned by over 60% of the students, Figure 5. This corresponded with the findings of Al-Zoubi and Younes (2015).

Figure 5.
Common problems presented in survey.



In another question the students were asked to write what grade they realistically wanted to achieve, and to give the reasons that could prevent them from reaching this goal. The analysis showed that students who expected grades above average were more critical of themselves and showed conscientiousness about their choices as well as accepting responsibility. This factor was called “Attitude” by Ismail et al. (2018). Meanwhile, students that expected to receive a passing grade or an average grade expected the learning process to be given to them – through a passive attitude, Figure 6.

Figure 6.
Reflection over desired grades and problems in achieving them.



Both of those problems were addressed during the interviews. The dialogues showed that students did not have any specific preferences/experiences and they mentioned many different things. Yet, there were some differences between first-year students and the more experienced students. There were three common factors: a student’s experience with studying and learning, a student’s preparation and awareness of the assessments itself and the type of exam.

4.1. Differences in students’ experience

After analysing the interviews of all of the students, the authors observed that the more experience students gained in being students, the more reflective they were about

their own methods of studying, which caused their attitude to change (Ismail et al., 2018). Those students explained how several aspects of studying affected them and what they did about them. First-year students, without any studying experience, tended to do what others did without reflecting on how they should adapt to the environment. Third-year students, and also to a point second-year students in the Bachelor's degree programme were more likely not to differentiate classes, courses and the level of effort in a subject by their own motivation or personal mood but by creating good study habits and structuring their learning process. First-year students were more likely to skip early-morning classes if they were not interested in the specific topic or if they thought that they understood the topic.

Another difference between new students and experienced ones was the effort they made towards achieving the desired grade. First-year students tended to want to earn above-average grades and expressed a desire to achieve their goals. Third-year students tended to have goals that were related to the difficulty and complexity of an exam. They tended to be more reflective about themselves both as students and as to how they adapted to the relationship between themselves and the academic institution.

4.2. Form of the final assessment

Most participants in this project claimed to have found a method for preparing for an academic assessment that worked for them. Some students preferred to work alone, while others preferred to work in small groups with other classmates. Nearly all of the students said that they worked with practical problem-solving tasks that were related to the course and topic. Reading was not an effective way of preparing for the exams because the STEM courses are practical orientated and the students followed this orientation and mainly practiced mathematics.

Eighty-nine percent of the students argued that four- to seven-hour-long written exams were not an effective assessment method for STEM courses. Some said that a whole semester depended on one day and that if you had personal matters that put you out of mental balance, you were not able to give your best. Others said that a written exam does not represent the society or workplace of today because today you have colleagues to discuss things with and no one expects you to know everything there is to know about every topic within the engineering field. They also stated that one could get lucky with what he or she reads; one student could know only a small part of the subject, get lucky in the exam tasks and get a top grade, while another could prepare and read everything except the given task and fail. Students felt that it was often about how lucky you are with the topics and how your body and mind are on the day of an exam.

5. DISCUSSION

5.1. Anxiety and stress

The authors wanted to ask the students about the main factors on the survey in order to get the students point of view, but surprisingly, none of the students talked about real nerves and anxiety on the day of the exam. They appeared to have confidence in their exam preparation and in the fact that they had done their best to deal with the exam in the very best way they could. The only nerves or anxiety some of the students had were about what kind of questions there would be on the assessment or whether they would remember everything from the lessons. These kinds of nerves disappeared when they began to solve the exam tasks. What is interesting is that all of the students that the authors interviewed mentioned that their classmates had anxieties that cause them to have a mental block during

an exam. This result is not consistent with the result of the survey, (where over 60% of the students complained about stress) and even more importantly, this result did not have a normal distribution, Figure 7.

Figure 7.
Optimal stress zone.



If the stress level is too high, it can stop logical reasoning when a student is too stressed and scared to perform, but if the stress level is too low, it can mean that this activity is not important enough for (in this case) a student, and that the student does not care about the evaluation and the final grade (Hauge & Wormnes, 2014). Al-Zoubi and Younes (2015, p. 2264) mentioned in their research that there are factors such as “Generalised Anxiety Disorder” and “Exam Phobia”, which can affect students by weakening their memory and concentration both in preparing for a final assessment as well as on the assessment itself.

5.2. The duration of exam (lack of time)

The second problem the students commented on in the interviews was about the duration of the exam. In both the surveys and interviews, the students expressed concerns about not having enough time to take the exam. This factor was also mentioned by Ismail et al. (2018). The students stated that they sometimes felt that they would not have enough time to answer all of the questions. There were students from different study programmes and therefore they had different assessments in different courses, which were mainly written exams that lasted for three to six hours. Nevertheless, most of the students wanted to have more time to write the answers. The authors observed some activity during one of the exams. About 80% of the students left the examination room before the examination time was over. The exam results showed that 34% of the students had one (17% of the students) or more (17% of the students) unanswered questions, which means that the students had the time to stay longer to finish the examination and answer the questions, but for some reason, they did not try to answer some of the questions and left the exam early.

6. DISCUSSION AND CONCLUSIONS

The authors goal with this project was to help and support students in learning and preparing for an academic assessment. The aim of this project was to identify and to eliminate, correct or improve the internal and external factors that can affect student performance and their results on final summative assessments. As a result of the research, the authors believe that there are more elements than subject knowledge that affect student assessments. These additional elements include stress, lack of time, lack of motivation, lack of information and experience in exam preparation and test-taking techniques. While it is not possible to solve all of these problems, by continuously providing students with information, motivation and explanations, it is possible to improve the levels of achievement.

Because this study was limited to the STEM courses in a Bachelor's degree programme, it would be difficult to generalise the findings from this research. In education it is important to remember that every student is different, every subject is different, every assessment and every exam is different, but this project showed some tendencies that teachers and institutions should consider when preparing future students for their final assessments.

Being a student means much more than just performing well on academic assessments. It is the time to try new things, gain experience and discover new experiences, go on an exchange to a different country and learn about another culture as well as to find out more about themselves, discover their strengths and weaknesses and grow up. Education is not limited to a Bachelor's degree (Michalos, 2017). Personality traits such as striving to achieve, self-discipline and activity affects student examination performance in at least 30% of the known cases (Chamorro-Premuzic & Furnham, 2003). Furthermore, knowledge about the factors that can influence student performance can compensate for any known or unknown weaknesses and nurture a student's strengths (O'Connor & Paunonen, 2007).

Our research indicates that there is a correlation between a student's study strategies and consciousness on their academic performance. A student's performance on objective academic assessments is influenced by their learning style, while applying that knowledge in real-life situations requires additional skills (Lynch, Woelfl, Steele, & Hanssen, 1998). Student in this research complained that the most used form of assessment in Norway is a four- to seven-hour-long written examination, a form that does not reflect the current situation in working life. Moreover, the students felt that the expectations of examinations are too high, but that very few teachers use their lessons to teach about different study techniques or different ways to prepare for final assessments in order to perform at one's best.

An assessment or examination at the end of the semester is the final, and sometimes only, chance to prove one's knowledge in a subject. Usually, there are not many occasions on which students can show what they have learned and what they can do with that knowledge. In Fojcik et al. (2019b), it is presented that the level of stress before an assessment should be distributed on a normal distribution model. This means that it is optimal for students to be in a mediate stress level during an evaluation, so that their body and mind can focus to enable them to be able to perform at their best. One may say that students that are not stressed at all simply do not care enough to perform well. In our interviews, the students did not mention any influence of stress or anxiety, neither positive nor negative. A possible explanation is that the word stress may be associated with anxiety and choking under pressure, which those students do not experience. Another reason may

be that the students did not remember the stress after the exams, when they learned that they had passed and that those positive feelings could overshadow the previous negative ones.

It is important to remember that learning is a process and that students need to be constantly reminded of the purpose of what they are learning and motivated to keep on working as well as being conscious of the whole learning and performing process. Small activities such as providing explanations or information, motivation or social inclusion are important, especially for new students.

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Chapter #23

CULTURAL HERITAGE AS BUILT ENVIRONMENT EDUCATION RESOURCE: Pupils and teachers evaluating learning within Lost Traces project

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ABSTRACT

Monuments as facets of our material culture can be focal points of built environment education. Cultural heritage can enhance teaching of curricular subjects and can provide *par excellence* cross-curricular opportunities. Yet, studies evaluating educational experiences involving cultural heritage sites are scant. Therefore, this chapter presents results of an evaluation of learning experience with pupils and teachers participating in a 'Lost Traces' project. Questionnaires and group interview with card sorting task revealed educational methods the pupils selected as helpful for developing a myriad of competencies – from perceiving and feeling, analysing and communicating monuments related themes, to artistically intervening on sites and developing designs for the future use. LT projects promote diverse competences and highly enrich learning experiences. Pupils appreciated the ability to independently assemble teams spanning across generations, bring in their own ideas, work directly with experts, engage with interesting topics on-site. Yet, future project should allow for joined-up planning and careful programming of project phases and educational tools jointly with pupils; include more intensely social negotiation of what heritage is with different stakeholders to facilitate the process of monuments interpretation, thus, further broaden pupil's understanding of heritage.

Keywords: built environment education, monuments, cultural heritage learning, educational competencies, heritage interpretation.

1. INTRODUCTION

Built environment education (BEE), also named architecture education, utilises settlements, buildings and landmarks – as a subject, a context for learning and a curricular resource (Heinrich & Million, 2016). BEE incorporates educational activities related to cultural, arts, democratic, and environmental education using built environment (BE) facets. BEE aims to support pupils' development of critical thinking in connection to spatial issues and high-quality BE, foster environmental stewardship, inform about participatory and democratic decision making processes, and ultimately help pupils understand “*the interrelationships of humans with their environments in the past and present and in different parts of the world*” (Graves, 1990: 2). Monuments as facets of our material culture can be focal points of BEE. Cultural heritage can enhance teaching of curricular subjects, can provide *par excellence* cross-curricular opportunities; transforming abstract concepts from textbooks “*into tangible realities and intriguing stories about their everyday world*” (Hunter, 1993: 2), while assisting pupils to appreciate local history and culture, and comprehend the importance of historic preservation. Educational projects involving

monuments as a BEE curricular resource can be found internationally. Important contributions are coming from the English Heritage (Bradley, Coombes, Bradley, & Tranos, 2011) in the UK, 'Baukultur Aktiv' (active building culture) program from Switzerland (Fachwerk, n.d) 'Denkmal aktiv - Kulturerbe macht Schule' (active monument - cultural heritage makes school) program from Germany (DSD - Deutsche Stiftung Denkmalschutz, 2018), and Teaching with historic places (2016) from the USA. However, what we are lacking are evaluations of learning experiences involving monuments and cultural heritage sites. Therefore, this chapters presents results of an evaluation of learning experience with pupils and teachers participating in a project called 'Lost Traces' (LT).

2. LITERATURE REVIEW

Today, architects and urban planners, as the authors themselves, carrying out educational projects with cultural heritage in focus find information and support for their work in policy documents, educational guides, and academic studies.

Policy documents such as Davos Declaration (2018) and Faro Convention (Council of Europe, 2005) accentuate the importance of active engagement and citizen participation in decision making processes about space, as well as the knowledge about the origin and the effects of space and its facets. BE, and cultural heritage sites as a part of BE, should be made a central educational topic, addressed at all levels of education (Art. 13, Council of Europe, 2005: 5-6; Davos Declaration, 2018: 12), as this so far was rarely the case.

An ever-growing number of educational guides for teaching/learning with monuments demonstrate how policies can be translated into educational practice. These guides provide a plethora of tasks and assignments for incorporating topics related to BE, cultural heritage and monuments (preservation) into curricular subjects (Fachwerk, n.d.; Schmidt-Breitung & Michels, 2018; DSD, 2018). The role of architects as creators and facilitators of BEE programs with monuments in focus can be most prominently observed in this group.

Academic studies reveal that monuments have been used to teach about local cultural heritage in history and geography (Apostolopoulou, Carvoeiras, & Klonari, 2014), cultural geography (Waters & Russel, 2012), heritage and history (Moreeng, 2014), social justice and sustainable learning (Moreeng & Twala, 2014), social studies (Hunter, 1993), sustainable development (Deutsche Stiftung Denkmalschutz, 2018) and art and architectural history (Shanken, 2004). The empirical evidence from this group of studies highlight the importance of including monument in curriculum, as 58% of teenagers from a study by Bradley et al. (2011) perceived at least one historic building in the local area, as distinctive, and personally significant. Yet, Moreeng (2014) calls for reconceptualization of the heritage teaching in schools to allow critical approach able to enhance pupils' deeper understanding of heritage. Pupils should have an opportunity to (re-) negotiate "the representation of a collective memory through the creation of their own monument" (Uhrmacher & Tinkler, 2007: 11). Hence, the accent should be on social construction of heritage (Dolff-Bonekämper, 2008). Architects and urban planner have recently started to contribute to the academic debate. Brković Dodig (2017) discussed BEE in museums and provided examples of teaching with historical buildings. Plein (2009) explored *Denkmalpädagogik* (monument pedagogy) projects in German schools. Heinrich and Million (2016) researched the engagement of young people in neighbourhood development projects including the (re-)use of cultural heritage. A recent study by Ozdemir (2018) evaluated how primary school pupils value cultural landscape and suggested that verbal information when paired with visual data increased pupils' levels of perception and awareness; and that practical experiences when paired with personal ones improve pupils

understanding and connection to the cultural heritage, thus laying out the foundations for preservation of cultural goods. Studies exploring children's perception of cultural heritage are scant. We are evidently lacking children's and teacher's evaluation of the quality and content of educational experiences involving monuments and cultural heritage. This chapter ventures into narrowing this identified gap.

3. OBJECTIVES AND METHODOLOGY

This research aimed:

(1) to survey the general satisfaction of the pupils with the LT projects - what they liked and disliked, and what could have been better?;

(2) to investigate more deeply how children learned in LT projects, what from the offered learning tools and methods they have used and what from the envisioned competences they have developed.

Figure 1.

Lost Traces projects. Photo by bauwärts-Stadt, Raum, Bildung.



Figure 2.
Lost Traces project-Baukultur (Building culture) building camp in Venice. Photo by
bauwärts-Stadt, Raum, Bildung.



'Lost Traces...search for traces of cultural heritage' was a part of the 2018 European Year of Cultural Heritage (Lost Traces, 2018a). It was developed by the Landesarbeitsgemeinschaft (LAG) Architektur und Schule Bayern e.V. (regional working group Architecture and School in Bavaria). LT comprised of 23 individual projects, mainly carried out in secondary and high schools (age 10-18) in Bavaria (Figure 1 and 2). Teachers worked in teams with professionals from monument conservation, archaeology, urban development, architecture, and creative industries. The individual projects took place during 2017/18 and 2018/19 academic year, lasting from a few days to a whole school year.

LT projects began with the site exploration: photo and video documentation were made; books were researched, and locals interviewed so that the places could be personally and collectively experienced. Drawings, photography, collages, maps, and 3D models assisted pupils to deepen their thinking about the place, as well as to showcase individual and group sentiments. Afterwards, pupils researched the archives and analysed historical and recent maps. The last phase tasked pupils to envision the future development of the heritage site expressed and presented through creative spatial interventions, artistic scenography, street art, light installations, guided tours, exhibitions, concerts or communal meals (Brković Dodig, Klepp & Million, 2019).

As the infographic shows (Figure 3), the focus was on iterative learning cycles, where one stage in the form of an essay, a photograph or a presentation could inform and initiate the next, thus potentially forming an educational continuum. Looking at the LT projects through the prism of education and pedagogy, the learning process followed Kolb's (1984) experimental learning cycle – each competence group was taught through one learning phase. In the learning process factual knowledge about location, building and history was complemented with personal impressions of a monument (including personal views of co-learners) to give others a tangible sense of individual learning experience. Teaching with monuments and cultural heritage meant viewing space as pedagogy. The result of the learning process was a personally enlivened and personally significant physically tangible object / model / performance / or exhibition, i.e. a result that negotiated the future of the place.

We have surveyed 8 LT projects. Firstly, we have administered 157 questionnaires to pupils in the participating schools, with a return quota of 86%. Via multiple-choice questions students were asked what they liked, disliked, what persons, materials they liked to have had, what they took personally from the project and how they define monuments. Since questionnaires do not allow further clarification of questions to respondents and collection of additional data (Bryman, 2012), we carried out group interviews with keyword card sorting activity (Figure 4).

We have carried out group interviews with children (3 groups of 5 to 6 children) and teachers (1 group of 6 teachers). According to Lewis (1992, 413) "*group interviews with children help to reveal consensus views, may generate richer responses by allowing participants to challenge one another views, may be used to verify research ideas or data gained through other methods and may enhance reliability of children's responses*". Card sorting as an elicitation technique is easy to administer for the researcher, easy to comprehend for the participants and speeds up the interviewing process (Fincher & Tenenberg, 2005). When combined with interview, it "*allows the reasons behind participants' categorizations to be explored and understood, making sense of the data collected*" (Saunders, 2015, 112).

Figure 3.
Learning in Lost Traces projects based on Kolb's experiential learning cycles – visualisation of a theoretical model. Authors' belonging.

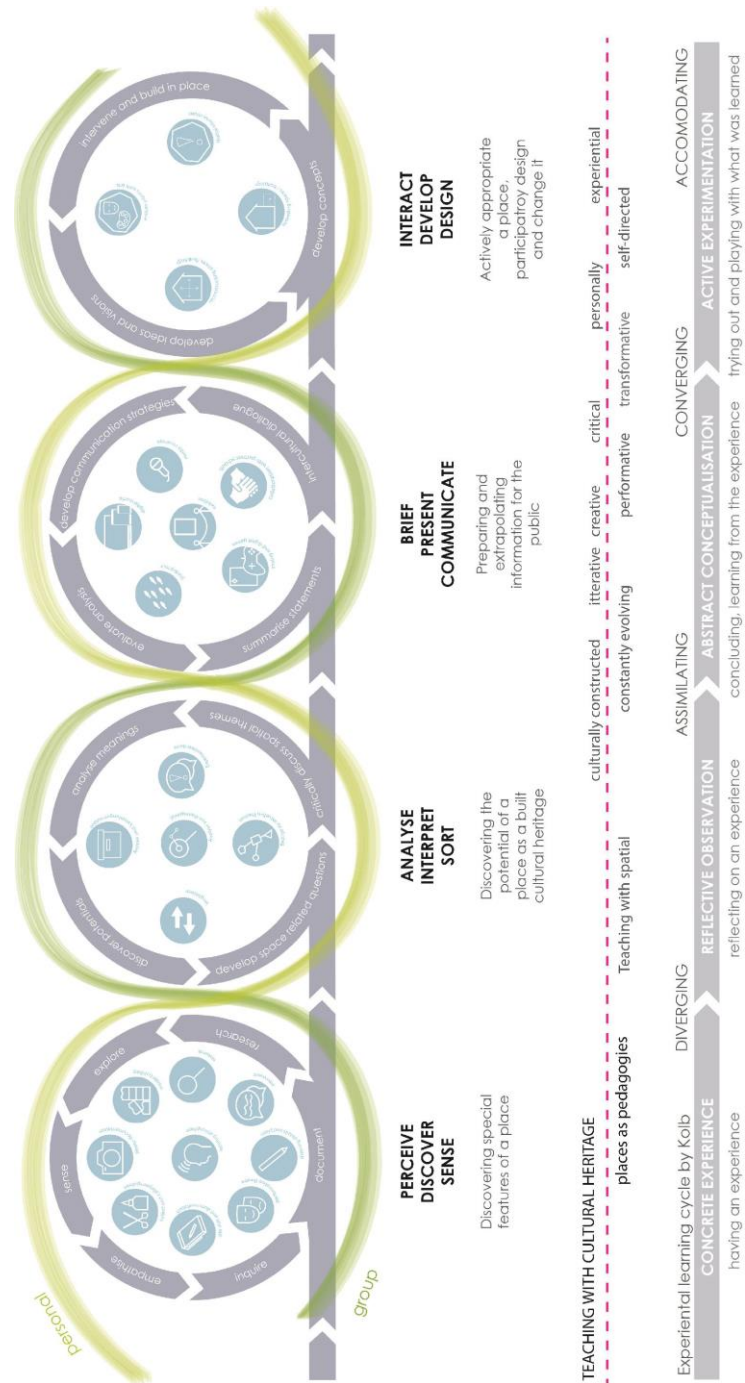
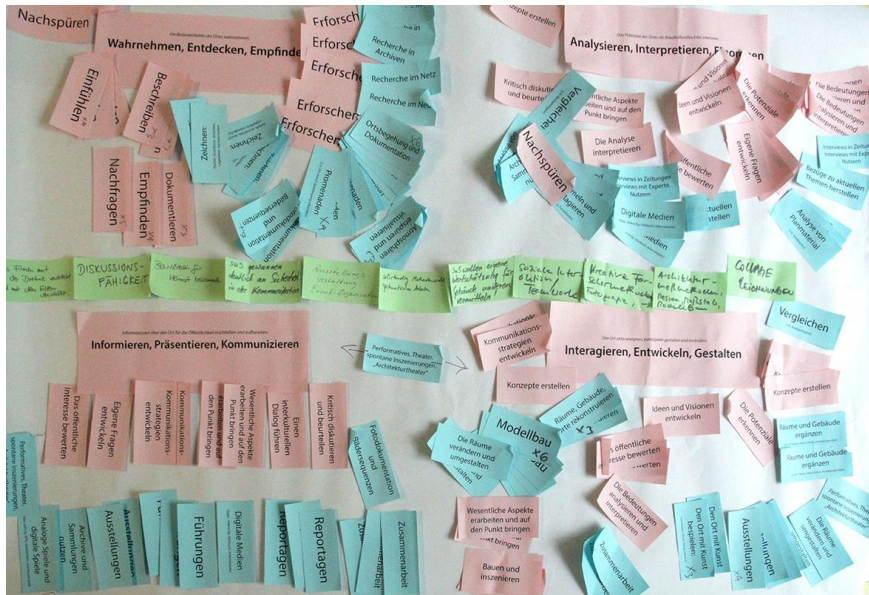


Figure 4.
Group interview with card sorting task. Photo by Sarah Klepp.



Firstly, participants respectively in their own groups were asked to select the competences learned and classify them into the four possible groups. Secondly, they selected educational tools and methods which used to carry out specific tasks in LT project. Thirdly, they linked the methods to the competences learned by gluing cards one next to the other. Simultaneously, they described a work assignment in which the pupils have learned the selected competences using certain methods.

The basis for card-sorting task was the pedagogical guideline of Lost Traces (2018b, 26-27) where 4 areas of competence were named, which children could possibly develop, when participating in LT projects, as well as the 4 corresponding groups of educational methods. The competencies and the educational methods were translated into keywords and phrases (Table 1) written on cards for the sorting task. All interviews were audio recorded and photographed. Respondents names are anonymised.

The questionnaires were analysed with a quantitative approach. The group interviews with card sorting were analysed quantitatively and qualitatively; as well as triangulated to identify different nuances of educational experiences within the LT projects (cf. Kelle, 2008, 232). For the quantitative analysis, the authors first counted the number of methods, competencies and links of competencies and methods selected by the respondents. For analysing the transcripts of audio recorded interviews, qualitative content analysis by Mayring (2000) was applied. The content was coded using QDA software in a feedback-loop search of main categories that appeared repeatedly in the interviews. In this way authors were able to identify the most important competencies pupils developed, the educational methods most frequently employed, as well as to establish the connection between the two – which educational tools helped children to develop particular competences. Additionally, through the same process authors selected statements and stories from the pupils and teachers to illuminate the quantitative data.

4. RESULTS

In the section below the results from the questionnaire will be followed by the results arising from the interviews.

4.1. Questionnaire results

Important aspects named by the pupils in LT project will be commented on in order of their significance discovered through the questionnaire.

1. In LT pupils praised teamwork the most. They appreciated working with classmates, learning with younger and older children, choosing their team, having sense of a community, meeting new people, experiencing opinions of the others and ultimately making friends.

Table 1.
The list of competences and methods offered through Lost Traces project.

1. PERCEIVE, DISCOVER, FEEL	2. ANALYSE, INTERPERT, CALSSIFY
<ul style="list-style-type: none"> - Empathise, feel, trace, explore - Describe and document - Inquire and research 	<ul style="list-style-type: none"> - Develop your own questions for the location - Discuss and judge the place critically - Analysing and interpreting the meaning of the place - Recognising the potential of the location
Possible Tools/Methods	Possible Tools/Methods
<ul style="list-style-type: none"> - Site inspection and documentation - Sensing and visualizing atmospheres - Collecting and collaging - Photo documentation and image sequences - Draw: Details, floor plans, views, site plans, mental maps - Model making - Research in archives, - Research on the net - Interviews in newspapers, with experts, users - Performatives, theatre, spontaneous productions, "Architecture Theatre", - Promenades (explore places by walking) 	<ul style="list-style-type: none"> - Using archives and collections - Comparisons (e.g. building typologies) - Analysis of planning material (e.g. city maps) - Talks and interviews with experts, contemporary witnesses, users - References to current topics (e.g. Europe as a cultural space or migration)
3. INFORM, PRESENT, COMMUNICATE	4. INTERACT, DEVELOP, DESIGN
<ul style="list-style-type: none"> - Developing analyses and interpretations according to public interest - Recognise essential aspects, and make concise statement - Develop communication strategies - Intercultural dialogue 	<ul style="list-style-type: none"> - Develop ideas and visions - Create concepts - Intervene, build and stage on site
Possible Tools/Methods	Possible Tools/Methods
<ul style="list-style-type: none"> - Guided tours - Exhibitions - Reportages - Digital media (apps, video clip, audio book, website) - Analog and digital games (Geocaching, APPs, board games) - Teamwork 	<ul style="list-style-type: none"> - Inscenate the location with art, theatre, music, literature (e.g. poetry slams) - Reconstruct rooms, buildings, places - Intervene, change and redesign a space - Add rooms and buildings (galleries, stages, exhibition furniture)

2. They appreciated the room for self-initiative, the opportunity to work independently, being allowed to bring their own ideas and interests, as well as being creative and developing practical working skills.

3. Interesting learning topics and projects were highly lauded. LT projects gave pupils an opportunity to try something new – visit new places, meet new cultures and get introduced to new working methods.

4. Pupils valued discovering specific characteristic of a place, researching it and using for them novice educational tools e.g. - archives and photography.

5. Pupils liked the opportunity to artistically and creatively act upon what they learned. They liked making models, designing and changing the spaces; the result of their work being visible and usually tangible also.

6. Lastly, they praised acquiring new knowledge and skills, learning from different experts – architects, planners, conservators and historians in a positive learning atmosphere.

Their criticism regarded

1. time-management and organisation. Pupils did not have enough time for some of the activities and work stages, e.g. while the introductions to the projects were characterised as long, the time for actual making and constructing the project outputs was criticised as being too short.

2. Teamwork was perceived ambivalently – group collaborations, as stated above, were perceived as positive, but it was challenging for pupils to argue for their ideas and reach consensus.

3. Lastly, pupils complained about working conditions (being too hot or cold, having not enough furniture), the choice of topics that sometimes they could not impact and not having enough working materials.

4.2. Group interview results

In the following, we present the significant links between educational tools and competences children developed that stood out particularly strong in both quantitative and qualitative analysis (Figure 5).

4.2.1. Competence group 1. "Perceive, discover, feel"

Pupils - In order to develop competencies 'empathise, feel, trace and explore' pupils selected educational methods which allowed them a personal approach and a dialogue with the examined place, where 'site inspections and documentations' strongly stood out. The initial site explorations stimulated pupil's perception and discovery of the personal significance of the place through emotional access. In the words of one pupil "*...you simply notice for yourself - how does this place affect me? And yes, it has also something to do with how to get other people excited about it*".

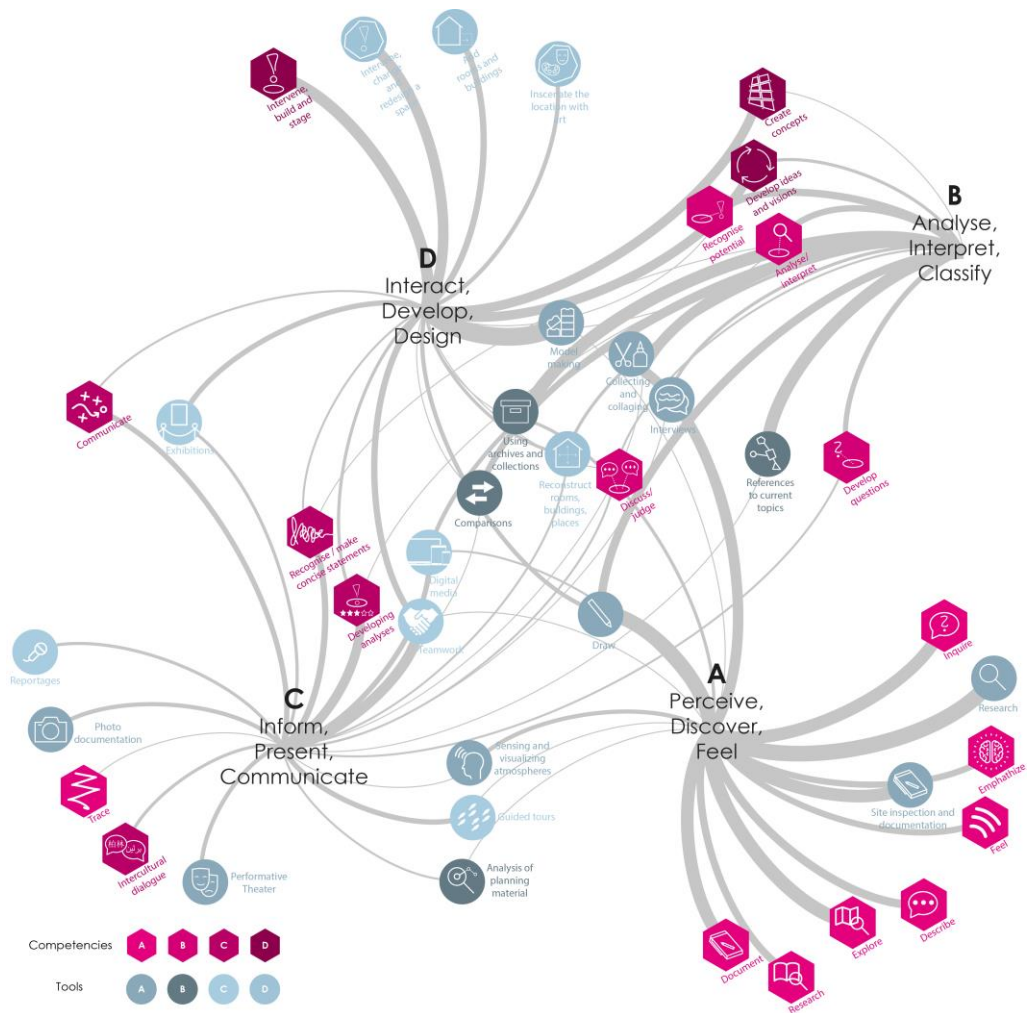
Competences 'describing and documenting' were also strongly connected to 'site inspection and documentation' methods. This was followed by 'photo documentation', 'drawing' or 'model making' to document the research and the inventory on site.

To develop the competences 'inquiring and researching', pupils most often selected 'research on the net' and 'research in archives and collections' methods which helped them to collect information about the monument and discover possibilities for the new uses which correspond to the location. 'Interviews with contemporaries, experts, users' stood out as particularly important working method to learn quickly something new about the site.

Teachers - Similarly to the pupils, the teachers interviewed considered the use of on-site research methods: 'site inspections and documentations', 'photographic and film documentation', 'drawings', 'interviews with contemporary witnesses, experts, users' and

‘research in archives’ as significant in that order for developing competencies ‘inquiring and researching’. As one teacher stated, in order to open up the site for pupils and to develop an understanding of the spatial situation: “... a very central competence was simply inquiring and researching with very different methods. Namely, drawing, observing, photographing, but also filming”. While the teachers emphasise revealing of historical layers of a site and the discovery of information unknown to others as strong motivational factor for learning, children appreciated more the personal engagement with the monument.

Figure 5.
Visualisation of the strengths of the links between educational tools and competencies.



4.2.2. Competence group 2. Analyse, interpret, classify

Pupils - With regard to ‘analysing and interpreting the meanings of a place’, the pupils named ‘establishing references to current topics’ as a particularly relevant method: *"...because it is important to analyse whether a building is significant, whether it can be used again today"*, elaborated one pupil. Secondly, they chosen practical methods such as ‘drawings’ and ‘reconstructing rooms, buildings and places’ through ‘model making’ as particularly useful for analysing, interpreting and developing future visions for a place. Lastly, pupils thematised ‘discussing and judging the place critically’ through ‘teamwork’ because *"...if you do group work, you have to convince each other. This means that you have to deal with the topic, discuss it critically and also analyse it"*.

Teachers - The teachers differently prioritised the methods relevant to competences in group 2 compared to the pupils. Regarding ‘analysing and interpreting the meanings of a place’ the teachers named ‘collecting and collaging’ and ‘conversations and interviews with contemporaries, experts, users’ as essential methods applied by the pupils. Teachers agreed that previous methods enabled different generations to talk about the meaning of a place based on personal (family) stories, they are essential prerequisites for the pupils to learn to recognise historical relevance of a place and develop appreciation for it – this coincided with pupils opinions: *"... what is also important to me in this analysis ... to recognize: What is the historical context? And what relevance such a building can have, so that one learns to appreciate it. So this appreciation, I believe, comes simply by acquiring a certain amount of knowledge about the interrelations"*.

Lastly in this group, teachers thematised the importance of the ‘analysing and interpreting the meanings of a place’ attained by the pupils to be further developed and accompanied by ‘developing your own questions for the location’. Teachers also observed that methods in group 2: ‘analysis of planning material’, ‘model building’, and ‘drawing’ are useful for ‘developing ideas and visions’ competence in Group 4.

4.2.3. Competence group 3. Informing, presenting, communicating

Pupils - In the Group 3 ‘Informing, presenting and communicating’, as crucial for the ‘developing analyses and interpretations according to public interest’ pupils mentioned methods such as ‘exhibition’, ‘guided tours’ and ‘digital media’. They were helpful for arousing public interest, drawing attention to and encouraging visitors to engage with a forgotten place; as well as for getting feedback and the opinions of the visitors. One pupil commented *"we had an exhibition... you go around during it and people ask you questions, give you feedback and suggestions. In return you just try to make the exhibition even better"*.

"If you want to communicate something to a broad mass, to the public", or develop suitable ‘communication strategies’ pupils stressed ‘teamwork’, ‘guided tours’, and ‘presentations’ as equally important methods, that should complement each other. Pupils stressed the importance of joint discussion in evaluating how successfully devised communication strategy worked.

Teachers - For the pupils to acquire competence of ‘developing analyses and interpretations according to public interest’, the teachers accentuated the importance of ‘exhibitions’ and ‘guided tours’. According to them, the *"vision of going public"* - pupils being able to present the acquired knowledge or the newly gained results publicly and having their work publicly appreciated and acclaimed, was an essential motivational learning factor for the children. A teacher explained: *"This open day, this event, where the community came, where the pupils did tower tours showed a large exhibition, where all the research results and the citizen survey were documented... the pupils noticed: 'What we have done is not only well received by parents and teachers'"*.

4.2.4. Competence group 4. Interacting, developing, designing

Pupils - Within the group 'Interacting, Developing and Designing', the pupils stressed the importance of bringing in their own ideas about a space, discussing their expectation of their own project, and evaluating its applicability to other contexts; thus, singled out 'developing ideas and visions' as the most important competence developed here. They used 'intervening, changing and redesigning a space' methods as a way of signalling that the space was important to them and through remodelling tried to arouse appreciation of the public also. *"The city church is very important for us"* state one pupil and *"other people should also join"*.

For 'creating concepts' pupils used 'model making' tool to speculate how a space should be built and which elements should it contain. For 'intervening, building and staging on site' and 'adding rooms and buildings' the pupils strongly accented the importance of manual works through 'model building'. *"We built a cube model which was quite important for us later at the presentation"* explained one pupil.

For 'developing ideas and visions' and 'adding rooms and buildings' 'cooperation' played an important role, e.g. working together in a group or with external helpers: *"...what is also important here is working together. To build something together...even if everyone has an idea of their own...you have to bring them together and make something good out of all of them"*.

Teachers - For 'creating concepts' the teachers emphasized the relevance of manual activity and hand work. Teachers observed that 'model making' and practical work was very motivational for the pupils. This is emphasised in both the quantitative and qualitative evaluations but is not explicitly selected as a strong link. For 'intervening, building and staging on site' teachers once again underlined the importance of hand work and named it as the most important competence learned within the LT project framework: *"... it was above all 'intervening, building and staging on site', i.e. the craftsmanship. And to understand this process: What does size mean? What does weight mean? What does tool mean? And how well you can use them to create a new room and prepare a party, prepare the set up. That is essential"*.

5. DISCUSSION

As the results demonstrate using a myriad of working method and educational tools children developed various competencies related to researching, sensing, analysing, interpreting, communicating, interacting and (re) designing cultural heritage sites. Positive condition of LT project that enabled children to do so, as well as criticism that should be considered when in future similar educational project are organised are discussed below.

5.1. Qualities of the learning process in the LT project

5.1.1. A personal change of perspective

One of the main objectives of LT project was to change the students' perspective on what a monument and a cultural heritage is. Although, the questionnaires suggested that still most of the pupils see the monuments standardly and traditionally as places of remembrance and works of art; the qualitative interviews make it clear that the children managed not just to explore the history of a place, but to gain personal insight, establish a personal and emotional relationship with the cultural heritage sites, transforming them through artistic interventions into their own.

5.1.2. Don't just talk, do it yourself practically

The interviews made it clear that pupils appreciated having the results of the learning process in LT visible and tangible too. Being able to initiate, design and produce project outputs, on their own initiative independently, and also collaboratively in teams, was highlighted by both the pupils and the teachers. Practical/manual work and crafting activities were particularly strong motivational learning factor. As one teacher stated: *"If they're allowed to do anything [with their own hands], they were really committed afterwards. They loved that they could do [make and build] something, and that they don't have just to draw it on a paper"*.

5.1.3. Go public!

Group interviews with pupils and teachers, made it clear how important it was for pupils to present their results and projects to the public, get public feedback and ultimately appreciation for their work. Effective public presentations increased children's and young people's self-confidence in their own abilities. This is undoubtedly important for children's experiences of self-efficacy.

5.2. Challenges within LT project

The following aspects were named as challenges by the students and teachers.

5.2.1. Time management

Pupils criticism regarded time management within their projects. For example, introductions were too long and implementation working phases too short. Pupils did not have enough time to familiarise themselves with the new methods and to complete each phase of the work. Pupils believed that time management for implementing certain concepts was not always realistic and *"many things"* were not as feasible as they had imagined at the beginning. It could be that the problems did not arise due to the poor time management in LT project. Being introduced to new learning ways and tools pupils needed a bit more time to get accustomed to them, acquire mastery over them and skilfully use them. Pupils also suggested ways for tackling these challenges. To illustrate, some groups regularly discussed and documented specific work phases in order to keep an overview; and made a concrete plan for implement certain work steps. Already within the project they used some of the through project exercised skills, e.g. 'describing and documenting' to make past and future steps comprehensible for all team members: *"... that you know a little bit where you are now...that you can review what you have done and that you can keep all the steps in your head"*.

5.2.2. Reduce abundance of tools to ease comprehension

Pupils raised their concern about how they applied some of the tools and methods. They for example, evaluated teamwork ambivalently – while it was highly praised for enabling communication, exchange of ideas, quick completions and production of high-quality results, pupils complained about not knowing how to discuss and debate their personal ideas, evaluate suggestion and reach consensus. Instead of trying to offer as much working tools as possible (knowing how novice but beneficial these educational projects are in standard schools this tendency of project organisers to offer extremely rich learning experience supported by an abundance of learning tools could be understood) future projects should present all the available tools, and then should carefully pick a few discussing their pros and cons with the pupils. Before application pupils should be introduced and trained to use new tools. For each learning step learners should have time to familiarise themselves with the methods and to choose the appropriate one. They also should be provided with enough time to reflect and plan the next step.

5.2.3. More pupils involvement at each project stage

The pupils expressed the wish to be involved in important project decisions and to be able to participate more in different learning phases. For example, some pupils criticised the fact that some phases of the project's implementation did not involve a dialogue on controversial issues such as changes of the concept idea:

"That was then also a point of friction in between, because in the end the object was completely different than we actually wanted it to be and [the project leaders] also rebuilt our model and did not respond to us as much as we initially imagined, which was a bit difficult". Hence pupils should have more time and space to vote on all relevant changes and issues.

6. CONCLUSIONS

Cultural heritage projects enhance learning processes, an appreciation of local history and culture, and the future understanding of monuments. In this research the learning outcomes of pupils in LT projects was evaluated in order to develop recommendations for further development of curriculums and teaching with monuments in schools.

LT projects promote diverse competences and highly enrich learning experiences. The evaluation showed the immediate growth in children and teachers. It revealed what methods and teaching settings worked better than others, as well as where and why pupils faced challenges. The next possible step could be evaluation of BEE project through the prism of transnational framework of competencies (see Koehn & Rosenau, 2016, 5-16) appropriate for the primary and secondary school context in partnership with experts from pedagogy and educational sciences. Nevertheless, beyond learning about cultural heritage pupils stated being in favour of everything that is *"not school or a class"*. School as a learning setting is a contested one; pacified by its very components - set up, teaching methods, tools, external educators, locations etc. In LT projects pupils appreciated the ability to independently assemble teams spanning across generations, bring in their own ideas, work directly with experts, engage with interesting topics on-site. The quality of teaching in schools benefited from working in multi-professional teams and bringing in external experts to engage into multi-disciplinary and cross-generational teaching. Teaching methods and non-standardised learning tools appropriated from architecture and urban planning can enhance existing teaching/ learning practice and curriculum in schools (for exemplary project for illustrative purpose see Apostolopoulou et al., 2014; Brković & Chiles, 2016). However, when used in abundance, within short time frames and with little previous planning with children they can also put a lot of pressure on both teachers and pupils. Similar future project should allow for joined-up planning and careful programming not for, but jointly with pupils.

The goal of the LT project was to offer pupils another, more personal perspective of monuments and cultural heritage. In a narrow sense this aim was reached - especially in relation to cultural heritage sites reuse. Today's conflicts of interest and interpretational disputes in which monument values do not exist only by law or traditions, but are also socially assigned and constructed was rarely acknowledged by the pupils. Hence, to broaden the pupil's perspective monuments are to be studied and taught as social negotiation processes between different stakeholders (Dolff-Bonekämper, 2008), so that the processes of monuments interpretation is supported (Uhrmacher & Tinkler, 2007) and that the views of cultural heritage values of underrepresented or national, regional, global or transcultural groups become appreciated.

Lastly, it needs to be acknowledged that children learned about heritage in many settings - also outside of schools and LT projects: e.g. in their family, with friends, using different medias like the internet. Hence there is a need for exploring heritage learning in these other settings also, to draw a richer understanding of cultural heritage educational landscape.

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