CONTEMPORARY TOPICS IN EDUCATION IV

Edited by Janez Vogrinc and Iztok Devetak

University *of Ljubljana*
Faculty *of Education*

CONTEMPORARY TOPICS
IN EDUCATION IV

PART I

Editors
Janez Vogrinc and **Iztok Devetak**

Ljubljana, 2020

CONTEMPORARY TOPICS IN EDUCATION IV
Part I

Editors	dr. Janez Vogrinc and Iztok dr. Devetak
Reviewers	dr. Janez Vogrinc, dr. Tatjana Devjak, dr. Janez Krek, dr. Saša A. Glažar, dr. Vesna Ferk Savec, dr. Robert Potočnik, dr. Karmen Pižorn, dr. Vesna Štemberger
Publisher	Faculty of Education University of Ljubljana
For the Publisher	dr. Janez Vogrinc, dean
Cover Designer	dr. Jurij Selan
Technical Editing	Mira Metljak
Typeset	Igor Cerar
Available at	http://www.pef.uni-lj.si/fileadmin/Datoteke/CRSN/PhD/Education-IV_Part-I.pdf

Kataložni zapis o publikaciji (CIP) pripravili v Narodni in univerzitetni knjižnici v Ljubljani
COBISS.SI-ID=14176771
ISBN 978-961-253-254-3 (pdf)

CONTENTS

INTRODUCTION

The education system is always, at least to a certain extent, state-regulated. The states usually frame the conditions of the education system in their school legislation (e.g. duration of compulsory education, children age when entering the compulsory school, types of secondary schools, enrolment requirements at university, the teachers' conditions to be fulfilled for employment in school, etc.). Teachers and other pedagogical staff have the opportunity to find and/or adapt and develop the most appropriate didactic solutions within the legal framework (e.g. how they will deal with specific teaching content, which teaching approach is most appropriate in view of the students' characteristics, etc.). Due to the regularity of the educational system and the fact that the specifics (historical, cultural, and social) of each country are reflected in its educational system, the research of the specific educational system is for that matter also nationally bound. Certain problems in education, which can be meaningful for research within one country, are not relevant for another country, because there are different solutions suggested in its school system. For that matter it is certainly true that researchers in education take up topics that are significant for their country, but at the same time, it is also important to conduct education research in a way that can be generalized globally. In the school environment, too, it is important that there should be an exchange of experience, examples of good practice and scientific knowledge. This scientific monograph **Contemporary topics in education IV** is also intended for these purposes. It presents 12 chapters covering different school areas and its authors come from 4 countries (Slovenia, Kosovo, Austria and Croatia).

The chapter **Preschool Teachers' Assessments in Early Identification of Creative - Productive Giftedness**, written by **Jasna Cvetković-Lay** and **Mojca Juriševič**, focuses on the concept of creative-productive giftedness (CPG), which is operationalised through outstanding children's products in the context of pre-school institutions. The aim was to: (1) determine which indicators in the process of early identification of CPG are given the greatest importance by pre-school teachers; (2) identify the differences in teachers' assessments of outstanding products and the characteristics of the child expressed in them; (3) compare the assessments of pre-school teachers with those of pre-school psychologists. The results have shown that, regardless of differences in professional competencies, preschool teachers rate children's products and passionate interests as the most important indicators for early identification of giftedness. Statistically significant differences were found in the assessment of the creative and technical characteristics of outstanding

products and the characteristics of the children expressed in them. A high degree of agreement between pre-school teachers and psychologists in the assessment of creativity and the expressiveness of the outstanding features in the products was observed.

Alenka Dražić discusses in the chapter **Non-formal chemistry education in Slovenia** about learning science in non-formal to formal environments. In the first part of the chapter, it is proposed to distinguish three types of learning: formal, informal and non-formal learning. It examines the links and differences between these three types of learning. The second part presents some good practices of science teaching, with a focus on chemistry teaching outside school learning environments in Slovenia and internationally (such as in non-formal education laboratories at universities). The third part of the paper discusses effective aspects and limitations of non-formal science and chemistry learning.

The aim of the chapter **Guided active learning in Chemistry (GALC) and 13-year-old students´ selected chemistry concepts understanding**, written by **Jasmina Kolbl** and **Iztok Devetak**, is to present two studies on GALC approach in chemistry education. The first study investigated the influence of the GALC on the conceptual understanding of hydrocarbons by 8th grade students (13-14 years) and the teachers' views on the use of these modules in the classroom. The experimental group was exposed to the GALC learning units, while the control group was taught using the traditional approach (teacher's explanation, question and answer, writing, etc.). In addition, the first study also presents findings on how a new teaching approach influences students' attitudes towards chemistry and collaborative learning. The second study shows the results of the application of the GALC modules on acids and basis chemistry. It can be concluded that the effects of GALC on students' learning outcomes in relation to hydrocarbons show that, on average, students perform better on the knowledge test in the experimental group (learning by GALC approach) than in the control group.

The aim of the study conducted by **Martina Lešnjak Opaka**, which is presented in the chapter **Elementary school teachers' opinions on learning and teaching in the digital age**, was to find out how primary school teachers perceive the role of digital technology in teaching. Five primary school teachers were involved in the qualitative research. Digital technology is neither seen by teachers as a savior nor as an enemy. They see the mediating role of the teacher and the educational system as the ones responsible for its effects. They express many limitations they encounter and the need for additional knowledge, time and resources. A major role in educating children to deal with the digital world has been assigned to primary family education.

The chapter **Principals´ role in the development of professional learning communities**, written by **Rexhep Krasniqi**, provides a comprehensive framework on the concept of learning communities, their impact on teachers, factors influencing their activities, and the role of the school principal in creating conditions for the professional development of teachers. It concludes with a set of practical recommendations that could be used by teachers, school leaders and other educational actors involved in professional learning community activities. Considering that the vast majority of research on professional learning communities (PLCs) is conducted in well functioning systems and that the results obtained by PLCs are positive, the author stresses the functionalisation of PLCs in poorly functioning schools and systems.

The aim of the chapter **Institutional Autonomy of Public Universities in the New Context: A Perspective from a Developing Country**, written by **Iliriana Tahiraj**, is to examine how institutional autonomy is regulated in Kosovo and how elements of institutional autonomy affect the operation of the country's largest public university. The data were collected through five semi-structured interviews with some of the main actors in higher education and analyzed within the four dimensions of institutional autonomy as presented in Lisbon Declaration (2007): academic, financial, organizational and staff autonomy. The results show that all respondents agree that institutional autonomy, as contained in existing laws, is similar to most other countries in Europe, while the need to strengthen the position of the Rector and the need for increased cooperation to reduce the gap between the Ministry, the Rector and the Deans were identified as main concerns.

Nina Rupel and Jurij Selan in the chapter **The significance of virtual experience for drawing performance of a 7-year-old child**, they present the case study in which they observed how the mediation of a motif in three different ways - in a direct physical interaction, on a (tablet) screen and with virtual reality glasses - influenced the drawing performance of the 7-year-old boy. On this basis, the authors consider how virtual experiences in visual arts education can be used to develop artistic competence. The interpretation of the data points to a potential benefit of the use of the screen and virtual media in artistic development, which is particularly important for 7-year-olds in the transition to the literacy phase. However, virtual experience cannot replace physical experience in the art process, as physical experience is the one that confronts the child with the complexity of the artistic process by activating all artistic senses.

Urška Žerak, Mojca Juriševič and Sonja Pečjak in the chapter **Differences in students' self-regulated learning according to their age and gender** present the results of empirical research about students´ ability to self-regulate

learning behaviour. The dominant learning type (i.e., external, impulsive, self-regulated) of 175 students from primary school in Slovenia (M_{age} = 11.49, SD_{age} = 1.73; 84 girls and 91 boys) was investigated, using self-report questionnaire FSL-7. The results revealed that the majority of students are self-regulated learners. Moreover, according to the students' age, it was found that older students are more impulsive learners than younger ones, and that female students are more self-regulated and less impulsive learners than male students.

Chapter **The potential of online practice materials in English language teaching to increase achievement and to decrease anxiety**, written by **Eva Gröstenberger** discusses the potential of on-line practice materials in English teaching to respond to the needs of individual learners and thus improve their performance. She presents the theoretical considerations and practical applications of designing an online learning environment that can make learning visible and encourage learners to focus on their own sense of progress, giving them a sense of action and increasing their self-confidence. The author investigates how the interactive, multimedia component of the blended learning course can be designed as a low-anxiety environment through various design principles such as scaffolding or feedback.

Chapter **Exploring the contribution of mentor's feedback on development of student teacher' lesson planning skills and instructional strategies**, written by **Elmedina Nikoçeviq-Kurti, and Blerim Saqipi** provides a model for the development of the students' teaching experience, which is useful for the effectiveness and efficiency of student teachers to carry out appropriate lesson planning and develop teaching strategies. The results are based on a qualitative study and show that student teachers do not collect enough feedback and hesitate to teach because of doubts about teaching skills. This had an impact on the inability of school mentors to give feedback more often.

Rudloff Christian presents a **Design-Based Research - a model to connect theory and practice in research**. The aim of this approach is to solve problems in educational practice. Development and research take place in continuous cycles of design, implementation, analysis and re-design. In the Design-Based Research approach, the initial situation is first analyzed, an intervention is developed, described and tested, and finally evaluated and modified in iterative cycles.

Luljeta Belegu Demjaha in the chapter **The Influences of Teaching and Learning Process in the School Infrastructure Design** discusses the importance of the relationship between school design and teaching and learning environments and the requirements of curriculum reform. She conducted

qualitative research in Kosovo and found that the process of designing school infrastructure in education is seen as a task for architects and designers and not yet something that affects educators. Thus, the process of designing school settings is still far from being an inclusive process, as the role of teachers, students and parents in this process is practically non-existent.

All chapters in this book contribute specific parts to the field of educational research not just in Slovenian context but also internationally. Readers can find information about different areas of education. Chapters explore students' giftedness and their ability to self-regulate learning behavior. Chapters deal with the importance of information-communication technology in education, and teachers' competences to use ICT is also an important educational element nowadays. However also other pre- and in-service teacher education topics are covered, from teachers' professional development to exploring the contribution of mentor's feedback on development of student teachers' lesson planning skills to the importance of tertiary education organization, such as the autonomy of public universities. Leaving the university education, teachers enter school environment and their work achievements depend also on the specific school infrastructure design. Scientific monograph also covers more specific topics from science and art education to language education. To make the picture whole it is important to emphasize also the meaning of research in education. For that matter one of the chapters also covers relevant issues in connecting the theory and practice in educational research.

Covering a brads spectrum of different topics in educational research this scientific monograph will contribute to the growing body of research in this field and hopefully gives the readers relevant aspects in designing their own research or implementing the research findings into teaching practice at all level of education.

dr. Janez Vogrinc and dr. Iztok Devetak

PRESCHOOL TEACHERS' ASSESSMENTS IN EARLY IDENTIFICATION OF CREATIVE-PRODUCTIVE GIFTEDNESS

Jasna Cvetković-Lay and Mojca Juriševič

Abstract

This research focuses on the concept of creative-productive giftedness (CPG), which is operationalized through outstanding child product in the context of preschool institution. The aim was to: 1. Identify which indicators in the process of early identification of CPG are given the greatest importance by preschool teachers; 2. Identify the differences in teachers' assessments of the outstanding products and child's characteristics expressed in them; 3. Compare preschool teachers' estimates with those of preschool psychologists. In the pre-research, Consensual Assessment Technique was used to select the outstanding children's products that deviated from normative development and to collect detailed descriptions of selected products as a base for constructing the questionnaire. In the main research, 103 preschool teachers with different professional competences evaluated 10 outstanding children's products via a structured questionnaire. The results indicate that, in the early identification, preschool teachers attribute greater importance to products and passionate children's interests than to other indicators (e.g., achievements in demanding games or behavioural signs). Ingenuity is valued as a dominant feature of the outstanding products, followed by the level of detail, complexity, meaningfulness, expression of unusual ideas, and demonstration of knowledge above the chronological age. Statistically significant differences were obtained for the estimates of the creative and technical features of the outstanding products and the characteristics of the children expressed in them. A high degree of agreement between preschool teachers and the psychologists in the assessment of the creativity and the expressiveness of the distinguished features in the products were found. All of this suggests that preschool teachers can be valid assessors of the preschool children CPG. Moreover, the research findings justify the idea that, in the process of early identification of CPG, focus may be put on the outstanding product.

Key words: preschool child, outstanding product, product-based assessment, preschool teachers, ability assessment

Introduction

The focus of this research is the concept of creative-productive giftedness (CPG) which is connected with the question why so few talented children become creative producers, and highlights the need for more research in this field, especially in the early years (Paik, 2005, 2012). The term productive giftedness was introduced by Walberg and Paik (2005) and includes high achievement measured by

general IQ, creativity and other domain-specific abilities, and it is operationalized through productive outcomes. Sternberg, Jarvin, and Grigorenko (2011) claim that the label of giftedness does not have any meaning if it is not followed by a product, whereas some other authors stress the difference between creative and academic (intellectual) giftedness (Cramond & Kim, 2008; Guignard, Kermarrec, & Tordjman, 2016; Zenasni, Mourgues, Nelson, Muter, & Myszkowsky, 2016). Creative giftedness research has differentiated itself from the research of intelligence which is confirmed by studies according to which we may overlook as many as 80% of the top 20% of the most creative individuals if we do not look at intelligence and creativity as separate constructs (Kim, 2005).

Creativity occupies a central role in modern conceptions of giftedness. Renzulli's model (2005) views giftedness as the interaction of three characteristics: well above-average ability, evidence of creativity, and task commitment. He defines creative giftedness as the development of original materials or products and emphasizes the need to develop creative productive skills in addition to knowledge acquisition. His theory presents evidence that leads to broadened identification procedures and highlights the alternative assessment methods (Renzulli & Callahan, 2008). The Gagné's DMGT Model (2005) proposes a theory of giftedness that emphasizes the talent-development process and incorporates a great number of factors that serve as catalysts in the development from gifts to talents. In the Sternberg's WICS model (2003) giftedness is conceptualized as a synthesis of wisdom, intelligence, and creativity. For better understanding of the nature of creativity, Besançon, Lubart, and Barbot (2013) suggest a distinction between the creative potential, creative accomplishment, creative talent, and the construct of creative potential; the latter is viewed as multifaceted, partly domain-specific, and trainable phenomena.

Consequently, the role of alternative assessments has been growing in the last two decades, including that of CPG which uses performance and products as indicators (Pfeiffer, 2012; Renzulli & Callahan, 2008). Also, there is the so-called "mastery model" which claims that identification should be an ongoing process, more focused on the individual differences and strengths, and includes measures other than IQ (Brown, Renzulli, Gubbins, Del Siegle, & Ching-Hui, 2005; Matthews & Foster, 2006).

Product assessment

In the literature, less attention is devoted to the assessment of the product than to the estimation of the person, process, or features of the environment that encourage creativity (Alencar, Bruno-Faria, & Fleith, 2014; Plucker & Matthew, 2010; Treffinger, Young, Selby, & Shepardson, 2002). However, some authors argue that product is one of the most important aspects of

creativity assessment in general, so it is even called the "golden standard" of creativity estimates (Baer, Kaufman, & Gentile, 2004; Plucker & Matthew, 2010). According the concept of a little-c (everyday creativity), creative products are those that are identified as such based on the values of a particular context in which they are produced (Kaufman & Beghetto, 2009; Sternberg & Lubart, 1991). A review of the relevant literature identifies numerous instruments for evaluating complex concepts related to creativity of a product, the most prominent being the judgement of the product (Hocevar & Bachelor, 1989) and the product-based assessment (Amabile, 1996; Baer et al., 2004; Kaufman, Plucker, & Baer, 2008). Both approaches involve judges, recognized experts in the relevant domain, who use predetermined criteria to assess the degree of a product's creativity (Alencar et al., 2014).

These approaches have some weak points, such as judge bias, a lack of standardized criteria, and a limited scope of measurement. However, they have some strong points as well, such as the similarity to evaluating creativity in real-life and a high degree of reliability and validity (Said-Metwaly, Van den Noortgate, & Kundt, 2017). The product-based assessment of creativity has been widely recommended and has a great potential for use, especially the CAT - Consensual Assessment Technique (Amabile, 1996; Hennessey, Amabille, & Mueller, 2011). Amabile (1996) claims that the work or response is creative to the extent to which suitable observers agree that it is creative, i.e. consent among experts during evaluation solves the problem of creativity criterion. By factor analysis of 23 dimensions, she extracts three clusters, one of which relates to the creativity of the product, the second one to the technical performance, and the third one to the subjective aesthetic judgment. However, the use of expert assessment is not without doubt because the determination of the necessary level of expertise depends on a number of factors such as personal skills, target domains and the purpose of assessment (Said-Metwaly et al., 2017). On the other side, CAT is widely used. For example, Long (2014) shows that out of 105 studies that relied on judges, approximately 60% clearly indicated the use of CAT.

Creativity and giftedness at preschool age

Even at an early age, creative people can demonstrate distinctive features and behaviours predictive of their future development and the emerging of outstanding products (Cassandro & Simonton, 2000; Winner, 1996). In the relevant literature the characteristics of young gifted and creative children cannot be found under the unique concept of "creative productive giftedness". Rather, it is highlighted that, even though children of high intelligence are not necessarily creative, it is possible to be both - highly intelligent and creative, and particular indicators of precocity can be used to informally assess creativity

in preschool age (Owens, 2009; Torrance, 2000). Also, information about a relatively high percentage of potentially creative preschool children is available (Cremin, Burnard, & Craft, 2006). Pfeiffer and Jarosewich (2003), in their screening scale GRS-P, consisting of the skills and behaviours for pre-school age (from 4.0 to 6.11), and the scale of intellectual, academic and motivational skills, indicate two sub-scales that point to CPG which can result in outstanding product or exceptional performance. Creativity scale measures young child's ability to think and/or produce unique, novel, or innovative thoughts or products, whereas Artistic scale measures young child's potential for, or evidence of, ability in drama, dance, drawing, singing, playing a musical instrument, and/or acting. Some authors say that the products of creative children are new and useful in relationship to peer groups (Runco, 2004) regardless of the fact that the examples of the Big C (eminent creativity) among children are rare because they cannot yet master the base of knowledge, skills, and complex transformations and sublimations (Kaufman & Begheto, 2009). A new measure to assess creative potential in children, the Evaluation of Potential Creativity (EpoC), presents standardized tasks to children which lead them towards the production of a single creative output such as a story, a drawing, or a musical composition (Besançon et al., 2013). Moreover, statistically significant relationship between drawing skills and creative ability among preschool children is not negligible (Chan & Zhao, 2010; Matuga, 2004).

Preschool teacher assessment

Despite the fact that the importance of early identification of giftedness and creative potential is well recognized (Harrison, 2004; Hodge & Kemp, 2000; Jackson, 2003; Jarosewich, Pfeiffer, & Morris, 2003) there is no sufficient research on preschool teachers' assessment skills in the process of early identification, more specifically CPG. Authors mainly deal with teachers' assessments, i.e. reviewing and evaluating of the existing instruments and procedures of giftedness and creativity identification (Said-Metwalyet et al., 2017). However, although the preschool teacher's assessment is considered an important and necessary element in the process of early identification, empirical evidence reveals that its effectiveness depends on teacher's experience, and their understanding of the concepts of creativity and giftedness, and the details of the assessment scale (Hodge & Kemp, 2006). The validity of preschool teachers' ratings significantly increases when the rating is preceded by the training of evaluators (Alencar et al., 2014). Research also reveals that teachers manage to identify highly creative children who have not been identified by standardized psychological testing, or traits such as explicit task commitment and some special areas of highly sophisticated performance or potential (Hoge & Cudmore, 1996; Kaufman et al., 2008; Renzulli & Callahan, 2008).

Research problem

This research was guided by the question - are preschool teachers valid assessors of CPG? The literature overview shows that this topic has been insufficiently researched. The reason may be in the fact that the products made by prodigy children are extremely rare (Besançon et al., 2013), yet such products – evaluated by a group of experts as outstanding – can be a valuable indicator of the child`s creative and learning potentials (Plucker & Matthew, 2010). Although an examination of the reliability and validity of different creativity assessment instruments revealed some difficulties in the selection of external indicators of creativity (Treffinger et al., 2002), in practice, preschool teachers most frequently rely on two main sources of information – the observed behaviour and the child`s product (Čudina-Obradović, 1990). Some research confirms that creatively–productive behaviour is a measurable and visible component of CPG (Plucker & Matthew, 2010). At the same time, behavioural assessment can be unreliable and is often plagued with the problem of overestimation or underestimation of possible indicators of giftedness and creativity (Cvetković-Lay & Sekulić–Majurec, 2008; Hodge & Kemp, 2000). Highly creative children are often negatively evaluated by their teachers (Westby & Dawson, 1995), despite noticeable early distinctive features in their behaviour, which later characterize highly creative individuals (Daniels & Piechowsky, 2008).

Therefore, the operationalization of CPG begins with the child product and typical preschool teacher's perception of it (e.g., drawing, modelling or construction with or without additional verbal elaboration). Further assumption is that successful early identification of CPG implies a valid expert's recognition of distinguished features of the outstanding product which, by its technical and creative characteristics, deviates from the majority of products made by children of the same chronological age. It is expected that preschool teachers, focused on the outstanding products, should be capable of recognizing their distinguished features that indicate a higher level of creativity and specific characteristics of the child, as some authors have already noticed (Mathijssen, Feltzer, & Hoogeveen, 2017). More specifically, research questions are as follows:

1. What are the differences in assessing the importance of particular indicators in early identification of CPG among preschool teachers with different professional competencies?
2. Are there differences in the assessment of the technical and creative features of different products? To what extent are some features expressed in each of the products according to the estimates of preschool teachers?

3. Are there differences in the assessment of child characteristics expressed in the product? To what extent are some characteristics expressed in each of the products according to the estimates of preschool teachers?
4. To what extent will the estimates of preschool teachers and the reference and expert group of preschool psychologists be reliable in the assessment of the degree of creativity and the presence of distinguished features of products?

Method

Participants

The study included 32 female preschool psychologists and 127 preschool teachers from Zagreb (n = 77), and outside Zagreb (n = 50), 125 female and 2 males. They were selected according to the purposive sampling criterion to include teachers with various professional competences, such as general (length of service), methodical (title of mentor/counsellor) and specific (experience with gifted, leading a special program, additional in-service training). The group of 32 preschool psychologists consisted of 22 subjects with emphasised interest in the field of giftedness, and experts selected by three criteria: completed additional in-service training in the field, implementation of the program for the gifted in their kindergarten, and long length of service. Their main features are shown in Tables 1 and 2. Prior to the main research, the group of 24 preschool teachers was surveyed to define distinguished features of the products in order to obtain indicators for constructing questionnaires. Their features are shown in Table 3.

Table 1. *Professional competences of reference group of preschool psychologists who assessed products in pre-research*

Profession	n	Years of working experience		n additional education	n implement a program for gifted
		Range	M		
Psychologist	18	1.5-25	7.37	1	4
Psychologist-mentor	1	30	30	1	0
Psychologist-counsellor	3	29-30	26.66	2	0
Total	22			4	4

Table 2. *Professional competences of expert group of preschool psychologists who assessed products in pre-research*

Profession	n	Years of working experience		n additional education	n implement a program for gifted
		Range	M		
Psychologist	6	8-30	17.66	6	6
Psychologist-mentor	3	10-20	14.33	3	3
Psychologist-counsellor	1	29	29	1	1
Total	10			10	10

Table 3. *Professional competences of preschool teachers who define distinguished features of the products in pre-research*

Profession	n	Years of working experience		n additional education	n implement a program for gifted	n conduct special program
		Range	M			
Preschool teacher	22	2-40	17.86	0	0	4
Preschoo teacher - mentor	2	23-30	26.50	0	0	0
Total	24			0	0	4

In the main research setting 103 preschool teachers participated, 101 female and 2 male teachers, with length of service ranging from 1 to 42 (M = 17.19; SD = 11.83). Preschool teachers with less than 10 years of service (43.88%) were compared to those whose length of service was 10 years and above (56,12%). Furthermore, 15.46% had high qualifications, 47% had experience with gifted children, mostly through the work in their own class, 32% preschool teachers completed some form of additional in-service training in the field, and 21% of them had been conducting some special program in kindergarten (linguistic, artistic/creative or sport`s). The number of mentors/counsellors among these preschool teachers was negligibly small in total sample (N = 12). Since this implies long length of service, they were included in this category.

Instruments

Three instruments had been developed for the purpose of this survey.

1. A semi-structured questionnaire for referent and expert group of preschool psychologists for the assessment of child's product consisted of 4 questions for each of the 13 products and the task was to: (1) assess deviation from standard development on a dichotomous scale (yes/no); (2) assess prominence of a specific ability on a dichotomous scale (yes/no); (3) state a specific ability that had been noticed (open-question); (4) assess the level of creativity on a 4-level scale (imitative, standard for the age, creative, and very creative).
2. The unstructured assessment done by preschool teachers who had been exposed to 10 outstanding children's products selected by the expert group, consisted of only one open type question: "What do you see in this product?".
3. A structured questionnaire for preschool teachers for the assessment of outstanding products consisted of two parts: First, a shorter part in which demographic variables were collected, such as years of occupational activity, personal qualifications, vocation, immediate experience with gifted children, completed additional in-service training, leading of a special program and ranking the importance of five indicators in the early identification (from 1 – least important to 5 – most important). In the second part, participants needed to assess the following for the 10 selected products: (1) the presence of 11 features on the 5-point Likert type assessment scale (from 1 – not present at all to 5 – present to a large extent); (2) the presence of 7 features of a child observed in the product on the 4 category scale (below average, average, above average, not presented); (3) the level of creativity of a product on a 4 category scale (imitative, common for the age, creative, very creative).

Content validity of the structured questionnaire has been attested with experts from the field of preschool education and gifted education (ECHA specialists). Clarity of the concepts has been tested on a different group of preschool teachers. The sensitivity of the chosen scales has been created according to similar scales of the product assessment (O' Quin & Besemer, 2006; Reis & Renzulli, 1991). An intraclass correlation (ICC) was used as an estimation of inter-rater reliability of scales that capture two constructs - distinguished features and child's characteristics observed in the products. The results showed that preschool teachers were reliable assessors/raters of almost all products, the ICC ranging from .47 to .99 for distinguished features and from .65 to 0.97 for child's characteristics (Table 4).

Table 4. *Inter-rater reliability of preschool teachers' assessment of distinguished features and child's characteristics in the different products*

Product	ICC - assessment of distinguished features	ICC - assessment of child's characteristics
Ballerina	0.963	0.973
Pigs warriors	0.888	0.826
Clock tower	0.989	0.946
Stegosaurus	0.957	0.915
Unusual use of ordinary items	0.972	0.859
Face of numbers	0.471	0.646
Hair cutting monster - construction	0.939	0.740
Hair cutting monster - verbal elaboration	0.940	0.646
Riddles	0.982	0.869
Reverse situation	0.958	0.943
My menu	0.992	0.945
Average	0.914	0.846

In order to assess latent structure of provided measures, a series of explanatory factor analyses (PCA with Varimax rotation) were conducted. For the measurement of distinguished features in the product, preconditions were met since the KMO measure of sampling adequacy was satisfactory for almost all products (range from .596 to .815; .692 on average) and the Bartlett's test of sphericity was significant for each assessed product at $p < .05$.

The results indicate that the fixed two-factor model is applicable, explaining on average 47.71% of the variance, with items grouping around technical features that reflect a greater set of cognitive skills (such as level of details, complexity, ingenuity, meaningfulness, and demonstration of knowledge above the age) and more creative features (such as the presence of multiple solutions, expression of spatial relationships, movement and action). Reliability of these factors is not high (on average α=.697 for technical and α=.662 for creative features), but can be significant with respect to a relatively small number of items.

Assessment of the child's characteristics observed in a product had also met preconditions regarding the sampling adequacy – KMO ranges from .566 to .749, on average .650, whereas the Bartlett's test is significant for each assessed product at $p < .05$. This scale shows quite a coherent structure

that mainly does not depend on the assessed product: two-factor structure emerged as appropriate, explaining on average 62.49% of the variance. In almost all cases, saturations show grouping of items around one factor covering mostly cognitive traits (i.e., perseverance, patience and meticulousness) and the other covering mostly creative traits (i.e., imagination, sense of humour, unconventionality, and playfulness). Considering a relatively small number of items, reliability of these factors can be considered satisfactory (αM = .753 for cognitive and αM = .609 for creative factor).

Research design and procedure

Research was conducted in two stages: pre-research and the main research. Methodologically, it relied on CAT - Consensual Assessment Technique (Amabile, 1996) in both stages, because it dealt with product-based assessment. All respondents were motivated to participate due to credits they were given for additional professional development. Also, the survey was preceded by a lecture about the significance of the early identification of CPG.

Pre-research

Ten preschool psychologist experts evaluated 13 children's products for the purpose of selection of the outstanding products by consensus evaluation. For the purpose of detailed comparison with teachers' assessments in the main research, 22 preschool psychologists with high interest in the field of giftedness were joined to the group of experts. They had been surveyed during the professional seminar organized by Educational & Teacher Training Agency (ETTA). Unstructured assessment by 24 preschool teachers was used to collect free descriptions of the ten selected outstanding products using as many details as possible. The information given to the participants referred to the chronological age of the child-author, the title of the product, and the circumstances under which it was made (spontaneously or as assigned). Participants completed an unstructured assessment (preschool teachers) or semi - structured questionnaire (psychologists) (pencil-paper) while looking at the products via a slide show. Each round lasted for an hour. Qualitative (semantic) analysis of the most frequently used key-words in open type questions was used in this part of the pre-research.

Main research

Main research was conducted in preschool institutions that have voluntarily applied to participate, in accordance with the ethical standards. The group filled out (paper-pencil) a structured questionnaire that was accompanied by the detailed written instruction. Products were presented in a slide show, lasting for about an hour in total per group.

Data analysis

Descriptive statistics analysis of data obtained via the structured questionnaire was used in main research. Data analysis was done in the SPSS program (IBM Corporation, 2016) in two steps. First, a psychometric analysis of the structured questionnaire, developed for the purpose of this study, was conducted to estimate variables of interest. Since the questionnaire structure is not strictly theory-based, explanatory factor analysis was conducted to describe what factors may be underlying preschool teachers' assessments. Their homogeneity was checked using internal consistency indicators. Also, intraclass correlations were considered as an estimation of inter-rater reliability. In the second step, descriptive statistics were calculated to answer the main research questions. Also, t-tests, Cohen's d and ANOVA were used to test the significant difference among sub-groups.

Results

Assessment of the importance of particular indicators in early identification of CPG

According to the average assigned rank, preschool teachers, regardless of different professional competences, consider the children's products and passionate interests the most important indicators in early identification of giftedness, followed by achievements in demanding games, behavioural signs, and out-of-preschool achievements (Table 5).

Table 5. *Average rank of importance of particular indicators in early identification of giftedness assessed by preschool teachers (N = 103)*

Indicators in early identification	M	SD
Products	3.88	1.123
Passionate interests	3.85	1.309
Demanding games	3.10	0.924
Behavioural signs - check lists	2.48	1.083
Out-of-preschool achievements	1.69	1.245

Despite of the equal relative importance of particular indicators, preschool teachers statistically significantly differ in assessing the importance of behavioural signs. Teachers with less working experience attached greater importance to the observing of behavioural signs on check-lists, compared to teachers with more working experience. For other indicators, there were no statistically significant differences in the average rankings depending on the general length of service (Table 6).

Table 6. *Differences in preschool teachers' assessment of indicators in early identification of CPG*

Indicators in early identification	Length of service	n	M	SD	t	df	p	d
Behavioural signs - check lists	1 -10 years	43	2.84	1.194	2.62	78.68	.011	0.55
	more than 10 years	55	2.25	0.947				
Demanding games	1 -10 years	43	2.95	1.09	-1.24	74.72	.218	0.26
	more than 10 years	55	3.2	0.803				
Products	1 -10 years	43	3.91	1.13	-0.09	96	.929	0.02
	more than 10 years	55	3.93	1.103				
Passionate interests	1 -10 years	43	3.58	1.367	-1.43	96	.155	0.29
	more than 10 years	55	3.96	1.261				
Out of preschool achievement	1 -10 years	43	1.72	1.26	0.26	96	.795	0.06
	more than 10 years	55	1.65	1.25				

Assessment of the technical and creative features of products

Statistically significant differences had appeared in preschool teachers' assessments of the expression of all technical and creative features related to the estimated product (Table 7).

Table 7. *Difference in preschool teachers' assessments of the expression of technical and creative features depending on estimated outstanding product (ANOVA)*

Technical and creative features	F	df1, df2	p
Complexity	20.05	10, 1112	.000
Ingenuity	16.95	10, 1117	.000
Meaningfulness	12.62	10, 1099	.000
Detail	32.92	10, 1109	.000
Neatness	32.85	10, 1108	.000
Realistic	21.91	10, 1098	.000
Expressing unusual ideas	42.92	10, 1122	.000
The presence of multiple solutions	17.29	10, 1098	.000
Expressing spatial relationship	33.70	10, 1100	.000
Expressing movement and action	46.09	10, 1080	.000
Demonstration of knowledge above the age	38.52	10, 1113	.000

As far as the second research question is concerned, the following indicators were obtained (Table 8). The comparison of average values for all estimated products showed that ingenuity is the most valued feature in the products, followed by the level of details, complexity, meaningfulness, expression of unusual ideas, and adoption of knowledge beyond the age. Other features were evaluated as being less important in presented products.

Table 8. *Preschool teachers' assessment of distinguished features in the outstanding products*

Technical and creative features in product	**M total**	**Products selected as prominent**	**M**	**SD**
Complexity	4.64	Clock tower	5.00	0.000
		Riddles	4.98	0.197
		Face of numbers	4.85	0.381
Ingenuity	4.75	Riddles	4.99	0.099
		Hair cutting monster - verbal elaboration	4.94	0.235
		Unusual use of ordinary items	4.89	0.342
		Reverse situation	4.85	0.452
		Stegosaurus	4.85	0.452
		Face of numbers	4.85	0.406
Meaningfulness	4.57	Hair cutting monster - verbal elaboration	4.92	0.303
		Clock tower	4.85	0.386
		Unusual use of ordinary items	4.82	0.534
		Riddles	4.80	0.679
Detail	4.65	Clock tower	4.98	0.139
		Riddles	4.97	0.171
		Hair cutting monster - verbal elaboration	4.86	0.421
		Face of numbers	4.80	0.492
Neatness	4.22	Clock tower	4.76	0.585
		Pigs warriors	4.70	0.624
Realistic	4.07	Clock tower	4.91	0.284
Expressing unusual ideas	4.56	Hair cutting monster - verbal elaboration	4.94	0.235
		Unusual use of ordinary items	4.93	0.289
		Reverse situation	4.89	0.368
		My menu	4.87	0.499
		Riddles	4.84	0.556
The presence of multiple solutions	3.68	Unusual use of ordinary items	4.65	0.804
Expressing spatial relationship	3.65	Clock tower	4.77	0.465
Expressing movement and action	3.12	Ballerina	4.50	0.743

Technical and creative features in product	M total	Products selected as prominent	M	SD
Demonstration of knowledge above the age	4.51	Riddles	4.98	0.139
		Stegosaurus	4.91	0.284
		Clock tower	4.90	0.332
		Face of numbers	4.87	0.414

Assessment of child's characteristics expressed in the products

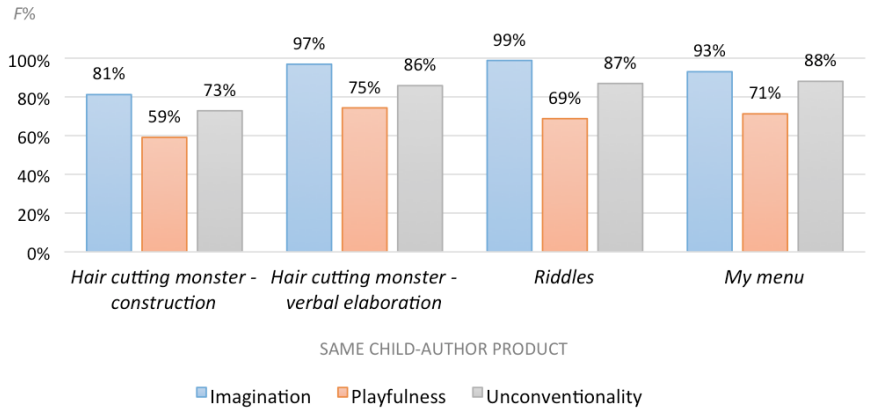
For the next research question, related to the extent to which some child's characteristics were expressed in each of the products, the following indicators were obtained (Table 9).

Table 9. *Preschool teachers' assessment of distinguished characteristic of the child expressed in the outstanding products*

Child's characteristics expressed in product	Products selected as prominent	Percentage of "above average" rating
Sense of humour	My menu	88%
	Reverse situation	86%
	Hair cutting monster - verbal elaboration	79%
Imagination	Riddles	99%
	Hair cutting monster - verbal elaboration	97%
	My menu	93%
Meticulousness	Clock tower	99%
	Pigs warriors	66%
	Face of numbers	57%
	Riddles	57%
Playfulness	Hair cutting monster - verbal elaboration	75%
	My menu	71%
	Riddles	69%
	Reverse situation	69%
Unconventionality	My menu	88%
	Riddles	87%
	Hair cutting monster - verbal elaboration	86%
Patience	Clock tower	96%
	Riddles	82%
	Stegosaurus	78%
Perseverance	Clock tower	96%
	Stegosaurus	87%
	Riddles	83%

In the context of assessing child's distinguished characteristics expressed in the products, one aspect of reliability of the assessment was verified, i.e. the degree of agreement in the assessment of three products (Hair cutting monster, Riddles

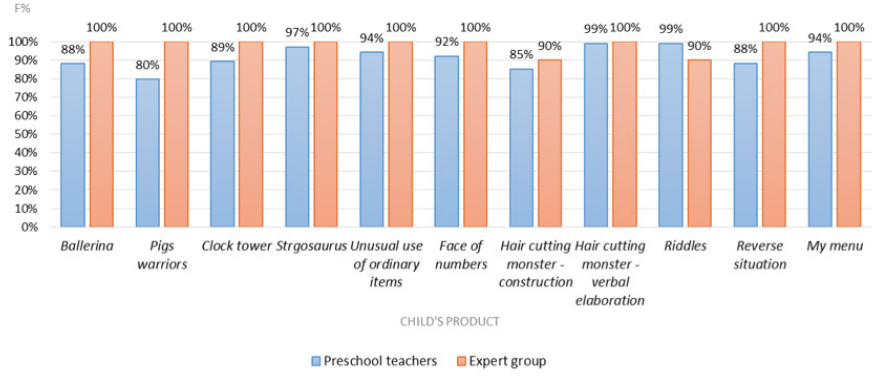
and My menu) by the same child. Preschool teachers were not notified of this. For this purpose, a comparison of three distinguished characteristics was made – of imagination, playfulness, and unconventionality, which were estimated as above average in all three products, and are important features of creativity. Picture 1 shows that there is a high degree of agreement in the assessment of characteristics of the same child/author based on his/her various products.



Picture 1. Preschool teachers' assessment of the characteristics of the same child-author based on his various products

Comparison of preschool teachers' assessments and expert group assessments

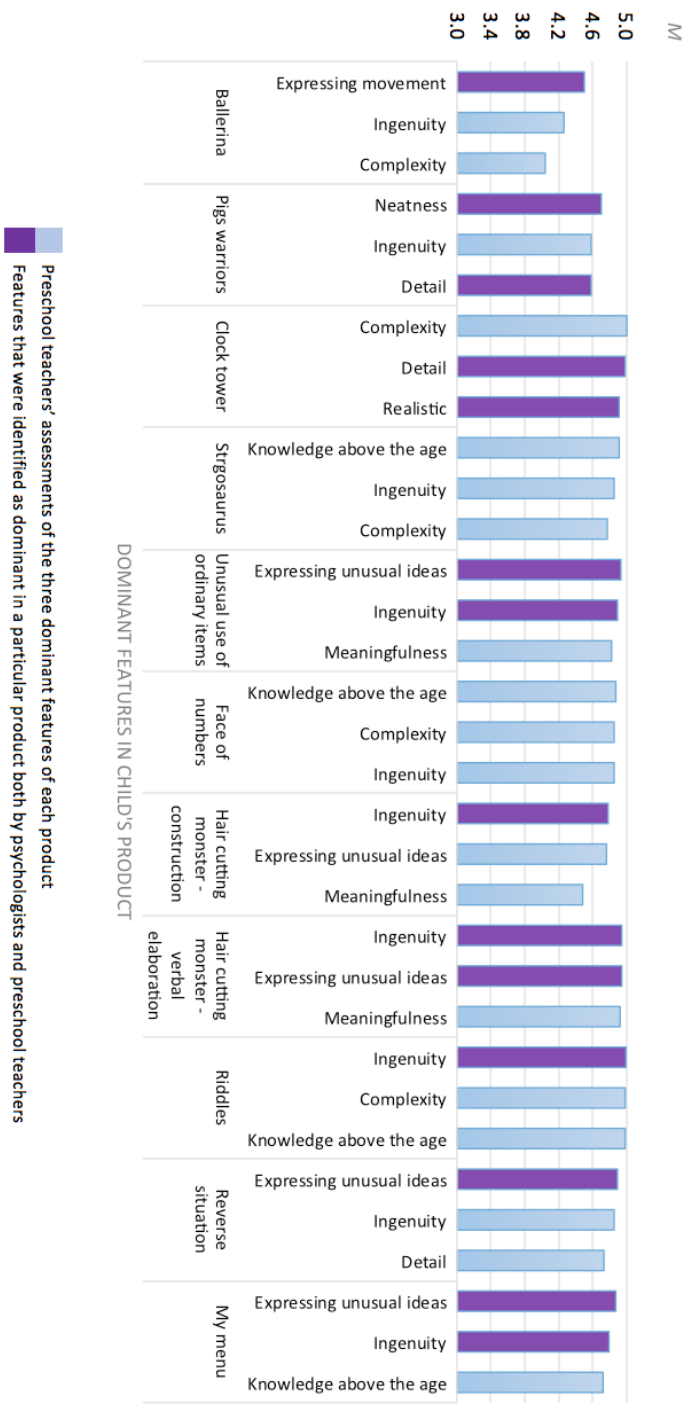
The degree of agreement between preschool teachers and the expert group of psychologists in the assessment of creativity of products through the summarised categories „creative„ and „highly creative " is also high (Picture 2).



Picture 2. Comparative view of the degree of agreement between preschool teachers and the expert group of psychologists in assessing the creativity of products

Comparison of preschool teachers' assessments and the reference group assessments

Means of the estimated level of presence of particular features of a given product were compared. Three distinguished features were identified in each product, based on preschool teachers' assessments (Picture 3). After the descriptive responses of the reference group of 32 preschool psychologists had been categorised, the features with the highest degree of equivalence to the estimates of preschool teachers were highlighted (purple columns in Picture 3). For the majority of products there is a correspondence in at least one of the distinguished features identified by preschool teachers. The only exception are the products Stegosaurus and Face of numbers, where the expression of unusual ideas and the presence of many ideas were dominant features for psychologists, but not for preschool teachers.



Picture 3. Comparison of the dominant features of products identified by preschool teachers and the reference group of psychologists

Discussion and conclusions

Starting point in this study was the observation that more research is needed in understanding CPG especially in the early years (Paik, 2005, 2012). In the introductory section the following ideas were highlighted: 1. product-based assessment is a valid method of estimating creativity; 2. creative and gifted preschool children are able to produce outstanding products; and 3. preschool teachers are able to identify areas that are not easily identified by standardized testing in the process of ongoing identification which includes measures other than IQ.

Results that we consider significant have shown that preschool teachers, regardless of the difference in their professional competencies, assess children's products and passionate interests as the most important indicators in early identification of giftedness. It is an empirical confirmation of the idea that a product may be put in the focus of early identification of CPG. Further, research has shown that it is equally important to examine those characteristics and behaviours of the child that are important for the emergence of an outstanding product, such as, e.g. passionate interests. This is in line with recent changes in the understanding of giftedness, according to which potential can also be manifested as passion for a certain domain and productivity in it, which are greater than those of one's peers (Subotnik, Olszewski-Kubilius, & Worrell, 2011). This is especially important in preschool context which could be relevant in the transition from potential, perhaps not estimated appropriately by means of behavioural indicators, to productivity, demonstrated and proven by an outstanding child's product.

Statistically significant differences in preschool teachers' assessments of the expression of technical and creative features in all estimated products point to both, the specificity of each of the evaluated outstanding products, and to the validity of teachers' assessment skills in recognition of this specificity. This is independent of their professional competences. The research results have shown that ingenuity is the most valued feature of outstanding products, followed by the level of detail, complexity, meaningfulness, expression of unusual ideas, and demonstration of knowledge above the chronological age. This can be explained by the fact that preschool teachers are sensitized to the recognition of the indicators of creativity and the advanced child's abilities by observing their outstanding product. They easily recognise certain technical features which are above expectations for the chronological age of the child. An outstanding product does not exclude technical excellence, which may be, and usually is, the consequence of advanced development of certain specific skills (e.g. fine-motor skills) and child's characteristics (perseverance, patience, meticulousness). It should be underlined

that preschool teachers had marked these three child's characteristics as the most distinguished ones demonstrated in 50% of all evaluated products. Some studies emphasize that high quality product is the one which shows a high level of technical performance and if it is not well-performed, it will not be perceived as creative, no matter how new and creative it may be (Barron, 1988). In fact, all the estimated features of products included in the structured questionnaire were somehow related to certain child's characteristics that lead to exceptionality in creative or technical performance. The only question was to what extent it would be recognized as important by preschool teachers.

Comparative results of the evaluation of the outstanding product's dominant features and the degree of expressed creativity, by the reference and expert group of psychologists compared to the evaluation of preschool teachers, refer to the validity of teachers' assessment skills regardless of their professional competences. This is supported also by a high degree of agreement in their assessment of the characteristics of the same child/author based on their various products. However, agreement between assessments of the expressed dominant features of the outstanding product by preschool teachers and the reference group of psychologists should be interpreted with caution because product assessment was not performed in an identical way: for psychologists, there was one open question asking them to state a specific ability that had been noticed in each product, and for preschool teachers there was the assessment of presence of 11 offered features in each product on the 5-point Likert type assessment scale.

However, preschool teachers with less working experience place greater importance on the observing of behavioural signs according to check-lists, compared to those with more working experience. This might indicate that the differences in professional competences still play a certain role in a more sophisticated and detailed assessment process. Observations from practice imply that the less experienced preschool teachers prefer to rely on the predicted behavioural signs offered in the check-lists. It provides more security. On the other hand, the more experienced teachers place greater importance on the more complex indicators such as product analysis and the observation of child's passionate interests. Some studies confirm that teachers create a kind of their "own conceptions of giftedness" which they use at each new estimate, and the accuracy of estimates depends largely on whether they have had direct experience with only a few or a large number of gifted children (Alkuş & Olgan, 2014; Cheung, 2012; Cheung & Leung, 2014).

In a certain way, the deep-rooted suspicion toward the teachers' assessments skills has been re-examined in this research. Some studies, e.g. Hoge and Cudmore (1996) or Kaufman et al. (2008) dealt with the estimates in

the nomination procedures, where teachers were asked to identify "intellectually" or "creatively" gifted children, and in the rating procedures, where they were asked to rate children with respect to one or more giftedness-relevant dimensions. They also confirmed that there was very little empirical foundation for the repeatedly appearing negative evaluations of teachers' assessment skills. Besides, they gave some useful recommendations, for example to define giftedness more adequately and develop explicit guidelines for the evaluated traits, behaviours, or aptitudes, and to expand teacher judgments in the identification process, preferably by using it in combination with other assessment tools.

In conclusion, some suggestions for improving the methodology could be given. First, to include other experienced professionals along with preschool psychologists in the expert group, mostly because psychologists are trained to apply standardized psychological instruments and not to evaluate products. Secondly, a greater number of items in particular scales of the questionnaire would obtain more precise indicators for the exploratory factor analysis and expand the research focus on personality traits of preschool teachers.

Albon (1997) noticed that "exceptional teacher sees the potential and encourages its realization" (as cited in Porath, 2009, p. 825). In that framework, this study can be seen as a step towards a better understanding of how preschool teachers' assessments can contribute to more effective early identification of CPG, and to improve the quality of that process by using product-based assessments. There is an indirect contribution of this research to the improvement of the assessment skills of preschool teachers, to help them become as objective and un-biased evaluators as possible, thus advancing and the early identification of CPG.

References

Alkuş, S., & Olgan, R. (2014). Pre-service and in-service preschool teachers' views regarding creativity in early childhood education. *Early Child Development and Care, 184*(12), 1902–1919. doi:10.1080/03004430.2014.893236

Alencar, S. E., Bruno-Faria, M., & Fleith, D. (2014). The measurement of creativity: Possibilities and challenges. In S. E. Alencar, M. Bruno-Faria, & D. Fleith (Eds.), *Theory and practice of creativity measurement* (pp. 1–21). Waco, TX: Prufrock Press.

Amabile, T. M. (1996). *Creativity in context: Update to the social psychology of creativity.* Boulder, CO: Westview Press.

Barron, F. (1988). Putting creativity to work. In R. J. Sternberg (Ed.), *The nature of creativity*: *Contemporary psychological perspectives* (pp.76–98). New York, NY: Cambridge University Press.

Baer, J., Kaufman, J. C., & Gentile, C. A. (2004). Extension of the Consensual Assessment Technique to nonparallel creative products. *Creativity Research Journal, 16*(1), 113–117. doi:10.1207/s15326934crj1601_11

Besançon, M., Lubart, T. I., & Barbot, B. (2013). Creative giftedness and educational opportunities. *Educational and Child Psychology, 30*(2), 79–88. doi: 10.1080/15332276.2013.11678410

Brown, W. S., Renzulli, S. J., Gubbins, E. J., Del Siegle, W. Z., & Ching-Hui, C. (2005). Assumptions underlying the identification of gifted and talented students. *Gifted Child Quarterly*, *49*(1), 68–79. doi:10.1177/001698620504900107

Cassandro, V. J., & Simonton, D. K. (2000). Creativity and genius. In C. L. M. Keyes, & J. Haidt (Eds.), *Flourishing: positive psychology and the life well-lived* (pp.163–183). Washington DC: American Psychological Association.

Chan, D. W., & Zhao, Y. (2010). The relationship between drawing skills and artistic creativity: Do age and artistic involvement make difference? *Creativity Research Journal, 22*(1), 27–36. doi:10.1080/10400410903579528

Cheung, H. P. R. (2012). Teaching for creativity: Examining beliefs of early childhood teachers and their influences on teaching practices. *Australian Journal of Early Childhood, 37*(3), 43–51.

Cheung, H. P. R., & Leung, C. H. (2014). Preschool teachers' perception of creative personality important for forstering creativity: Honk Kong perspective. *Thinking Skills and Creativity, 12*(78-89). doi:10.1016/j.tsc.2014.01.001

Cramond, B., & Kim, K. H. (2008). The Role of creativity tools and measures in assessing potential and growth. In J. Van Tassel-Baska (Ed.), *Alternative assessments with gifted and talented students, the critical issues in equity and excellence in gifted education series* (pp. 203–227). Waco, TX: Prufrock Press.

Cremin, T., Burnard, P., & Craft, A. (2006). Pedagogy and possibility thinking in the early years. *International Journal of Thinking Skills and Creativity, 1*(2), 108–119. doi: 10.1016/j.tsc.2006.07.001

Cvetković-Lay, J., & Sekulić – Majurec, A. (2008). *Darovito je, što ću sa sobom* [*He is gifted, what should I do with my self?*]. Zagreb, Croatia: Alinea i Centar „Bistrić».

Čudina – Obradović, M. (1990). *Darovitost, razumijevanje, prepoznavanje, razvijanje* [*Giftedness, understanding, recognition, development*]. Zagreb, Croatia: Školska knjiga.

Daniels, S., & Piechowski, M. M. (2008). *Living with intensity: Understanding the sensitivity, excitability and emotional development of gifted children, adolescents and adults.* Scottsdale, AZ: Great Potential Press.

Gagné, F. (2005). From gifts to talents: The DMGT as a developmental model. In R. J. Sternberg & J. E. Davidson (Eds.), *Conceptions of giftedness*, 2nd edition (pp. 98–120). New York, NY: Cambridge University Press.

Guignard, J. H., Kermarrec, S., & Tordjman, S. (2016). Relationships between intelligence and creativity in gifted and non-gifted children. *Learning and Individual Differences*, *52*, 209–215. doi:10.1016/j.lindif.2015.07.006

Harrison, C. (2004). Giftedness in early childhood: The search for complexity and connection. *Roeper Review*, *26*,78–84. doi:10.1080/02783190409554246

Hennessey, B. A., Amabile, T. M., & Mueller, J. S. (2011). Consensual Assessment. In M. A. Runco & S. R. Pritzker (Eds.), *Encyclopedia of creativity* (pp. 253–260). San Diego, CA: Academic Press.

Hocevar, D., & Bachelor, P. (1989). A taxonomy and critique of measurements used in the study of creativity. In J. A. Glover, R. R. Ronning, & C. R. Reynolds (Eds.), *Hand- book of creativity* (pp. 53–75). New York, NY: Plenum Press.

Hodge, K. A., & Kemp, C. R. (2000). Exploring the nature of giftedness in preschool children. *Journal for the Education of the Gifted, 24*(1), 46–73. doi:10.1177/016235320002400103

Hodge, K. A., & Kemp, C. R. (2006). Recognition of giftedness in the early years of school: Perspectives of teachers, parents, and children. *Journal for the Education of the Gifted, 30*(2), 164–204. doi. org/10.4219/jeg-2006-259

Hoge, D. R., & Cudmore, L. (1996). The use of teacher-judgment measures in the identification of gifted pupils. *Teaching & Teacher Education*, *2*(2), 181–196. doi:10.1016/0742-051X (86)90016-8

IBM Corporation. (2016). *IBM SPSS Statistics for Macintosh*, Version 23.0. Armonk, NY: IBM Corporation.

Jarosewich, T., Pfeiffer, S. I., & Morris, J. (2002). Identifying gifted students using teacher rating scales: A review of existing instruments. *Journal of Psychoeducational Assessment, 20*(4), 322–336. doi:10.1177/073428290202000401

Jackson, N. E. (2003). Young gifted children. In N. Colangelo & G. A. Davis (Eds.), *Handbook of gifted education* 3rd edition (pp. 470–482). Boston, MA: A & B.

Kaufman, J. C., & Beghetto, R. A. (2009). Beyond big and little: The four C model of creativity. *Review of General Psychology, 13*(1), 1–12. doi:10.1037/a0013688

Kaufman, J. C., Plucker, J. A., & Baer, J. (2008). *Essentials of creativity assessment.* New Jersey, NJ: John Wiley & Sons.

Kim, K. H. (2005). Can only intelligent people be creative? A meta-analysis. *Journal of Secondary Gifted Education*, *16*(2–3), 57–66. doi:10.4219/jsge-2005-473

Long, H. (2014). An empirical review of research methodologies and methods in creativity studies (2003–2012). *Creativity Research Journal, 26(4)*, 427–438. doi:10.1080/10400419.2014.961781

Mathijssen, A. S., Feltzer, M. J., & Hoogeveen, L. (2017). Identifying highly gifted children by analysing human figure drawings: An explorative study. *Talent Development & Excellence, 8*(1), 41–53.

Matthews, D. J., & Foster, J. F. (2006). Mystery to mastery: Shifting paradigms in gifted education. *Roeper Review, 28,* 64–69. doi.org/10.1080/02783190609554340

Matuga, J. M. (2004). Situated creative activity: The drawings and private speech of young children. *Creativity Research Journal, 16(*2–3), 267–281. doi:10.1080/10400419.2004.9651458

Owens, R. L. (2009). Very young gifted, very young creative. In B. Kerr (Ed.), *Encyclopedia of giftedness, creativity and talent* (pp. 922–923). London, GB: SAGE Reference Publication.

O'Quin, K., & Besemer, S. P. (2006). Using the creative product semantic scale as a metric for results-oriented business. *Creativity and Innovation Management, 15*(1), 34–44. doi:10.1111/j.1467-8691.2006.00367.x

Paik, S. J. (2005). Nurturing talent, creativity and productive giftedness, A New Mastery Model. In K. H. Kim, J. C. Kaufman, J. Bear, & B. Sriraman (Eds.), *Creatively gifted students are not like other gifted students: Research, theory, and practice* (pp. 101–121). Rotterdam: Sense Publishers. doi:10.1007/978-94-6209-149-8

Paik, S. J. (2012). From dogmatic mastery to creative productivity. In D. Ambrose & R. Sternberg (Eds.), *How dogmatic beliefs harm creativity and higher-level thinking* (pp.185–191). New York, NY: Routledge.

Pfeiffer, S. I. (2012). Current perspectives on the identification and assessment of gifted students. *Journal of Psychoeducational Assessment, 30*(1), 3–9. doi:10.1177/0734282911428192

Pfeiffer, S. I., & Jarosewich, T. (2003). *Gifted rating scales (GRS)*. San Antonio, TX: The Psychological Corporation.

Plucker, J. A., & Matthew, M. C. (2010). Assessment of creativity. In J. C. Kaufman, & R. J. Sternberg (Eds.), *The Cambridge handbook of creativity (*pp. 48–64). Cambridge, GB: Cambridge University Press.

Porath, M. (2009). What makes a gifted educator? A design for development. In L. V. Shavinina (Ed.), *International handbook on giftedness* (pp. 825–837). Amsterdam, Netherlands: Springer. doi:10.1007/978-1-4020-6162-2_40

Reiss, S. M., & Renzulli, J. S. (1991). The Assessment of creative products in programs for gifted and talented students. *Gifted Child Quarterly, 35*(3), 128–134. doi: 10.1177/001698629103500304

Renzulli, J. S. (2005). The three-ring definition of giftedness: A developmental model for promoting creative productivity. In R. J. Sternberg, & J. E. Davidson (Eds.), *Conceptions of giftedness* 2nd edition (pp. 246–280). New York, NY: Cambridge University Press.

Renzulli, J. S., & Callahan, M. A. C. (2008). Product assessment. In J. Van Tassel-Baska (Ed.), *Alternative assessments with gifted and talented students, the critical issues in equity and excellence in gifted education series* (pp. 259–285). Waco, TX: Prufrock Press.

Runco, M. A. (2004). Everyone has creative potential. In R. J. Sternberg, E. L. Grigorenko, & J. L. Singer (Eds.), *Creativity: From potential to realization* (pp. 21–30). Washington, DC: American Psychological Association.

Said-Metwaly, S., Van den Noortgate, W., & Kundt, E. (2017). Methodological issues in measuring creativity: A systematic literature review. *Creativity. Theories-research-applications, 4*(2), 276–301. doi:10-1515/ctra-2017-0014

Sternberg, R. J. (2003). *Wisdom, intelligence, and creativity, synthesized*. New York, NY: Cambridge University Press.

Sternberg, R. J., & Lubart, T. I. (1991). An investment theory of creativity and its development. *Human Development, 34*, 1–31. doi:10.1159/000277029

Sternberg, R. J., Jarvin, L., & Grigorenko, E. (2011). *Explorations in giftedness*. New York, NY: Cambridge University Press.

Subotnik, R. F., Olszewski-Kubilius, P., & Worrell, F. C. (2011). Rethinking giftedness and gifted education: A proposed direction forward based on psychological science. *Psychological Science in the Public Interest, 12*(1), 3–54. doi:10.1177/1529100611418056

Treffinger, D. J., Young, G. C., Selby, E. C., & Shepardson, C. (2002). *Assessing creativity: A guide for educators.* Sarasota, FL: Center for Creative Learning.

Torrance, E. P. (2000). Preschool creativity. In B. A. Bracken (Ed.), *The psychoeducational assessment of preschool children*. Boston, BO: Allyn & Bacon.

Winner, E. (1996). *Gifted children: Myths and realities.* New York, NY: Basic Books.

Westby, E. L., & Dawson, V. L. (1995). Creativity: Asset or burden in the classroom? *Creativity Research Journal*, *8*(1), 1–10. doi:10.1207/s15326934crj0801_1

Walberg, H. J., & Paik, S. J. (2005). Making giftedness productive. In R. J. Sternberg, & J. E. Davidson (Eds.), *Conceptions of giftedness* (pp. 395–410). New York, NY: Cambridge University Press.

Zenasni, F., Mourgues, C., Nelson, J., Muter, C., & Myszkowsky, N. (2016). How does creative giftedness differ from academic giftedness? A multidimensional conception. *Learning and Individual Differences, 52,* 216–223. doi: 10.1016/j.lindif.2016.09.003

NON-FORMAL CHEMISTRY EDUCATION IN SLOVENIA

Alenka Dražić

Abstract
Non-formal learning in science has a central role engaging students' lifelong learning. It caters to diverse and context-specific learning needs of young people. Chemistry learning offers many contemporary topics that are often not yet part of the chemistry formal curriculum but can easily form contexts for non-formal learning. This paper aims to link these notions of learning science in non-formal to formal environments. The first part of the paper proposes to distinguish three types of learning: formal, informal, and non-formal. It investigates the links and the differences between them. The second part presents some good practices of science education focusing on chemical education outside of the school learning environments in Slovenia and internationally. The third part discusses effective aspects and limitations of non-formal science learning. The paper closes with the program of non-formal chemistry education initiatives in Slovenia and links it to primary school formal education.

Key words: science, chemistry, non-formal education, primary school

Introduction

Our central issue, which was already pointed out by Fensham (1985) and Millar (1996) is how can science education prepare all students to be responsible, scientifically literate, citizens. Science literacy' is a broad-brush concept that has been the subject of many interpretations. Essentially, a person who is scientifically literate not only knows about science and its technological and societal implications, but can use scientific evidence in everyday decision-making (Laugksch, 2000).

The goals of formal science education have been debated and redefined many times. There have been calls for science education to be more relevant to young people's lives, to more faithfully reflect the conduct of science itself and to be taught through inquiry (Dillon, 2009; Hofstein, Eilks, & Bybee, 2011; Stuckey, Hofstein, Momlok-Naaman, & Eilks, 2013). Many years of reform in science education tried to raise motivation and interest in science learning. These initiatives concerned the whole range of potential changes, in the objectives, curriculum, pedagogy, or media (Eilks, Rauch, Ralle, & Hofstein, 2013). Among the many initiatives there is also the suggestion to re-orient science education by strengthening the non-formal and

informal science education sectors and to better connect them to formal education in schools (Coll & Treagust, 2015; Garner, Siol, & Eilks, 2015; Tolppanen, Vartiainen, Ikävalko, & Aksela, 2015).

The purpose of this chapter is to link the notions of learning science, especially chemistry in non-formal to formal environments, to review non-formal education studies in chemistry education and to determine what benefits non-formal education can provide to raise students' motivation and interest towards chemistry, to orient them towards science-related careers, to provide a broader and more authentic view on science and engineering, or to overcome shortages in school science teaching caused by limited budgets, time constraints, or lack in infrastructure. In the following discussion, we refer to chemistry education, at the lower secondary school level because it appears that these are the most problematic years. This is the time that students begin to choose career options and it is here that the disengagement with science is most clearly evident (Sjøberg & Schreiner, 2005).

Formal, Informal and Non-formal chemistry education

There is a continuously growing number of non-formal educational opportunities across Europe and the world (Stocklmayer, Rennie, & Gilbert, 2010). While formal learning remains the central pillar of educating the young generation in the sciences, schools are no longer the only place where science education is suggested to take place (Coll et al., 2013). Since the early 1970s, many typologies of formal, informal and non-formal education have been suggested (Coll et al., 2013). The distinction between formal, non-formal and informal education is not always easily recognizable (Garner et al., 2014). Coll, Gilbert, Pilot, and Streller (2013) point out that both terms, informal and non-formal, although officially defined and widely used, are often incoherently applied.

The Organisation for Economic Co-operation and Development (OECD, 2012) actively promote and recognize learning as a lifelong endeavour, taking a "cradle to grave" approach to learning. According to OECD formal learning is intentional, organized and structured. Formal learning opportunities are usually arranged by institutions. These include credit courses and programs through community colleges and universities. Generally, there are learning objectives and expected outcomes. Often this type of learning is guided by a curriculum or other type of formal program. Informal learning is never organized. Rather than being guided by a rigid curriculum, it is often thought of as experiential learning. Critics of this type of learning argue that from the learner's viewpoint, this type of learning lacks intention and objectives. The learner is motivated intrinsically (Csikszentmihalyi & Hermanson, 1995) and determines the

path taken to acquire the desired knowledge, skill, or abilities.

Non-formal learning may or may not be intentional or arranged by an institution, but is usually organized in some way, even if it is loosely organized. It is not restricted to any national guidelines, such as a curriculum and learning and is usually not evaluated. This makes it possible for non-formal education to concentrate on issues not dealt with in school, making it an ideal way to teach multidisciplinary fields (Eshach, 2007). It shares the characteristic of being mediated with formal education, but the motivation for learning may be wholly intrinsic to the learner. Furthermore non formal education is usually voluntary and can be anything from a camp to a fieldtrip (Eshach, 2007) or a project done online (Schwier & Seaton, 2013). Table I summarizes some of the differences among these three types of learning.

Table 1. *Differences between Formal, Non-formal and Informal Learning (adapted from Eshach, 2007)*

Formal	**Non-formal**	**Informal**
Usually at school	At institution out of school	Everywhere
May be repressive	Usually supportive	Supportive
Structured	Structured	Unstructured
Usually prearranged	Usually prearranged	Spontaneous
Motivation is typically more extrinsic	Motivation may be extrinsic but it is typically more intrinsic	Motivation is mainly intrinsic
Compulsory	Usually voluntary	Voluntary
Teacher-led	May be guide or teacher-led	Usually learner-led
Learning is evaluated	Learning is usually not evaluated	Learning is not evaluated
Sequential	Typically non-sequential	Non-sequential

The fact which was researched by Garner, Hayes, and Eilks (2014) is that the non-formal and also informal education is much less researched than it is the case for formal school lessons. Much of the research on non-formal science education focuses on characteristics of high-quality experiences for identifying appropriate pedagogical approaches. Linking formal education with informal or non-formal settings can have an influence on the curriculum and pedagogy in the formal educational system by allowing teachers to learn about corresponding teaching approaches in the non-formal educational environment (Garner et al., 2014).

Good practices of chemical education outside of the school learning environments internationally and in Slovenia

In many countries, learning environments, such as science centres and non-formal student laboratories, have emerged to provide additional value to school science education. Non-formal learning, especially learning in non-formal educational laboratories located at universities, has become a very important feature in several countries (Tolppanen et al., 2015). Finland and Germany were among them from the beginning.

In Finland non-formal education in science is primarily provided by Finland's Science Education Centre LUMA, which operates non-formal learning all over the country in close collaboration with universities, companies and schools (Vihma & Aksela, 2014). There are 12 out-of-school laboratories in different universities from all over the country. Finland's national curriculum obliges schools to part-take in out-of-school education showing the support and formal appreciation for non-formal education on a national level. The main aim of LUMA Centre Finland is to inspire and motivate children and youth into science and technology through the latest methods and activities of science and technology education. The LUMA Centre Finland has organised hundreds of different science clubs and science camps for young people. The oldest out-of-school laboratory is Chemistry Lab Gadolin (Aksela & Pernaa, 2009). Another popular innovation has been the international Millennium Youth Camp for talented and gifted students, where participants before and during the camp worked in groups of six on a group project through inquiry-based learning. Each participant worked on the theme that they showed the most interest towards during the application process. The main goal during the camp was for the students to reflect on the ideas with each other. They were also given the opportunity to elaborate on their thoughts and ideas with experts. During the camp, the attendees visited universities and companies, where they met with experts from various fields. In the evenings, the camp program included activities where the students could interact with each other over activities such as games and sports. The camp culminated in the Millennium Youth Camp Gala, where campers presented their project works (Tolppanen & Aksela, 2013).

The other approach concerns science chemistry education modules offered in a non-formal science laboratory for secondary students in a German university called Schülerlabor (SL). In Though less formal than in Finland, also in Germany this movements officially acknowledged and supported by the Federal Ministry of Education and Research, especially when it comes to science learning for sustainability. More than 300 of such laboratories exist all over Germany in order to support science learning by offering out-of-school

experiences and practical work that is not possible to implement in schools due to lack of equipment, high costs, or poor facilities. Visits typically include half- or full-day excursions to excellently equipped laboratories where a practical lesson takes place. Quite often the programme is prescribed, but the laboratory visit is not necessarily connected to the school curriculum. Thus these laboratories belong mainly to the non-formal educational sector (Haupt et al., 2013). One of the central aims of this SL-initiative is to link non-formal and formal learning in a meaningful manner, thus making the out-of-school experience a component of formal school education and contributing to fulfilling the school curriculum. During the SL-visit, emphasis is placed on contextualized, inquiry-based and student-orientated learning (Garner et al., 2014). Laboratory instructions offered within the project use different degrees of openness and complexity. Tasks in the laboratory allow variation from structured to open inquiry (Abrams, Southerland, & Evans, 2007). The students work in small teams and solve their tasks cooperatively and autonomously. Situated cognition suggests learning to be most effective if it is embedded into meaningful contexts. Contexts that are bound to chemical technology, research and industry as well as to societal relevant issues (Hofstein et al., 2011) are among the most promising frameworks through which to connect chemistry learning with all the different dimensions that make the learning of science relevant (Stuckey et al., 2013). The spectrum of examples ranges from daily-life, natural and industrial products (such as vanillin, plastics and fuels) and authentic and controversial societal issues (such as climate change and renewable energy supply) to research relevant emphases (such as click chemistry and zeolites as highly selective catalysts). Overall, the activities aim to support practical learning of science content, better understanding of the nature of science, and development of positive and critical attitudes and motivation towards science and technology.

One of the settings is also science education in the Irish Transition Year (TY), a facultative year between lower and upper secondary education. The TY is not compulsory and does not follow a formal curriculum, yet is offered in the majority of Irish schools. The TY is designed to act as a bridging year, between the two examinable cycles of secondary level education. It was designed to enable pupils to move away from the highly structured, formally examinable education program which prevails throughout the Irish schools system (Jeffers, 2011). Students are on average 15-16 years old when they take the TY. The educational categorization of the TY is complex; it encompasses both non-formal and informal learning in a formal setting. The learning is not necessarily linked to a syllabus or curriculum, it tends to take place in the formal school setting, yet many informal field trips are encouraged. For science education, the TY provides a unique opportunity for teachers to teach science in an imaginative and authentic way without the confines of

a syllabus or central examinations. The TY guidelines (Department of Education, 1993) suggest that schools place particular emphasis on negotiated learning, personal responsibility in learning, activity-based learning, integration of appropriate areas of learning, team teaching approaches, group work, discussion, debate, interview, role play, project- and research-based learning, visiting speakers and seminars, study visits and field trips, or work experience, work simulation, community service.

In Slovenia works under the auspices of the University of Ljubljana Faculty of Education a the centre KemikUm – a development and innovation learning laboratory. The Centre is an innovative learning environment for pupils, students and future active chemistry teacher. The work of the KemikUm Centre is based on the integration between universities and enterprises with the aim of joint development of innovations, their use in chemistry learning and optimization based on the evaluation of performed activities in order to contribute to the transfer and successful application of developmental research findings in the educational process; improving the quality of teaching and learning chemistry in relation to needs in school practice, the local environment and in companies with activities in the field of sciences; promoting the interest of young people in chemistry and in improving awareness of the role of chemistry in science, in society and the importance of sustainable development. In the framework of full-time study, future chemistry teachers gain experience in the cooperation of UL Educational faculties with elementary schools in numerous activities related to contemporary topics in the field of chemistry and science (University of Ljubljana, Faculty of Education, 2017).

Another example of good practice for non-formal education in Slovenia is the Science Center House of Experiments (The House of Experiments), whose mission is curiosity, creativity, critical thinking and active engagement empowering centre. House of Experiments *strives to arouse curiosity, stimulate creativity, and impart critical thinking skills through open communication, exploration and discovery.* They are empowering society by inspiring the passion for learning; encouraging curiosity, creativity, dialog, and questioning; accepting the necessity of making mistakes; promoting sincerity and helping and encouraging others so as to achieve common goals. The House of Experiments is the first Slovenian centre of science in the "hands-on" style. It is intended for adults and children. In House of Experiments, they popularize science and prove that learning can be fun too. The permanent exhibition consists of approximately 60 fully interactive exhibits that individuals can individually test. It covers various fields of science, from optical and other illusions, perceptions, and the field of art to the field of medicine. They are closely related to formal education in Slovenia, with almost

no primary school, which would not visit House of Experiments with their students and would place this in the annual implementation plan. Also the Ministry of Education supports the House of Experiments.

Effective aspects and limitations of non-formal science and chemistry learning

Previous research suggests that non-formal learning experiences in science education can increase students' scientific literacy (Eshach, 2007), increase student motivation (Csikszentmihalyi & Hermanson, 1995), offer more meaningful learning (Muscat & Pace, 2013), improve students' attitudes (Nadelson & Jordan, 2012), support cognitive achievement (Orion & Hofstein, 1994), and provide meaningful social experiences (Tolppanen & Aksela, 2013). Furthermore non -formal learning environments can better provide flexible and individually adaptable programs than school science classes (Rennie, 2007), because it gives more freedom of what to teach relating the heterogeneity of learning groups and includes the ability to integrate multidisciplinary topics and cutting-edge topics, such as sustainability issues, which are currently not implemented in many curricula (Garner et al., 2015). Another benefit of non-formal education is that working materials can be made adjustable to the current student's interest, performance and knowledge level. Approaches like student-centered, inquiry-based learning, where young people operate as ''researchers'', can be directly oriented towards students' lives and help them construct knowledge (Affeldt, Tolppanen, Aksela, & Eilks, 2017). Therefore, non-formal education is a good door opener for innovative pedagogies, materials, and inquiry learning and caters to diverse and context-specific learning needs of students. Stuckey et al. (2013) suggested that non-formal education provides the opportunity to connect gaining knowledge with interest, learning about authentic societal issues from science-related research, and orientation about professions. All these are essential components of relevant chemistry education.

Another contribution of non-formal education is that it offers opportunities for teachers to learn about new developments in science and technology while learning about corresponding teaching approaches, experiments, and pedagogical innovations (Garner et al., 2015; Vihma & Aksela, 2014). Finally, non-formal learning is the role it can play in teacher training to develop teachers' content knowledge and pedagogical content knowledge.

The effects of non-formal learning depend on various factors. Eshach (2007), Stocklmayer et al. (2010) and Garner et al. (2015) point out that careful preparation of visits to non-formal learning environments is important to increase the impact on students' learning. They suggested an

intense connection between learning contexts to effectively link nonformal and formal science education so that teachers are crucial for the success of the non-formal learning experiences. If the programme in the non-formal learning environment is not attuned to the learning in school, the students frequently do not connect experiences and knowledge gained in the nonformal setting with their formal learning in school.

Orion and Hofstein (1994) suggested a model for the implementation of out-of-school learning into science curricula. In this approach, out-of-school visits are divided into three steps: the preparation in the science classroom, the conduction of the field trip and the subsequent follow-up in school. Furthermore, multiple visits and the linkage to the syllabus may help positive effects persist over time. It was also suggested that social interactions in non-formal education can be important, as students can reflect in a more open atmosphere what they have learned with like-minded students, with their teachers and staff from the non-formal learning provider (Affeldt et al., 2017).

Reasons for the limitations in the positive effects of visiting a non-formal setting are suggested in the insufficient follow-up work and a lack of catching up the previously learned contents in school. In this context, multiple visits and the linkage to the syllabus may help positive effects persist over time. It was also suggested that social interactions in non-formal education can be important, as students can reflect in a more open atmosphere what they have learned with like-minded students, with their teachers and staff from the non-formal learning provider (Affeldt et al., 2017). With a view to an often discussed achievement gap between students, Rennie (2007) pointed out that non-formal learning environments should be flexible and adaptable to different learning groups so that the programme can consider individual learning conditions. Student groups with a high degree of heterogeneity and diversity make individual advancement in school education often difficult. In a non-formal setting, the staff–student-ratio is often much better for individual support as there are more tutors per class during the visit than in school. Garner et al. (2014) also described that teachers started following individual students' behaviour with great interest. Teachers started seeing their students from a different angle and were often surprised by the working behaviour of the lower achieving students.

The greatest limitation of non-formal learning, in addition to the already mentioned quality of learning experience and its interconnectedness with formal education, is that not all opportunities for non-formal learning are available to all students. Non-formal learning areas are generally more accessible in urban areas, especially in academic institutions and industry. Another limitation is that no object will be available in each site. Schools in

rural areas generally have fewer opportunities to visit research and industrial backgrounds, in particular with regard to specific topics. In such cases, it is at least much more difficult to organize relevant learning experiences.

Conclusion

The field of non-formal science and chemistry education is growing. With the establishment of the KemikUm development and innovation-learning laboratory, Slovenia also made a major shift towards non formal chemistry education. Nevertheless the process of transfer from non-formal to formal education is still an area that needs more research and development. Practises of non-formal education described in this paper show the different learning activities can be linked with the national curricula. There are many opportunities in the non-formal settings to develop innovative teaching and learning approaches and materials with potential for the adaptation in typical everyday science classes in school. Projects of non-formal education described in this paper show that a thorough connection of formal learning with non-formal settings can be beneficial for the teaching of chemistry and this can be done in totally different ways. All of described practises of non-formal education have potential for the development of innovative teaching and learning ideas and materials and to contribute to the reform of curricula and teaching approaches in science education. Limitations which we discussed about are that, which not all schools have the opportunity to benefit from non-formal educational programs. Another approach to overcome the limitations that not all students can visit the non-formal activities would be to invest in mobile or virtual projects to allow all students also in rural areas, the non-formal learning experience. Another limitation about non-formal learning experience is that there is not much research on the long-term effects, understanding on how non-formal chemistry learning affects learners with different educational backgrounds. The focus of research and evaluation of non-formal education needs to be broadened and more research is needed on skills development and cognitive achievement.

References

Abrams, E., Southerland, S. A., & Evans, C. A. (2007). Inquiry in the classroom: Identifying necessary components of a useful definition. In E. Abrams, S. A. Southerland, & P. Silva (Eds.), *Inquiry in the science classroom: Realities and opportunities* (pp. 11–22). Greenwich: Information Age.

Affeldt, F., Tolppanen, S., Aksela, M., & Eilks, I. (2017). The potential of the non-formal educational sector for supporting chemistry learning and sustainability education for all

students – a joint perspective from two cases in Finland and Germany. *Chemistry Education Research and Practice, 18*(1), 13–25.

Aksela, M., & Pernaa, J. (2009). Kemianluokka Gadolin – opettajien kokemuksia uuden oppimisympäristön käytöstä [Chemistry-lab Gadolin – teachers' experiences in using a new learning environment]. In M. Aksela & J. Pernaa (Eds.), *Arkipäivän kemia, kokeellisuus ja työturvallisuus kemian opetuksessa perusopetuksesta korkeakouluihin [Every day chemistry, experiments and safety in chemistry education from primary schools to higher education]* (pp. 40–49). Helsinki: Unigrafia.

Coll, R. K., Gilbert, J. K., Pilot, A., & Streller, S. (2013). How to benefit from the informal interdisciplinary dimension of chemistry in teaching? In I. Eilks & A. Hofstein (Eds.), *Teaching chemistry – a studybook* (pp. 241–268). Rotterdam: Sense.

Coll, S. D., & Treagust, D. (2015). Using informal learning experiences to enhance student learning outcomes education. *Journal of Science and Educational Technology, 16*(2), 171–190.

Csikszentmihalya, M., & Hermanson, K. (1995). Intrinsic motivation in museums: What makes visitors want to learn? *Museum News, 74*(3), 34–37, 59–61.

Department of Education. (1993). *Transition year programmes guidelines*, *1994-95*. Retrieved from http://www.education.ie/en/Schools-Colleges/ Information/Curriculum-and-Syllabus/Transition-Year-/ty_transition_year_ school_guidelines.pdf

Dillon, J. (2009). On scientific literacy and curriculum reform. *International Journal of Environmental Science and Technology*, *4*(3), 201–213.

Eilks, I., Rauch, F., Ralle, B., & Hofstein, A. (2013). How to allocate the chemistry curriculum between science and society. In I. Eilks & A. Hofstein (Eds.), *Teaching chemistry - a studybook* (pp. 1–36). Rotterdam: Sense.

Eshach, H. (2007). Bridging in-school and out-of-school learning: formal, non-formal, and informal education. *Journal of Science Education and Technology, 16*(2), 171–190.

Fensham, P. J. (1985). Science for all: A reflective essay. *Journal of Curriculum Studies, 17*(4), 415–435.

Garner, N., Hayes, S. M., & Eilks, I. (2014). Linking formal and non-formal learning in science education – a reflection from two cases in Ireland and Germany. *Sisyphus, 2*(2), 10–31.

Garner, N., Siol, A., & Eilks, I. (2015). The potential of non-formal laboratory environments for innovating the chemistry curriculum and promoting secondary school level students education for sustainability. *Sustainability, 7*(2), 1798–1818.

Haupt, O. J., Domjahn, J., Martin, U., Skiebe-Corette, P., Vorst, S., Zehren, W., & Hempelmann, R. (2013). Schülerlabor – Begriffsschärfung und Kategorisierung [Student laboratory – Sharpening the term and categorization]. *Der Mathematische und Naturwissenschaftliche Unterricht, 66*(6), 324–330.

Hofstein, A., Eilks, I., & Bybee, R. (2011). Societal issues and their importance for contemporary science education: a pedagogical justification and the state of the art in Israel, Germany and the USA. *International Journal of Science and Mathematics Education, 9*(6), 1459–1483.

Jeffers, G. (2011). The Transition Year programme in Ireland. Embracing and resisting a curriculum innovation. *The Curriculum Journal, 22*(1), 81–76.

Laugksch, R. C. (2000). Scientific literacy: A conceptual overview. *Science Education, 84*(1), 71–94.

Millar, R. (1996). Designing a curriculum for public understanding of science. *Education in Science, 166,* 8–10.

Muscat, M., & Pace, P. (2013). The impact of site-visits on the development of biological cognitive knowledge. *Journal of Baltic Science Education, 12*(3), 337–351.

Nadelson, L. S., & Jordan, J. R. (2012). Student attitudes toward a recall of outside day: an environmental science field trip. *Journal of Educational Research, 105*(3), 220–231.

OECD. (2012). *Recognition of non-formal and informal learning*. Retrieved from http://www.oecd.org/edu/skills-beyond-school/recognitionofnon-formalandinformallearning-home.htm

Orion, N., & Hofstein, A. (1994). Factors that influence learning during a scientific field trip in a natural environment. *Journal of Research in Science Teaching, 31*(10), 1097–1119.

Rennie, L. J. (2007). Learning science outside of school. In S. Abell & N. Lederman (Eds.), *Handbook of Research on Science Education* (pp. 125–170). Mahwah: Lawrence Erlbaum.

Schwier, R., & Seaton, J. (2013). A comparison of participation patterns in selected formal, non-formal and informal online learning environments. *Canadian Journal of Learning and Technology, 39*(1), 1–15.

Sjøberg, S., & Schreiner, C. (2005). How do learners in different cultures relate to science and technology? Results and perspectives from the project ROSE (the Relevance of Science Education). *APFSLT: Asia-Pacific Forum on Science Learning and Teaching, 6*(2), 1–16.

Stocklmayer, S., Rennie, L., & Gilbert, J. (2010). The roles of the formal and informal sectors in the provision of effective science education. *Studies in Science Education, 46*(1), 1–44.

Stuckey, M., Hofstein, A., Mamlok-Naaman, R., & Eilks, I. (2013). The meaning of relevance in science education and its implications for the science curriculum. *Studies in Science Education*, *49*(1), 1–34.

Tolppanen, S., & Aksela, M. (2013). Important social and academic interactions in supporting gifted youth in in chemistry. In I. Eilks & A. Hofstein (Eds.), *Relevant chemistry education: from theory to practice* (pp. 355–368). Rotterdam: Sense.

Tolppanen, S., Vartiainen, J., Ikävalko, V. M., & Aksela, M. K. (2015). Relevance of non-formal education in science education. In I. Eilks & A. Hofstein (Eds.), *Relevant chemistry education: from theory to practice* (pp. 335–354). Rotterdam: Sense.

Univerza v Ljubljani, Pedagoška fakulteta Ljubljana [University of Ljubljana, Faculty of Education]. (2017). *Center KemikUm – razvojno-inovacijski učni laboratorij*. Retrieved from http://www.pef.uni-lj.si/kemikum.html

Vihma, L., & Aksela, M. (2014). Inspiration, joy, and support of STEM for children, youth and teachers through the innovative LUMA collaboration. In H. Niemi, J. Multisilta, L. Lipponen, & M. Vivitsou (Eds.), *Finnish Innovations and Technologies in Schools* (pp. 129–144). Rotterdam: Sense.

GUIDED ACTIVE LEARNING IN CHEMISTRY (*GALC*) AND 13-YEAR-OLD STUDENTS' SELECTED CHEMISTRY CONCEPTS UNDERSTANDING

Jasmina Kolbl and Iztok Devetak

Abstract
The purpose of this chapter is to present two studies about Guided Active Learning in Chemistry (GALC) approach in chemistry classrooms. The first study investigated the influence of the Guided Active Learning in Chemistry (GALC) on the 8 Grade (age 13–14) students' conceptual understanding of the hydrocarbons, and the teachers´ views on applications of these modules in classrooms. Altogether, 47 students from a primary school in Slovenia participated in the study (24 students in experimental and 23 students in the control group) and also five chemistry teachers gave their views about the GALC modules application. The experimental group was exposed to the GALC learning units, while the control group was taught with the traditional approach (teacher's explanation, question and answer, writing, etc.). In addition, the first study also presents findings on how a new teaching approach influences the students' attitudes toward chemistry and towards collaborative learning. The second study reveals the results of application of the GALC modules about acids and basis chemistry. 129 upper primary school students (age 13–14) participated in the study (65 students were in the experimental group and 64 students were in the control group). Different instruments were used for gathering the data. Students' achievements in the experimental group were higher than the results of the students in control group after the instruction of electrolyte chemistry. It can be concluded from both studies that GALC teaching approach is efficient and can stimulate students to archive better chemical knowledge.

Key words: guided active learning in chemistry (GALC), teachers' views, students' achievements, students' formal reasoning abilities hydrocarbons, electrolyte chemistry

Introduction

Developments in cognitive learning theories and classroom research show that students generally experience improvements in learning when they are engaged in classroom activities that encourage developing their own knowledge following a learning cycle (Farrell, Moog, & Spencer, 1999). Students need to work together, not only because of their preparation for team work (in science and most of the professions), but because they learn better through social interactions. Students should reach their own conclusions and not be called upon to verify, for example, what the textbook or

instructor has indicated to be the expected result of the experiment (Spencer, 1999; Hanson & Wolfskill, 2000). Active learning methods are becoming more prevalent in science education as the verifiable evidence of their success becomes apparent to more educators (Michael, 2006) and received considerable attention over the past several years.

Research shows that there is a lack of evidence that traditional lectures as well as traditional laboratory activities in chemistry lessons contribute to promoting meaningful learning (Tobin, 1990; Lazarowitz & Tamir, 1994; Hofstein & Lunetta, 2004). Innovative learning strategies could be used by teachers at all levels of chemistry education to enhance the students' motivation to learn chemistry (Hanson & Wolfskill, 2000; Eybe & Schmidt, 2004). One of such innovations is the GALC (Guided Active Learning in Chemistry) approach (Devetak & Glažar, 2010). This approach can be used by teachers in order to facilitate learning to learn strategies in students, who can apply them in the future when learning about new chemical phenomena described by more abstract concepts. The GALC is an educational approach that takes place in an environment where students are actively involved in the process of learning chemistry. When students use the GALC approach, they learn new concepts and connections from one another in groups within a social context. Their knowledge is developed by the data analysis and discussion of ideas regarding the learning content. By studying questions at different levels of cognitive demand and by formulating specific conclusions in solving problems, the students are required to meet the demands of the individual GALC learning modules.

The GALC approach, which was developed in line with the above assumptions, was based on the POGIL (Process Oriented Guided Inquiry Learning) pedagogical method, the purpose of which was to teach process skills (such as collaboration and written expression) as well as the content using the inquiry based approach (Farrell et al., 1999; Hanson & Wolfskill, 2000; Hanson, 2007). It was developed according to the theories on cooperative and collaborative learning. This method was developed in the USA for use in teaching general chemistry, but POGIL can be applied to teaching other subjects, as well. Because this chapter is not dedicated to POGIL, this method will not be described in detail. You can get more information on POGIL at its official webpage: http://new.pogil.org/ and in some other references, such as in the papers published by Minderhout and Loertscher (2007) and Brown (2010). The difference between GALC and POGIL is in the organization and adaptation of the POGIL method to the Slovenian 45-minute periods of lessons. The GALC learning units can be used by the teacher in the classrooms during one learning period and are adapted to serve the teacher according to the standards and competences set by the national curriculum. Another significant difference is also in experimental work, which is incorporated

into the GALC learning unit. This approach is not characteristic for the POGIL method. Other segments of the POGIL and GALC units are similar. The GALC learning units have their specific parts, which follow consecutively and guide the student through the learning unit. At the end of each learning unit the students should be able to solve problems in connection with the learning content discussed (Devetak & Glažar, 2010).

Science educators have agreed that the development of a positive attitude toward science should be an important goal of the school curriculum (Koballa, 1988; Laforgia, 1988). Chemistry instructors have taken a number of approaches to motivate students to learn chemistry and to improve student attitudes towards chemistry (Henderleiter & Pringle, 1999; Hume, Carson, Hodgen, & Glaser, 2006; Miller, Nakhleh, Nash, & Meyer, 2004), and to improve students' chemistry self-concept as it is positively stimulated by *POGIL* approach applied in teaching chemistry courses for nonscience majors (such as nursing majors) (Smith, Paddock, Vaughan, & Parkin, 2018). On the other hand research show (Liu, Raker, & Lewis, 2018) that peer-led team learning (Flip–PLTL) pedagogies effect students motivation to learning chemistry. Students in the Flip–PLTL environment were significantly more motivated toward chemistry at the end of the semester while controlling for the motivation pre-test scores. Correlation results revealed variable relationships between motivation subscales and academic achievement at different time points. In general, intrinsic motivation subscales were significantly and positively correlated with student academic achievement. The findings in this study showed the importance of Flip–PLTL pedagogies in improving student motivation toward chemistry.

Various group dynamics operate that undermine the effectiveness of the cooperative approach, such as negative attitudes toward group work and student behaviors that are counter-productive to group success. Researchers concur that student attitudes, beliefs, values, and behaviors are influenced by natural peer contexts (Parr & Townsend, 2002). Thus, it can be argued that student attitudes and behaviors will also be influenced by cooperative group environments. Other authors report gains in adopting cooperative learning techniques (King, Hunter, & Szczepura, 2002; Oliver-Hoyo & Allen, 2005; Shibley & Zimmaro, 2002) and that cooperative learning chemistry course designs allow students to practice and develop the transferable skills valued by employers (Canelas, Hill, & Novicki, 2017). Students participating in cooperative learning activities had a stronger perception of the relevance of chemistry in their lives, greater enjoyment of chemistry, and had more positive attitudes toward learning chemistry than those participating in traditional courses.

Two specific topics were selected to illustrate the GALC effects on students understanding of specific chemical concepts. The first topic comprises concepts regarding hydrocarbons. Rare studies were conducted to show how active

learning approaches would influence lower secondary school students understanding specific organic chemistry concepts, such as hydrocarbons are. One research by Sarkodie and Adu-Gyamfi (2015) showed that the use of models can enhance students' performance in naming and writing of structural formulae of hydrocarbons which form part of the IUPAC nomenclature concept. The models are effective in teaching and learning of IUPAC nomenclature of hydrocarbons because not only did the performance of the students involved in the study improve but the attitudes of the students changed positively towards learning of IUPAC nomenclature of organic compounds. More studies were done on other aspects of organic chemistry, and this is the reason that hydrocarbons were used as a topic for developing GALC learning modules.

The second topic comprises concepts about acids and basis chemistry. Different teaching and learning approaches were investigated when this topic was applied in school chemistry. Some results of research conducted in Slovenian education context also show that GALC approach may have positive effects on students understanding neutralization reactions (Devetak, Križaj, & Glažar, 2011; Šket, Ferk Savec, & Devetak, 2012). The study by Hoe and Subramaniam (2016), using four-tier test indicate that the students harbor a range of misconceptions of varying strengths in relation to the properties of acids and bases, strengths of acids and bases, pH, neutralization, indicators, and sub-microscopic views of acids and bases. However studies indicate that different active learning approaches on different levels of chemistry education positively influence students' achievements during learning about acid-base chemistry and can diminish misconceptions about acid-base chemistry. Yaman and Ayas (2015) discusses how to evaluate students' concept maps as an assessment tool before and after 15 computer-based Predict–Observe–Explain (CB-POE) tasks related to acid–base chemistry. The results showed that there is a significant difference between students' pre and post concept map scores ($z = 3.05$; $p < 0.05$). The majority of the students constructed their pre and post concept maps non-hierarchically; while they drew more interconnected concept maps after the CB-POE tasks. Another approach, presented by Karpudewan, Roth, and Sinniah (2016) incorporating a green chemistry context - combining chemistry experiments with everyday, environmentally friendly substances with a student-cantered approach that includes student–student discussion show the increase students' understanding of acid–base concepts and argumentative skills. These approaches are also incorporated into the GALC learning modules.

Two studies are presented in this chapter. In the first one the organic chemistry GALC learning modules implementations was conducted and its effect on students' knowledge was explored in relation to the teaching and learning environment (i.e. cooperative learning). However, in the second research

similar implementation of the GALC learning modules was conducted and students' knowledge measured, but their formal reasoning abilities were explored in relation to learning of general chemistry concepts.

First study – the development of the GALC learning module about hydrocarbons and its evaluation

The research problem presented above relates to the explanation of the GALC learning module influences on the 13-year-old students' conceptual understanding of hydrocarbons and to the teachers' opinions about students' attitudes towards GALC learning modules during learning about hydrocarbons. In addition, the effect of GALC modules will be pursued by some other independent variables (such as student attitudes toward chemistry and toward collaborative learning).

Regarding the purpose of this study, four research questions can be addressed:

(1) What are students' attitudes towards hydrocarbons GALC learning modules according to teachers' views?

(2) How do achievement scores between the experimental and control group differ on knowledge test after hydrocarbons GALC learning modules implementation?

(3) Are there significant differences between pre- and post-instruction with GALC learning modules in students' attitudes toward chemistry?

(4) Are there significant differences between pre- and post-instruction with GALC learning modules in students' attitudes toward collaborative learning?

Method

Participants

Altogether 47 upper primary school students participated in the research. 24 students were in the experimental group (EG) and 23 students were in the control group (CG). The 8th grade (13-14-year-old) students at primary school of the Pomurje region of Slovenia participated in this research.

Five primary school chemistry teachers that used GALC modules in their classroom also participated in the study. They have 15–20 years of teaching experience.

Instruments

Six different paper-pencil questionnaires and knowledge test was used in this study. Teachers fulfilled a Questionnaire for teachers about attitudes toward GALC modules (QTAG). Students' data were collected using knowledge tests and questionnaires: (1) knowledge test of basic chemical concepts (pre-test), (2) knowledge test of hydrocarbons (post-test), (3) questionnaire about Students' Attitudes toward Chemistry (SAC) and (4) questionnaire about Students' Attitude toward Group Environments (SAGE).

Questionnaire for teachers about attitudes toward GALC modules (QTAG) comprise eight yes/no questions. Teachers also had the opportunity to comment each questions and give more detailed explanations about using GALC learning modules in their classrooms. For more detailed questions see the table in results section of the first study presentation. The questionnaire was developed specifically for this study.

Both achievement tests are paper-pencil type and consist of six items. The items in the pre-test tested understanding of basic chemical concepts and the items in post-test understanding of hydrocarbons. The pre- and post-achievement tests of chemistry contents were applied in both groups. The achievement tests were designed specifically for the purpose of this study. In designing the achievement tests the current national curriculum for chemistry in upper primary school and the aims determined by it were taken into account.

To determine students' attitudes toward chemistry SAC questionnaire was used. SAC has its theoretical and empirical bases on modern motivational strategies developed by Eccless, Wigfield, and Schiefele (1989) and the SAC questionnaire was developed by Juriševič, Vogrinc, and Glažar (2010). The instrument consist of 15-item. The response to each item is on a five-point Likert-type scale ranging from 1 as strongly disagree to 5 as strongly agree. The two factors that are measured by the SAC questionnaire are: individual interest (e.g. of item: "I'm interested in chemistry") and self-esteem (e.g. of item, "I'm good at chemistry").

SAGE questionnaire (Kouros & Abrami, 2006) was used to determine students' attitudes toward collaborative learning. The Slovene translation of the SAGE was used for the study. The SAGE questionnaire consists of 53 attitude statements. Students indicated their responses on a five-point Likert scale ranging from strongly agree to strongly disagree. The four factors that comprise the SAGE measure are: quality of product and process (e.g. of item: "When I work in a group I do better quality work"), peer support (e.g. of item: "When I work in a group I am able to share my ideas"), student

interdependence (e.g. of item: "Everyone's ideas are needed if we are going to be successful"), and frustrations with group members (e.g. of item: "I prefer to choose the students I work with"). The internal consistency of the SAGE was satisfactory (the overall Cronbach alpha reliability for the measure was 0.93 and the alphas for the four factors ranged from 0.93 to 0.69, thus attesting that the questionnaire is indeed reliable).

Research design

The GALC learning units have their specific parts, which follow consecutively and guide the students through the learning units. The GALC learning module usually starts with a seemingly simple question e.g. "What compounds can be found in essential oils?"

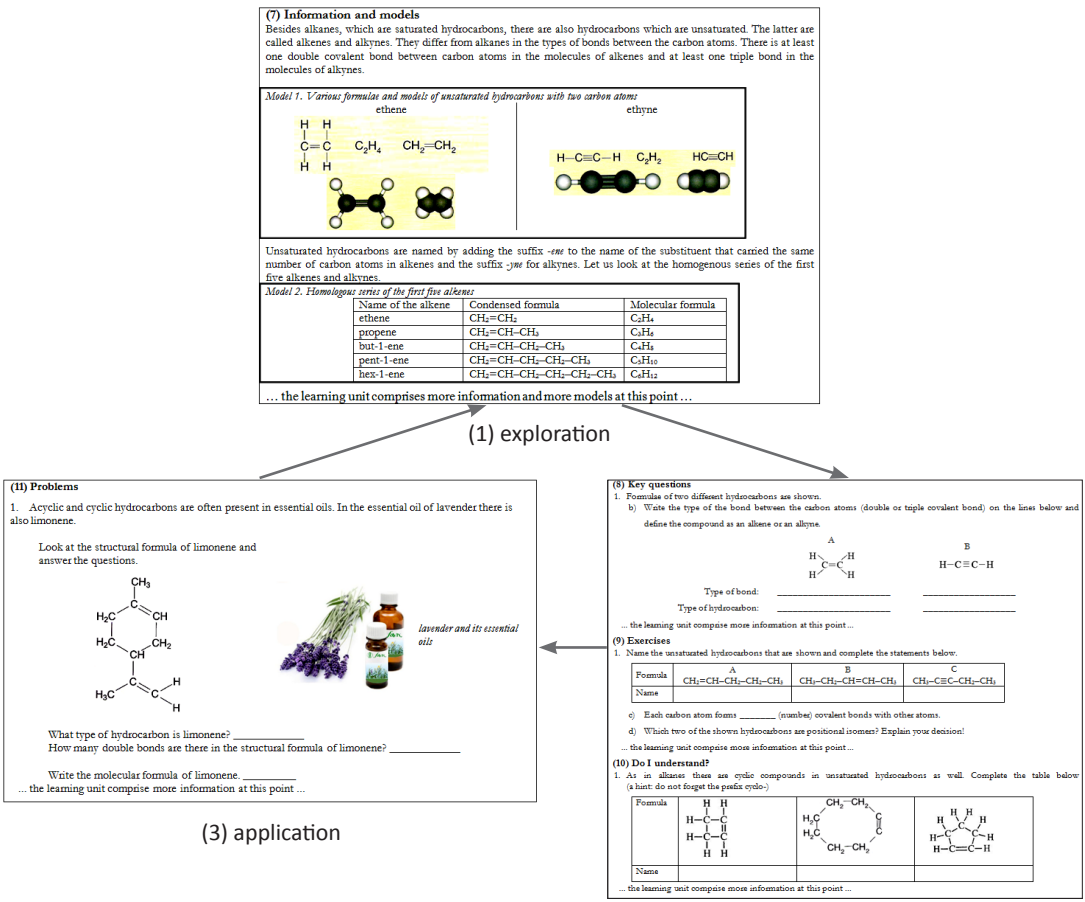


Figure 1. Activities are based on the learning cycle by Spencer (1999) and are sequenced applying Bloom's Taxonomy.

This question can facilitat the development of a complex teaching situation that leads to the realization of teaching goals in a unique way (see and/or take the GALC module below in a folder).

GALC module activities were developed to follow a broadly defined learning cycle model including (1) exploration, (2) concept invention, and (3) application (Spencer, 1999). Students were involved in teaching and learning using GALC modules for three weeks. To determine teachers' attitudes toward using GALC modules in teaching chemistry, the QTAG questionnaire was used. Teachers filled the questionnaires after implementation of the GALC modules in the classroom. This is the first part of the first study, i.e. the first research question.

The other three research questions were answered by gathering data from the application of the GALC learning modules. In the research the causal experimental method was used since it is suitable for studying »novelties« (the *GALC* approach) which are being introduced into instruction. In the experimental group (EG) students were involved into the teaching and learning using *GALC* modules. In the control group (CG) students were exposed to traditional didactic tools (e.g. lectures, experimental demonstrations). One teacher performed the teaching and learning activities in both groups. Table 1 shows a step-by-step course of the research.

Table 1. *Presentation of the research design*

Phases of the research	**The action in the specific phase**
Phase 1	Preparation of materials for *GALC* instruction. Formation of the experimental and control group.
Phase 2	Preparation of the experimental group teacher and students for the implementation of the experimental design.
Phase 3	Pre-testing both groups of students before the introduction of the *GALC* modules. Application of the questionnaires of the experimental group students about students' attitudes toward chemistry and toward collaborative learning.
Phase 4	Introduction of the *GALC* instruction into the experimental group.
Phase 5	Post-testing (testing of knowledge at the end of the experiment) in both groups. Application of the questionnaires of the experimental group students about students' attitudes toward chemistry and toward collaborative learning.

Both questionnaires SAC in SAGE before and after *GALC* instruction were applied. This was the only way to determine if *GALC* influences the students'

attitudes toward chemistry and collaborative learning. Since both surveys for students (SAC and SAGE) were available online, students filled out their digital forms.

The questionnaires and the achievement tests were analyzed by the descriptive and inferential statistics.

To determine the differences in the comprehension of concepts of basic chemistry concepts and hydrocarbons between the experimental and control group students we applied the t-test. To determine the differences in the attitude towards chemistry among the experimental group students prior and after the experiment we applied the -test and, regarding the attitude towards collaborative learning, the paired sample t-test.

Results and discussion

Results are presented according to the research questions. The first research question deals with students' attitudes towards hydrocarbons GALC learning modules according to teachers' views. Table 2 presents the results and results show that students have positive views on using GALC learning modules in chemistry classroom in general.

Teachers indicated that the scenario part (context of the module) of the GALC learning module is interesting for students and it stimulates interest for learning the content. Independent chemistry learning can cause problems to less capable students and teachers need to intervene and support their activities during learning new concepts. Students' learn most from the central part of the module where they had to learn using inquiry based approaches. Teachers also stressed that GALC learning modules positively influence students' logical reasoning and scientific thinking abilities development. However, teachers had different opinions about students' abilities for interpretation of the data obtained by the activities during learning new concepts by inquiry. It is also important to emphasize that according to teachers views GALC learning modules help students to link theory with practice while learning specific concepts. Teachers also pointed out that they should have more time to repeat the most important concepts, to identify and correct possible misconceptions at the end of the specific GALC learning unit.

Table 2. *Results from QTAG questionnaire*

Item	Response		Teachers' comments
	YES [f]	NO [f]	
Did students find the section "Why do I learn this?" interesting?	4	1	Initial part (like every day chemical problem) motivated students to learn the material.
Were students independent/they did not need additional teacher support while learning the GALC material?	4	1	Mostly yes, but questions occasionally came up for the teachers; more able students easily followed the material, but weaker students had more problems.
Did students find the activity/inquiry in the module interesting?	5	0	Students remembered the most from this part.
Do the material and activities encourage logical reasoning and scientific literacy?	5	0	Encourage yes, but achievements are not at the highest level for all students.
Do the learning material and activities in GALC promote the development of scientific thinking?	5	0	/
Did the students' activities/inquiry enable a better interpretation of the findings obtained by the activities?	3	2	/
Is the evaluation carried out in a way that allows students to correct their misunderstandings and to learn from them?	4	1	Teachers do not have enough time to adequately conduct this final part of teaching.
Does the learning material connect the theoretical and practical knowledge?	5	0	/

The results on the GALC implementation into organic chemistry have shown a positive influence of GALC instructions on students' attitude toward chemistry. Experimental group students expressed that chemistry lessons using the GALC approach were more interesting, different and informative (Kolbl & Devetak, 2012).

The second research question is about differences in students' achievement scores between the experimental and control group after hydrocarbons GALC learning modules implementation. To ensure the internal validity of the experiment, we controlled the pre-knowledge on basic chemistry concepts in

both groups of students prior to the experiment. The mean score of the pre-achievement test of the experimental group is slightly higher (M = 11.9; SD = 4.6) than the means of the control group (M = 11.6; SD = 4.2), however, this difference is not statistically significant (t = 0.284; p = 0.778). This implies that the comparison groups of students had equal level of pre-knowledge and that the pre-knowledge conditions were met and controlled in order to conduct the experiment.

After the experiment, in order to study its effects, we tested the understanding of hydrocarbon concepts and analyzed the overall achievement scores of the knowledge tests in both groups of students (experimental with hydrocarbon GALC learning modules implementation and control with traditional; i.e. lecture, experiments demonstrations teaching approach of the same topic).

The results of the conducted experiment suggest that the mean score of the experimental group achievement test (M = 16.5; SD = 3.5) is higher than the mean score of the control group's results (M = 15.4; SD = 6.2). Even the lowest and highest scores are considerably higher in the experimental group than they are in the control group. After the implementation of the hydrocarbon GALC learning modules, the t-test of the differences between the experimental group achievement scores and the control group scores showed no statistically significant difference (t = 0.807; p = 0.424). Since the experimental group students' results observed after the experiment were better than those of the control group, we were interested in determining statistically significant differences between the experimental and control group students according to specific test items.

On average, the experimental group students achieved better knowledge test results than the control group students in 5 in a total of 6 items. On average, the control group students achieved better results than the experimental group only in the second item. Overall, it can be summarized that teaching hydrocarbons by applying GALC learning modules does not result in significantly higher average achievement scores. However, the researches of the *POGIL* method impact on students' knowledge has already been investigated and some encouraging results in students' gains in general chemistry (Farrell et al., 1999), organic chemistry (Schroeder & Greenbowe, 2008) and biochemistry (Minderhout & Loertscher, 2007) were determined. Research showed that students' performance on exams were significantly higher in the *POGIL* sections than the students' achievements in the lecture-only offering of the same course. Although POGIL requires a great deal of effort and a careful introduction to students who might be skeptical of a novel and unfamiliar classroom experience, its benefits cannot be easily disputed.

The third research question deals with the differences between students' attitudes toward chemistry before and after instruction with GALC learning modules.

We also wanted to determine the experimental group students' attitude towards chemistry (individual interest and self-esteem) and whether the experiment factor (*GALC* instruction) had an impact on it. Prior to the implementation of hydrocarbons GALC learning modules an average level index of the individual interest (65.2%) and the same per cent (17.4%) of the poor and superior individual interest index level was observed in most of the students in experimental and control group. After the GALC learning modules implementation, the structure of the experimental group changed to certain extend regarding their individual interest index level; the most notable change was the per cent rise of the students with superior index levels, from 17.4% to 26.1%. However, based on -test no statistically significant differences was determined. Similar to the individual interest structure developed in a positive direction after the GALC learning modules implementation into chemistry classroom, the self-esteem structure changed as well; the average value of the self-esteem index rose from 47.8% to 52.5%. Under the influence of the experiment factor, we observed a change tendency of the students' attitude towards chemistry, developing in a positive direction, yet it was not possible to statistically confirm it ($p > 0.05$). Results show that if we want to influence students' attitudes towards chemistry, the GALC instructions should be longer because a short term exposure to the innovative teaching does not.

The last research question refers to the differences between pre- and post-instruction with GALC learning module in students' attitudes toward collaborative learning. In addition to their attitude towards chemistry, we were also interested in the test group students' attitude towards collaborative learning and whether the experiment factor affected it. All the four factors that comprise the SAGE were measured: quality of product and process, peer support, student interdependence and frustrations with group members.

All collaborative learning factors received an evaluation after the conducted experiment. Prior and after the conducted experiment, a statistically significant difference can be observed only with the student independence factor ($p < 0.05$), while there is a visible tendency with the quality of product and process factor ($p = 0.055$) that a difference in its measuring prior and after the experiment exists. The other two factors showed no statistically significant difference prior to and after the application of the *GALC* learning unit.

Second study – GALC learning modules and students' conceptions of electrolyte chemistry

The purpose of the second study was to evaluate if the guided active learning in chemistry (GALC) influences on the 8 Grade students' conceptual understanding of electrolyte chemistry and the sustainability of the conceptual changes that show as few misconceptions of these concepts as possible. The purpose if this study was also to determine how students' formal reasoning abilities influence their electrolyte chemistry achievements.

According to the purpose of this research two research questions were formed:

(1) Is there a statistically significant difference between students' achievement test scores after the implementation of electrolyte chemistry GALC learning modules?

(2) Is there a statistically significant difference between students' delayed achievement test scores one month after the implementation of electrolyte chemistry GALC learning modules?

(3) Is there a statistically significant difference between students' with different levels of formal reasoning abilities on the achievement test scores after the implementation of electrolyte chemistry GALC learning modules?

Method

Participants

129 upper primary school 8th grade students (13/14-year-old) students from different parts of Slovenia participated in this research. Students were divided into two groups, 65 students were in the experimental group and 64 students were in the control group.

Instruments

Different paper-pencil instruments were used to gather data. Students' preknowledge was tested with achievement test of basic chemical concepts. Items were designed specifically for this study and the items comprise concepts that are important for students' understanding of basic chemical concepts which are important for electrolyte chemistry concepts learning. Achievement test of electrolyte chemistry as post-test was applied after the implementation of the GALC learning modules. The delayed achievement test of electrolyte chemistry (one month after the GALC learning modules

implementation) was also implemented. Both achievement tests comprise items for testing students' understanding of specific chemical concepts of electrolyte chemistry. All achievement tests were valid regarding the content.

The level of students' formal reasoning abilities was obtained with *Test of Logical Thinking (TOLT)* (Tobin & Capie, 1981). The *TOLT* is a ten-item group paper-pencil test. The authors of the test reported a strong correlation (r = 0.82; p < 0.0001) between performance on tasks during Piagetian clinical interviews that are considered traditionally preferable method in measuring individuals' formal reasoning abilities. The *TOLT* has high internal consistency reliability (Cronbach's alpha was 0.85). The test consists of two items designed to measure each of the five modes of reasoning (i.e., controlling variables, proportional, correlational, probabilistic, and combinatorial reasoning). The test scores from 0-1 points (concrete reasoners), 2-3 point (transitional reasoners) and 4-10 point (formal reasoners) were used as a basis for classifying the students. Students spend 38 minutes solving the test.

Research design

In the experimental group students were involved into the teaching and learning using GALC modules which follow a broadly defined learning cycle model including (1) exploration, (2) concept invention, and (3) application (Spencer, 1999) – see the first study. The GALC learning units have their specific parts, which follow consecutively and guide the students through the learning units. In the control group students were exposed to traditional didactic tools (e.g. lectures, demonstrative experiments). One teacher performed the teaching and learning activities in both groups. Students were involved in teaching and learning of electrolyte chemistry for five weeks. The pre-, post- and delayed- achievement tests of chemistry contents were applied in both groups.

To determine students' thinking ability, the Test of Logical Thinking (TOLT) was used. Students filled the test after instruction in the classroom.

Results and discussion

This section of the chapter is presented according to the research questions. The first one deals with the statistically significant difference between students' achievement test scores after the implementation of electrolyte chemistry GALC learning modules.

To ensure the internal validity of the experiment, we controlled students' pre-knowledge of the basic chemical concepts and some electrolyte chemistry concepts prior to the experiment (pre-test).

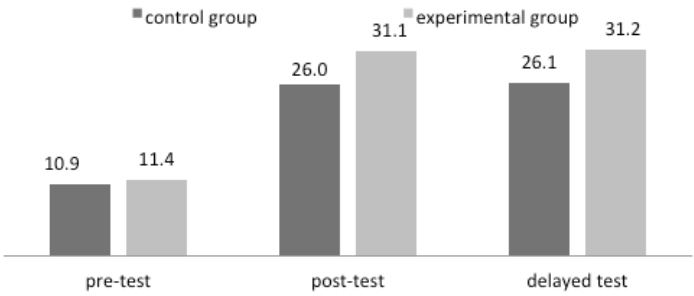


Figure 2. The control and experimental group students' average achievement test scores.

The t-test results of the control and experimental group students' average achievement pre-test scores show no statistically significant differences (t = –0.591; p = 0.556). See also Figure 2.

Data representing students' achievement post-tests scores are presented on Figure 3. Results show that students who participated in the GALC chemistry lessons achieve higher scores on achievement post-test than students' in the traditional chemistry class. It is also important to emphasize that higher number of students achieve higher number of point at the post-test in the GALC lessons than in the traditional one.

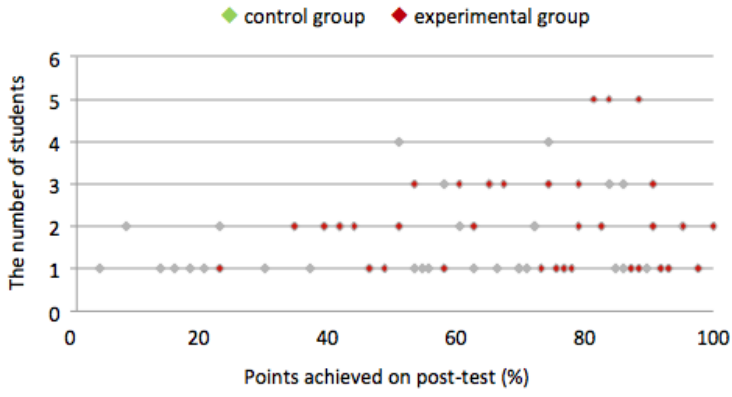


Figure 3. Results of the control and experimental group on post-test.

The t-tests between students' achievements on post-test show, that students in the experimental group, who were exposed to GALC learning modules, achieve statistically significantly higher scores than students in the control group (see Figure 2) (t = –3.156; p = 0.002).

The second research question refers to the statistically significant difference between students' delayed achievement test scores one month after the implementation of electrolyte chemistry GALC learning modules. As seen on Figure 4 similar results can be determined by analyzing the number of students achieving the specific number of points at the delayed achievement test as in Figure 3. Similar trends can be observed in favor to the GALC learning modules one month after their application in the chemistry classroom.

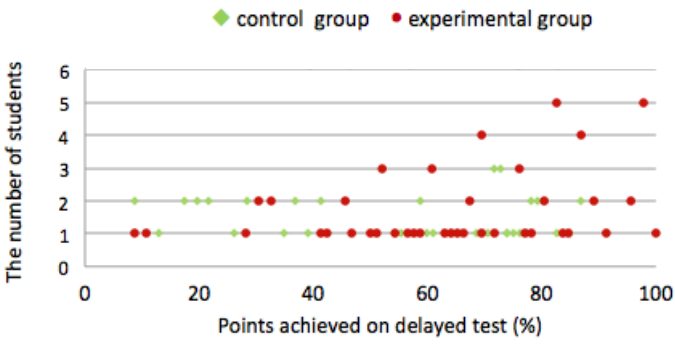


Figure 4. Results of the control and experimental group on delayed test.

The t-test shows that students participating in the chemistry class with implementing GALC learning modules scored significantly higher than those, who were part of the traditional chemistry lessons ($t = -2.508$; $p = 0.014$). See Figure 2 for mean values of achievement scores.

The third research question refers to the statistically significant difference between students' with different levels of formal reasoning abilities on the achievement test scores after the implementation of electrolyte chemistry GALC learning modules. Students were divided into three groups according to the results on TOLT. The three groups are, concrete reasoners, transitional reasoners and formal reasoners. Those students who have higher formal reasoning abilities also achieved higher scores on achievement post- and delayed test in lessons where GALC learning modules were implemented. However, it is important to emphasize that also concrete reasoners benefits more from GALC lessons than from traditional ones (see Figure 5).

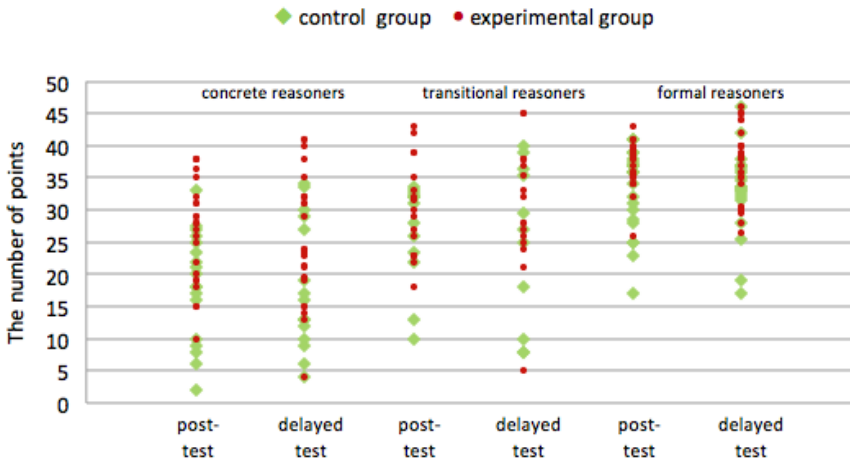


Figure 5. Results from TOLT questionnaire.

The test of homogeneity of variances was statistically significant $F(2, 111) = 5.72$; $p = 0.004$), so Welch test of equality of means was applied. There are statistically significant differences between the groups of students with different formal reasoning abilities in their post-test achievements ($F(2, 89.1) = 21.38$, $p = 0.000$).

Post hoc analysis using Tamhane (for equal variances not assumed) showed that there is a statistically significant difference ($p = 0.000$) between the mean post-test scores for concrete ($M = 23.2$, $SD = 8.7$) and formal reasoners ($M = 34.7$, $SD = 5.8$) and also for transitional ($M = 28.2$, $SD = 9.0$) and formal reasoners ($p = 0.002$). There is no statistically significant difference ($p = 0.061$) between group of concrete and transitional reasoners in post-test achievements. There are studies reporting that logical thinking abilities play a major role in students' performance in science (Lawson, 1982; Devetak & Glažar, 2010; Tsitsipis, Stamovlasis, & Papageorgiou, 2010). It is worth mentioning that our study also showed that students in the experimental group who were taught the GALC learning modules and are at the level of concrete thinking, proven better knowledge of electrolyte chemistry, such as those in the control group.

Conclusions

The primary goal of implementation of the GALC approach in the chemistry lessons is to encourage students to build their knowledge within a group of peers (social learning context) in a guided manner through discussion and

inquiry. Teachers should be motivated to implement the GALC approach to achieve better learning and improve chemistry education.

It can be concluded from the first study that teachers viewed the GALC learning material very suitable for learning chemistry especially because the material motivates students to learn chemistry, encourage logical reasoning, chemical literacy and promote the development of scientific thinking. They emphasize that more able students did not need any additional teachers' help while learning with the GALC modules, but weaker students had more problems. Teachers would also use these modules again in their teaching and they would also recommend them to other teachers.

It can be concluded that the *GALC* impact on the students' learning achievements regarding hydrocarbons, showed that, on average, the students score higher on the knowledge test in the experimental group (learning by GALC approach) than those in the control group. On average, the experimental group students achieved better results in 5 of totally 6 items of the post-knowledge test on hydrocarbons than the control group students. In Slovenia, no similar researches determining the *GALC* impact on the learning efficiency of students have been carried out till now.

The results of the research showed a positive impact of the *GALC* instruction on the students' attitude towards chemistry, however, no significance differences between the experimental and control group students showed. One of the possible reasons may lie in the experiment's considerably insufficient duration in order for it to have a significant impact on the change in the students' attitude towards chemistry.

In addition to the attitude towards chemistry, we also controlled the attitude change of the experimental group students towards collaborative learning after the conducted lessons implementing GALC learning modules. Positive trends in results were observed as well. In all four factors comprising the SAGE survey, after the conducted experiment, higher results were achieved than prior to the experiment. In the student interdependence factor, significant difference was observed and, in the quality of product and process factor, a well expressed tendency was observed. In two other factors, no statistically significant difference in the measuring of the experimental and control group students' attitude towards collaborative learning was observed prior and after the experiment.

It can be summarized from the findings that further research should be conducted to identify variables that can influence students learning following the *GALC* educational approach. It is also important to emphasize that although the differences between students who were taught by the traditional approaches and those using *GALC* learning modules were not

significantly different in most measured variables (chemistry hydrocarbon knowledge, attitudes towards chemistry and towards cooperative learning) positive trends can be observed between pre-and post-application of the learning modules. It should be also important to adapt *GALC* modules according to the findings so that students can learn with understanding of more abstract chemical concepts and a larger sample of students should be used in the future research.

The main goal of the second study was to determine the effects on students' knowledge about electrolyte chemistry during GALC learning modules implementation in the chemistry classroom. The most obvious finding to emerge from this study is that students in experimental group achieve significantly higher scores on post- and delayed tests and that formal reasoning abilities influence students' learning of electrolyte chemistry with GALC learning approach. It is also important to emphasize that students' formal reasoning abilities influence their achievement scores on electrolyte chemistry test. Students', participating in the study, were divided into three groups according to their formal reasoning abilities development (e.g. concrete reasoners, transitional reasoners and formal reasoners). Those students who have higher formal reasoning abilities also achieved higher scores on achievement post- and delayed test in lessons where GALC learning modules were implemented. However, it is important to stress that also concrete reasoners benefit more from GALC lessons than from traditional ones.

Implications for practice

There is, therefore, a definite need for implementing innovative educational strategies into the chemistry lessons. The findings suggest several possible courses of action, such as: (1) educating chemistry teachers to implement already developed GALC learning modules, (2) education teachers to adapt and/or develop their own GALC learning modules, (3) to implement GALC learning modules more frequently into the chemistry classes due to educate students to work in teams collaboratively and actively, by using inquiry based learning, (4) to stimulate students to understand that chemistry is relevant for the society and that chemistry knowledge (chemical literacy) is important for their everyday live, (5) implementing GALC learning modules in teaching situations where gifted students in chemistry have additional opportunity to develope their team-leading and research competences.

References

Brown, P. J. P. (2010). Process-oriented guided-inquiry learning in an introductory anatomy and physiology course with a diverse student population. *Advances in Physiology Education*, *34*(3), 150–155.

Devetak, I., & Glažar, S. A. (2010). Approach to developing the learning to learn strategy in chemistry. In M. Valenčič Zuljan & J. Vogrinc (Eds.), *Facilitating effective student learning through teacher research and innovation* (pp. 399–414). Ljubljana: Faculty of Education.

Devetak, I., Križaj, M., & Glažar, S. A. (2011). Vodeno aktivno učenje kislin, baz in soli [Guided active learning about acids, bases and salts]. In V. Grubelnik (Ed.), *Razvoj naravoslovnih kompetenc: izbrana gradiva projekta* [*The development of scientific competences; selected project material*] (pp. 106–112). Maribor: Faculty of science and mathematics.

Canelas, D. A., Hill, J. L., & Novicki, A. (2017). Cooperative learning in organic chemistry increases student assessment of learning gains in key transferable skills. *Chemistry Education Research and Practice*, *18*(3), 441–445.

Eccles, J. S., Wigfield, A., & Schiefele, U. (1998). Motivation to succeed. In W. Damon & N. Eisenberg (Eds.), *Handbook of child psychology.* Vol. 3 (pp. 1017–1095). New York, NY: John Wiley & Sons.

Eybe, H., & Schmidt, H. J. (2004). Group discussion as a tool for investigating students' concepts. *Chemistry Education Research and Practice*, *5*(3), 265–280

Farrell, J. J., Moog, R. S., & Spencer, J. N. (1999). A guided inquiry chemistry course. *Journal of Chemical Education*, *76*(4), 570–574.

Hanson, D. M. (2007). *Foundation of chemistry: Applying POGIL principles*, 3rd edition. Lisle, IL: Pacific Crest.

Hanson, D. M., & Wolfskill, T. (2000). Process Workshop: A new model instruction. *Journal of Chemical Education*, *77*(1), 120–129.

Henderleiter, J., & Pringle, D. L. (1999). Effects of context-based laboratory experiments on attitudes of analytical chemistry students. *Journal of Chemical Education, 76*(1), 100–107.

Hoe, K. Y., & Subramaniam, R. (2016). On the prevalence of alternative conceptions on acid–base chemistry among secondary students: insights from cognitive and confidence measures. *Chemistry Education Research and Practice, 17*(2), 263–282.

Holfstein, A., & Lunetta, V. N. (2004). The laboratory in science education: Foundations for the twenty-first century. *Science Education*, *88*(1), 28–54.

Hume, D. L., Carson, K. M., Hodgen, B., & Glaser, R. E. (2006). Chemistry is in the news: Assessment of student attitudes toward authentic news Media-Based Learning activities. *Journal of Chemical Education*, *83*(4), 662–667.

Juriševič, M., Vogrinc, J., & Glažar, S. A. (2010). Attitudes toward chemistry. In S. A. Glažar et al. (Eds.), *Ciljno raziskovalni projekt: Analiza dejavnikov, ki vplivajo na trajnejše znanje z razumevanjem naravoslovno-tehniških vsebin* [*Research project: The analysis of factors that influence student' knowledge of science and technology content*]. Ljubljana: Faculty of Education.

Karpudewan, M., Roth, W. M., & Sinniah, D. (2016). The role of green chemistry activities in fostering secondary school students' understanding of acid–base concepts and argumentation skills. *Chemistry Education Research and Practice*, *17*(4), 893–901.

King, J. R., Hunter, W. J. F., & Szczepura, L. F. (2002). Design, Implementation, and Evaluation of Novel Discussion Exercises for First-Year Chemistry Students. *The Chemical Educator*,

7(6), 329–333.

Koballa, T. R. (1988). Attitude and related concepts in science education. *Science Education*, *72*(2), 115–126.

Kolbl, J., & Devetak, I. (2012). The influence of guided active learning in chemistry (GALC) on 13-year-old students' understanding of the hydrocarbons. In S. Divjak (Ed.), *Proceeding book of the Joint International Conference MPTL '16 - HSCI 2011: MPTL '16 Workshop on Multimedia in Physics Teaching and Learning [and] Hsci 2011 Conference Hands on Science, 15th -17th September 2011* (pp. 233–236). Ljubljana: *University of Ljubljana, Slovenia*.

Kouros, C., & Abrami, P. C. (2006). Attitudes toward small group learning. Retrieved 15. 06. 2018 from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.538.5390&rep=rep1&type=pdf

Laforgia, J. (1988). The affective domain related to science education and its evaluation. *Science Education*, *72*(4), 407–421.

Lawson, A. E. (1982). Formal reasoning, achievement, and intelligence: an issue of importance. *Science Education, 66*(1), 77–83.

Lazarowitz, R., & Tamir, P. (1994). Research on using laboratory instruction in science. In D. Gabel (Ed.), *Handbook of research on science teaching and learning* (pp. 172–180). New York, NY: Macmillan.

Liu, Y., Raker, J. R., & Lewis, J. E. (2018). Evaluating student motivation in organic chemistry courses: moving from a lecture-based to a flipped approach with peer-led team learning. *Chemistry Education Research and Practice*, *19*(1), 251–264.

Michael, J. (2006). Where's the evidence that active learning works? *Advances in Physiology Education, 30*(4), 159–167.

Miller, L. S., Nakhleh, M. B., Nash, J. J., & Meyer, J. A. (2004). Students' attitudes toward and conceptual understanding of chemical instrumentation. *Journal of Chemical Education, 81*(12), 1801–1808.

Minderhout, V., & Loertscher, J. (2007). Lecture-free Biochemistry. *Biochemistry and Molecular Biology Education*, *35*(3), 172–180.

Oliver-Hoyo, M. T., & Allen, D. J. (2005). Attitudinal effects of a student-centered active learning environment. *Journal of Chemical Education, 82*(6), 944–949.

Parr, J. M., & Townsend, M. A. (2002). Environments, processes, and mechanisms in peer learning. *International Journal of Educational Research*, *37*(5), 403–423.

Sarkodie, P. A., & Adu-Gyamfi, K. (2015). Improving students' performance in naming and writing structural formulae of hydrocarbons using the ball-and-stick models. *Chemistry: Bulgarian Journal of Science Education*, *24*(2), 203–219.

Schroeder, J. D., & Greenbowe, T. J. (2008). Implementing POGIL in the lecture and the science writing heuristic in the laboratory-student perceptions and performance in undergraduate organic chemistry. *Chemistry Education Research and Practice*, *9*(2), 149–156.

Shibley, I. A., & Zimmaro, D. M. (2002). The influence of collaborative learning on student attitudes and performance in an introductory chemistry laboratory. J*ournal of Chemical Education, 79*(6), 745–748.

Šket, B., Ferk Savec, V., & Devetak, I. (2012). Pouk kemije z uporabo učnih modulov PROFILES [Chemistry lessons with application of PROFILES learning modules]. In M. Vidmar & T. Taštanoska (Eds.), *Poti do kakovostnega znanja naravoslovja in matematike [Paths to the quality knowledge of science and mathematics]. Proceedings* (pp. 96–97). Retrieved 5. 10. 2018 from http://www.zrss.si/pdf/Zbornik-prispevkov-NAMA2012.pdf

Smith, A. L., Paddock, J. R., Vaughan, J. M., & Parkin, D. W. (2018). Promoting nursing students' chemistry success in a collegiate active learning environment: "If I Have Hope, I Will Try Harder". *Journal of Chemical Education*, *95*(11), 1929–1938.

Spencer, J. N. (1999). New directions in teaching chemistry: A philosophical and pedagogical basis. *Journal of Chemical Education*, *76*(4), 566–569.

Tobin, K. G. (1990). Research on science laboratory activities: In pursuit of better questions and answers to improve learning. *School Science and Mathematics*, *90*(5), 403–418.

Tobin, K. G., & Capie, W. (1981). The Development and Validation of a Group Test of Logical Thinking. *Educucationa Psychology Measurements, 41*(2), 413–423.

Tsitsipis, G., Stamovlasis, D., & Papageorgiou, G. (2010). The effect of three cognitive variables on students' understanding of the particulate nature of matter and its changes of state. *International Journal of Science Education, 32*(8), 987–1016.

Yaman, F., & Ayas, A. (2015). Assessing changes in high school students' conceptual understanding through concept maps before and after the computer-based predict–observe–explain (CB-POE) tasks on acid–base chemistry at the secondary level. *Chemistry Education Research and Practice, 16*(4), 843–855.

ELEMENTARY SCHOOL TEACHERS' OPINIONS ON LEARNING AND TEACHING IN THE DIGITAL AGE

Martina Lešnjak Opaka

Abstract
The omnipresence of digital technologies and their significance in lives of children and adolescents have been growing fast for more than two decades. Schools try to follow this trend but research shows that unthoughtful introduction of new technologies does not have the desired effect. Teachers' opinions on technology play an important role. Research shows that they are often positive or mixed. Besides acknowledging the learning and motivational value of digital technologies teachers express concern about possible distractions, negative influences on students' attention and on aspects of their socio-emotional development. Purpose of present research is to contribute to our understanding of elementary school teachers' opinions on digital technologies, their possible benefits and harms in the context of teaching, learning and development. Qualitative approach was employed. Data were gathered transcribing a discussion of a focus group of elementary school teachers and analysed qualitatively by assigning codes and categories. It turned out that teachers do acknowledge benefits of using digital technologies but they list many obstacles. They are more concerned about thoughtless use of technologies. They detect negative influences on cognitive and socio-emotional development of children and adolescents. They emphasize the role of education in reducing the negative effects.

Key words: digital technology, teaching, learning, elementary school teachers' opinions, focus group

Introduction

Share of young internet users is 94% in developed countries and almost 97% in Europe (ITU, 2017). The share of youth who use internet daily or almost daily in Slovenia is almost 100% and exceeds the European average (SURS, 2016).

Extensive surveys of internet and other media habits of children and adolescents conducted abroad all came to similar conclusions – children and adolescents live in a media saturated environment and are early and most enthusiastic users of new technologies. Already over a decade ago data in the USA showed that the majority of preschool children (83%) spend more than two hours per day in front of screens (Rideout & Hammel, 2006). 79% of children are placed in front of screens before the age of two and 43% of them sit watching screens more than an hour daily. Both is contrary to

American Pediatric Association recommendations that preschool children should not be exposed to screens more than two hours per day and that children under two should not watch screens at all. Parents' main motivation for placing their child in front of a screen is to ensure some peace and quiet for themselves. In parent focus groups more was said about how to get kids to sit in front of a screen than about how to prevent them from doing that (Rideout & Hammel, 2006).

Research that focused on elementary and high school students found out that only half of families establish rules on media use (Roberts, Foehr, & Rideout, 2005, 2010; Skumavc, 2016). Time the young spend with media is growing especially after personal portable media such as smart phones, tablet computers etc. were introduced. With these the young manage to use media 7 hours and 3 minutes per day on average which is practically all the time when not in school or sleeping (Roberts et al., 2010).

A recent research conducted in Great Britain with children between 5 and 15 (Ofcom, 2016) shows that for the first time in history the children spend more time on internet then in front of a TV. The importance of Youtube is overshadowing TV especially in older children. Ownership of mobile phones among children is growing. Between the ages 10 and 11 the number of children with a personal social network profile doubles. Slovenian adolescents between 11 and 19 (mostly 14 and 15-year-olds) who answered questions in an online survey also listed Youtube as the most popular internet site closely followed by Facebook (Safe.si, 2014).

The digital world hides benefits as well as dangers for a developing person. Parents express concern watching their children spend more and more time in the digital world (Roberts et al., 2005, 2010). Handbooks addressing parents, educators and teachers are multiplying fast. Examples are books such as Raising generation tech (Taylor, 2015), The Parent App (Schofield Clark, 2013), Brain-Based Teaching in the Digital Age (Sprenger, 2010), The Information Behavior of a New Generation (Beheshti & Large, 2013), Young Children in a Digital Age (Kaye, 2017) and others.

Teachers' opinions on use of digital technologies in school instruction

The Slovenian law on elementary school states the "…development of literacy and knowledge… in information area…" (ZOsn-F, 2007) as one of the aims of education. Teachers' opinions on implementing digital technologies in teaching are in line with this and mainly positive. Even preschool educators are convinced in importance of digital technologies in education (Veličković & Stošić, 2016). Elementary and high school teachers believe that the use

of digital technologies increases student motivation (Alsaeed, 2017; Bindu, 2017; Orhan-Karsak, 2017; Scherer, Siddiq, & Teo, 2015), fosters creativity (Orhan-Karsak, 2017; Rideout, 2012), enables visualization and concretization of learning content (Alsaeed, 2017; Bindu, 2017; Orhan-Karsak, 2017), cooperation (Scherer et al., 2015) and more efficient search for information (Rideout, 2012; Scherer et al., 2015). Teachers perceive the use of digital technologies as helpful in changing their teaching approach by encouraging them to change from teacher-oriented to student-oriented teaching (Fairchild, Meiners, & Violette, 2016; Parsons & Adhikari, 2016).

Yet the opinions are not merely positive. Teachers perceive both positive and negative effects when introducing digital technologies into an elementary school classroom (Parsons & Adhikari, 2016). Even on higher education level teachers have more difficulties maintaining student attention on what is being taught when in a technologically rich classroom (Fairchild et al., 2016). Especially mixed opinions on technology are found among nonformal environmental teachers (e. g. teachers in museums, zoos, parks) placing greater importance on direct relationship with nature (Peffer, Bodzin, & Duffield Smith, 2013). Opinions on usefulness of digital technologies of vocational education teachers are polarized (Mažgon, Kovač Šebart, & Štefanc, 2015).

Teacher often mention numerous limitations and problems connected to digital technologies in a classroom. They doubt their skills of managing them (Mažgon et al., 2015; Veličković & Stošić, 2016; Fairchild et al., 2016; Alsaeed, 2017; Efe, 2011; Hismanoglu, 2012), they criticise the infrastructure and accessibility (Alsaeed, 2017; Mažgon et al., 2015; Bindu, 2017), mention lack of time for dealing with digital technologies (Fairchild et al., 2016; Alsaeed, 2017), the extra effort needed (Fairchild et al., 2016; Castro Sánchez & Chirino Alemán, 2011), constant dealing with technical problems (Fairchild et al., 2016) and a mass of passwords to memorize (Parsons & Adhikari, 2016).

The scientific literature expresses doubt about the meaningfulness and optimality of digital technology use in the classroom. Slovenian schools are well equipped with digital devices and well connected to internet yet these are rarely used by teachers (Mažgon et al., 2015). Various computer presentations and videos are used in classes most often whereas interactive contents which foster student activity are used less even though the teachers are aware of their educational value (Bindu, 2017; Orhan-Karsak, 2017). Meaningful use of digital technologies in teaching depends on teachers' education. Teachers who already started their careers ask for more training in this field (Veličković & Stošić, 2016). Students preparing for educational profession ask for more concrete experience in this field in their course of studying and more modelling of digital technology use by faculty staff (Al-Ruz & Khasawneh, 2011; Efe, 2011). Too much is left to teacher's personal

initiative (Bindu, 2017).

Even though most students of education uphold positive attitudes toward the use of digital technologies in teaching and intend to use them there are also some negative opinions on it. Vocational education teachers in Slovenia generally do not ascribe much importance to the role e-content plays in learning (Mažgon et al., 2015). Teachers exist who are against technology (Parsons & Adhikari, 2016). Some teachers do not experience positive feelings when teaching with digital technologies and believe it is a waste of classroom time (Hismanoglu, 2012).

PISA research (OECD, 2015) shows that school systems which invested a lot in equipping schools with new digital technologies do not record any noticeable improvement in students' reading, writing and math. Research on effects digital technologies have on student knowledge confirms that it is the meaningfulness and thoughtfulness of its implementation that matters. When its use is well considered the effects are positive (e.g. Folkesson & Swalander, 2007), when not it can be merely a source of distraction and results in poor student knowledge (e.g. McEwen & Dube, 2015; Perry & Steck, 2015; Terras & Ramsay, 2012).

Teachers' opinions on the impact digital technologies have on learning and cognitive development

Digital technology offers many opportunities for learning but it can also hinder it. Time spent playing computer games predicts lower school grades (Roberts et al., 2005). Multitasking, the use of more than one media simultaneously or the use of media during the performance of academic tasks, affects learning in a particularly negative way. Media multitasking is increasingly present among youth and has become more prominent with the expansion of portable digital devices (Foehr, 2006; Roberts et al., 2005, 2010). In a meta-analysis on multitasking it was shown that the main distractors are mobile phones with ringing, text messages and easy access to social networks (Chen & Yan, 2016). Learning processes that are most disrupted are reading and attention. Much research shows a negative effect of digitalization on attentive and immersed reading (Tancig, 2015, 2016). Social networks and their constant accessibility were labelled as major distractors of learning process or "academic quicksand" (Flanigan & Babchuk, 2015, p. 40) by the youth themselves. The young believe that a whole generation is in an underprivileged position on its way to success because of the social media. Beland and Murphy (2016) analysed student performance before and after banning mobile phones from schools and discovered that the ban resulted in higher student achievement.

Research on relations among use of digital technologies and attentional processes, working memory and other control processes known as executive functions yields interesting results. Green and Bavelier (2003) proved direct effect commercial video games have on changes in visual attention. Ophir, Nass, and Wagner (2009) proved on a sample of adults that people who media multitask more often have executive functions less developed than others. They have troubles filtering out internal and external distractors and, surprisingly, have more difficulties switching between tasks. Similar was found in early adolescents 11 to 15 years old (Baumgartner, Weeda, van der Heijden, & Huizinga, 2014).

Of course the question about the cause and the consequence is in place. Do individuals with less developed executive functions have more difficulties avoiding multitasking or does multitasking impair executive functioning? Probably both is possible but some related research proves that executive functions ca be undermined directly as a cause of media behaviour. Although research by Lillard and Peterson (2011) was not about multitasking it showed an immediate decline in executive functions in 4-year-olds after watching 9 minutes of a fast paced cartoon in comparison with children who spent this time drawing.

Teachers' opinions about the impact digital technology has on learning and cognition are in line with scientific discoveries. They believe in positive effects digital technology has on learning processes and student knowledge (Castro Sánchez & Chirino Alemán, 2011; Hismanoglu, 2012; Fairchild et al., 2016; Parsons & Adhikari, 2016). Nonformal environmental teachers would not agree with this – more than half of them believe that use of digital technology undermines knowledge (Peffer et al., 2013). Teachers also have negative attitudes towards entertainment media which are blamed for poor school grades (Rideout, 2012). Teachers often observe the distractive effects of digital technology which divert attention away from learning (Parsons & Adhikari, 2016; Fairchild et al., 2016; Hismanoglu, 2012). Use of digital technology is associated by teachers with worse reading literacy (Parsons & Adhikari, 2016; Rideout, 2012) which is noticed even by students themselves (Parsons & Adhikari, 2016).

Teachers' opinions on the impact digital technologies have on socio-emotional development

Children and adolescents who are less satisfied with their lives or prone to sensation seeking and risky behaviours are exposed to media over an hour per day more than others (Roberts et al., 2005). These are also the ones who media multitask more often (Foehr, 2006). "Liking" photographs and

commentaries is basis for strong and non-critical peer social influence which leads into peer pressure to perform risky behaviours such as binge drinking and smoking (Sherman, Greenfield, Hernandez, & Dapretto, 2017).

A big share of literature on digital technology is dedicated to addiction, e. g. on non-chemical behavioural addiction to mobile phones (Soror, Hammer, Steelman, Davis, & Limayem, 2015; Soror, Steelman, & Limayem, 2012; Verbrugge, Stevens, & de Marez, 2013), social networks (Lee, Cheung, & Thadani, 2012; Thadani & Cheung, 2011), internet (Macur, Király, Maraz, Nagygyörgy, & Demetrovics, 2016), and computer gaming (Pontes, Macur, & Griffiths, 2016). The latter was accepted as a conditional disorder into the diagnostic manual DSM-5 (APA, 2013). In Slovenian 8-graders the prevalence of this disorder was shown to be 2,5% of the population or 3,1% of all computer games players and is comparable to other European countries (Pontes et al., 2016). 8-graders who fall into this category are less satisfied with their lives and mental health.

Teachers perceive positive socio-emotional outcomes of digital technology use such as better opportunities for collaboration and interaction (Parsons & Adhikari, 2016; Fairchild et al., 2016), easier teacher–student communication (Castro Sánchez & Chirino Alemán, 2011), learning prosocial behaviours (Rideout, 2012) and last but not least positive feelings and fun (Fairchild et al., 2016; Orhan-Karsak, 2017). But they also notice some deterioration of relationships in a class after introducing digital technology (Parsons & Adhikari, 2016), some experience negative feelings of their own while teaching with technology (Hismanoglu, 2012), students are less emotionally involved with the environment, the nature (Peffer et al., 2013) and cyber peer bullying (Parsons & Adhikari, 2016) and sexualisation of girls (Rideout, 2012) are cautioned about. Signs of addiction are being noticed. Elementary school students started using their mobile devices at homes more often for purposes other than learning after implementing BOYD (bring-your-own-device) approach in their school (Parsons & Adhikari, 2016). University students are horrified if the computers have to be turned off for some time during class (Fairchild et al., 2016).

Present study

Considering the literature it is possible to identify positive and negative impacts digital technology has on youth. Effects of implementing new technologies in a class have been researched as well as the impact technology has on learning and its associations with cognitive and socio-emotional variables. Teachers are the ones who daily observe the youth and the impact

technology has on them so our aim was to describe their perception of it. Digital technology becomes an important part of everyday lives in the time of elementary schooling. First mobile phones and first social network profiles emerge at the age of 10 or 11 (Ofcom, 2016) while the computer games are encountered even earlier – at the age of 7 (Pontes et al., 2016). Therefore we aimed to find out how all this is perceived by elementary school teachers.

The purpose of this study was to find answers to following research questions:

1. How do elementary school teachers perceive the role digital technology plays in teaching?
2. Where do they perceive benefits and limitations of using digital technology in teaching?
3. How do elementary school teachers perceive the role digital technology plays in child and adolescent learning and development?
4. Where do they perceive benefits and limitations of using digital technology in child and adolescent learning and development?
5. What other topics inside this field emerge?

Method

A qualitative approach to research was employed – a qualitative analysis of the text acquired by recording a discussion of a focus group. Administration and analysis followed guidelines for qualitative research in the field of education (Vogrinc, 2008).

Participants

Five elementary school teachers were included. They all teach at the same urban area elementary school of a medium size. They have known each other for years so relaxed group dynamic, open and sincere epression of opinions were expected. Homogeneity of a focus group ensures more relaxed, sociable atmosphere which provides ground for sincerity and confidentiality (Vogrinc, 2008). Homogeneity of a group enables interaction to be established faster and ideas to be generated in greater quantity (Šarič, 2007).

Sampling was purposive, each unit was selected for a specific reason. To make sure teachers from all levels of elementary education were included the selected teachers teach in all three triads of Slovenian elementary

education system. Because of subject specificity three different teachers from the last triad were invited to participate:

- a teacher of Computer Science, who works at the school as an ICT manager and also teaches facultative subjects in the field of computer sciences (e. g. computer networks),
- a P.E. teacher because of the specificity of the subject which is not taught in a classical classroom with desks and demands well developed motor skills from students,
- a Physics teacher as a representative teacher of school subjects which are traditionally taught in a classical classroom environment.

Besides the three mentioned teachers also a teacher with years of experience teaching first grade and another with years of experience teaching the second triad classes (namely the 4th and the 5th class) participated.

Four out of five participating teachers were female. All have been promoted to the second degree level (i. e. consultant) and they all hold academic degrees in education, two of them finished postgraduate master's degree. They have from 17 to 32 years of service in education.

Data gathering

The adopted technic of data gathering was a focus group discussion or a focus interview, i. e a smaller group of people who meet for the purpose of discussing a certain topic which is known in advance by the participants (Vogrinc, 2008). The moderator (the researcher) initially addressed the focus group with a short cue for the discussion. She told the participants that the purpose of the debate is to hear the participants' opinions on using digital technologies when teaching in a formal school environment. Participants were also encouraged to speak about their opinions on student use of digital technologies for the purposes of learning and other and to highlight the benefits and limitations of the digital technology use and other opinions on the topic.

Since the discussion was fluent and the participants listened to each other, complemented each other and expressed their agreements and disagreements there were only a few extra questions needed for directing the discussion during the exchange. Questions were used when opinions had to be explained further or when the moderator needed some specific information

that had not been mentioned yet. No extra encouragements to continue the discussion were needed. When the role of the moderator is reduced the opening of difficult topics is possible (Vogrinc, 2008).

Procedure

All teachers were personally invited to participate in the research. The topic was announced in advance. The chosen data gathering technic was explained in advance and the purpose of gathering the data was clarified. All were intrinsically motivated to participate because of their beliefs in the salience of the topic.

After some coordination a morning hour before classes was chosen. The focus group gathered in a room at the school they teach at. There was a round table of an appropriate size in the room which enabled the group to seat in a manner that does not exclude anyone.

The discussion of the focus group lasted for half an hour. It was sound-recorded entirely and transcribed immediately after the group finished talking. The transcription was relatively literal. Interjections were omitted. A colloquial word ordering in sentences was sometimes rearranged for clarity.

The transcription of the discussion was sent to participants the same day for verification. One participant sent some minor remarks, others agreed with the transcription.

Codes were assigned to the text and later merged into categories. Relationships among categories were determined.

Research ethics were ensured with an informed consent, confidentiality, absence of deceit, and right to resign from the research. Rules and purposes of the research were clarified in advance (Šarič, 2007). The participants received a report on research findings and the present article before publishing.

Results with discussion

Acquired categories divided into two main topics as expected – opinions on the digital technology in the context of teaching and opinions on the digital technology in the context of learning and development.

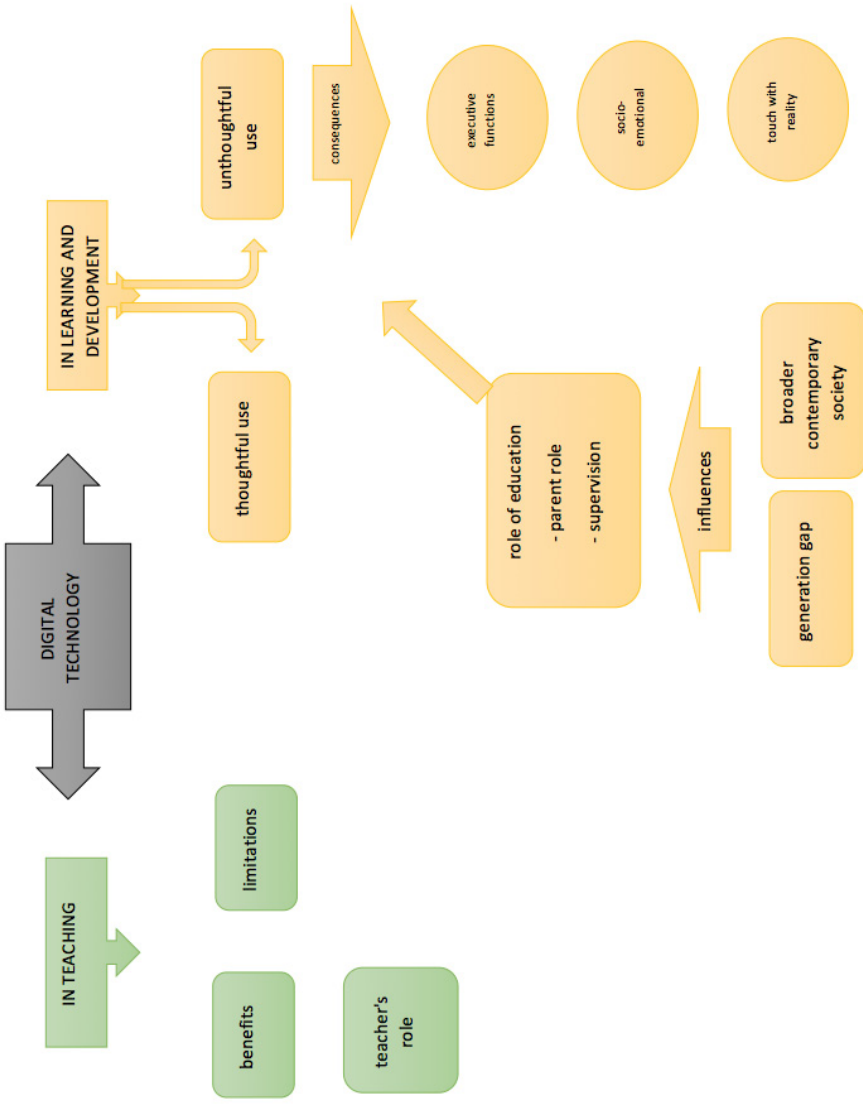


Figure 1: Categories and their relations

Digital technology in teaching

Even though fostering information literacy is an aim of education as stated by law (ZOsn-F, 2007) teachers clearly said that possibilities for using digital technology in elementary schools are in fact scarce and limited. The discussion started with positive aspects of the digital technology use in schools but was soon redirected to its limitations. The teachers listed several benefits of the digital technology such as electronic administration, fast and easy access

to visual content and other information, video feedback about movement and possibilities for designing more organized presentations. They listed the limitations which come with that (lack of time, poor accessibility of materials, finances etc.). They believe that digital technologies are not useful for all learning and they mentioned teaching reading and writing as an example. This opinion is in line with scientific research which revealed negative effect digital age has on reading and writing skills (Tancig, 2015, 2016). Accessibility of information can pose traps for teachers. Some content that would be better shown concretely and practically is instead shown on a screen which is an unneeded support or "crutch" to teacher's work and impoverishes instruction. They were aware that the value of digital technology is not in making shortcuts when teaching. Its purpose is in extra value given to teaching and it demands more, not less work when preparing a class.

The role of the teacher, his expectations, knowledge, exerted effort and personality was emphasized. His role is irreplaceable. Raising awareness of students and parents of an appropriate use of digital technology is also an important role played by teachers. The only disagreement the focus group had among its members was on the level of awareness students have of dangers of the internet. Research shows that there is little actual understanding among youth of the internet, its functioning and credibility (Beheshti & Large, 2013; Bowler & Nesset, 2013; Ofcom, 2016).

The teachers also uncovered the need for changes on the system level. The current information literacy development depends on the teacher too much. They wish for a more systematic approach of teaching information literacy e.g. a specialized school subject. It stems from their observations of a substantial effect of lectures and workshops on the topic of safe digital technology use which are currently performed by external teachers.

It can be said that digital technology is seen as neither saviour nor enemy by teachers. They see the mediating role of the teacher and the educational system as those responsible for its effects. They express many limitations they encounter and a need for extra knowledge, time and resources. This is in line with research which shows negative effects of introducing digital technology to instruction uncritically (OECD, 2015; Perry & Steck, 2015).

Digital technology in learning and development

The other topic turned out to be a) more heated (68% of everything said was about this topic) and b) more complex (more categories emerged and relations among them are more complicated). The topic relates to learning in the broadest sense and includes learning of school content with digital technology and other forms of digital technology use.

The basis for this topic was the division of the digital technology use on thoughtful and unthoughtful. Opinions on thoughtful technology use were relatively unanimous and less numerous. Teachers did not exclude positive opportunities digital technology offers in learning (information, extra exercise and explanation seeking, possibilities of distance collaboration) but they emphasized that these cannot be taken for granted. They must be used as an upgrade of learning and not as a shortcut. They demand extra work and student engagement and not less effort. At the same time the importance of well-developed executive functions for efficient learning from digital technology was emphasized which is in line with research (McEwen & Dubé, 2015).

It is the unthoughtful use of digital technology that poses a greater and a more complex problem in teachers' eyes. It was defined more broadly, its negative consequences were exposed and ways of influencing the children to be more thoughtful in its use were pointed out. Causes for negative influences on children and answers to why attempts of improving the state were looked for.

Great concern about using digital technology in childhood and adolescence for the purpose of entertainment was expressed. Lillard's and Peterson's (2011) findings about immediate negative effects of cartoons were confirmed. Negative effects of playing video games especially on motivation and learning were emphasized. Questionable content was considered too accessible to children. Children do not have the self-regulatory skills for using digital technology safely. Teachers blamed the exposure of children to the digital world being too early. It often starts before the age of one and the cause is parent passivity. Similar was found in Rideout's and Hamel's research (2006). The research on Slovenian children confirmed that the children today play computer games from a very early age – from age 7 on the average and two years earlier for those who later develop dependency behaviour (Pontes et al., 2016).

Many negative effects digital technology has on children were named. The biggest problem was seen in the decrease of children's attention. Green and Bavelier (2003) proved that video games affect attention, Ophir et al. (2009) and Baumgartner et al. (2014) proved similar specifically for persons who multitask often. Multitasking was found problematic also by our participants. Roberts et al. (2005, 2010) and Foehr (2006) found its increase among children in the USA. Teachers are aware of its harmfulness. Other negative effects mentioned were restlessness, thought passivity, memory problems and addiction. Addiction to digital technology and its harmfulness were also identified in the literature (Lee et al., 2012; Thadani & Cheung, 2011; Macur et al., 2016; Pontes et al., 2016; Soror et al., 2012, 2015; Verbrugge et al., 2013).

Besides the mentioned negative effects digital technology has on cognition teachers also mentioned negative effects it has on aspects of socio-emotional development such as emotional apathy, restlessness and impatience in personal relationships, lack of empathy due to lack of authentic peer socializing and a lost touch with reality. Poorer empathy development as the cause of lacking in authentic peer relations has ground in neuroscience findings. Infants' mirror neurons have trouble reading a mechanic arm's intentions but they have less problems predicting a human hand move (Meltzoff, 1995, in Tancig, 2008).

Danger of internet abuse was also mentioned being a reality of the digital world in the time of adolescence (Skumavc, 2016).

The role of education in and for the digital age

A great role in educating children to manage the digital world was assigned to primary family upbringing. This opinion is the basis for the many handbooks published to advise on upbringing children in the digital age (e.g. Beheshti & Large, 2013; Kaye, 2017; Schofield Clark, 2013; Sprenger, 2010; Taylor, 2015). Parents were criticized for not having enough knowledge about digital technologies and not being aware enough about the dangers of unthoughtful digital technology use. Digital technology is seen as being misused for parenthood shortcuts (it merely distracts the child so he temporarily demands less parent attention). To defend parents a little they said that the parents differ greatly in attitudes and upbringing styles and that highly aware parents do exist especially among more educated parents. An American research actually showed that it is the children of medium educated parents who are exposed to computer games the least while children of lower and higher educated parents engage in this kind of entertainment more often (Roberts et al., 2005). Another defence of parents mentioned by our participants was that raising awareness about harmful effects of digital technology in the media is still relatively scarce. They try to substitute this at least partially at parent-teacher meetings.

Teachers confirmed the research findings about the role of parent supervision over the digital technology use and that this supervision is in reality lacking (Foehr, 2006; Roberts et al., 2005, 2010; Skumavc, 2016).

Despite the pessimism about the digital technology teachers agreed that this is not the main enemy of young generations development. They broadened the problem and found out that the problems they see in the field of digital technology are actually a reflection of problems of the broader society ad its *zeitgeist*. A value crisis was mentioned which results in low

credibility of all (not just digital) media, in glorification of consumerism and following the interest of the capital instead the interest of children. A substantial generation gap makes raising new generations harder than ever.

Conclusions

Elementary school teachers are very critical about effects modern technology has on children and adolescents. On one hand they are aware of the opportunities the technology offers for teaching and learning. On the other hand they are conscious about the fact that these opportunities are taken advantage of poorly and that technology is in reality mostly used unthoughtfully. They know the dangers for cognitive and socio-emotional development and observe negative effects digital technology can have on children. They emphasize the role of upbringing and education in optimizing the digital technology use. There are problems of using digital technology in the eyes of teachers but there is also awareness that these problems have to be addressed. They believe the education should address the problem first and that teacher education, children and adolescents education as well as parent education should be included. Digital technology is neither saviour nor enemy – it is what we make of it as would be agreed by Apple (1988).

The present research addresses the creators of education system to take better care of systematic education for the digital age and information literacy teaching. The development of information literacy is at the moment left to personal enthusiasm and attitudes of teachers. They feel it is their responsibility and see the importance of the problem but miss the needed knowledge. They wish having more centralized guidelines in this area and more defined forms of teaching information literacy. They suggest more parent awareness raising by schools and the media.

It would be interesting to see how parents, children and adolescents feel about this topic. Similar qualitative research can be found in the scientific literature including parents and adolescents but rarely elementary school children. Having in mind that this is the period when the digital technology starts playing a more prominent role in their lives it would be important to see their beliefs about its effects. There also exists a need to carry out a quantitative survey about the actual digital technology use among elementary school students in Slovenia following the trend of research done abroad.

Because of the importance of the problem science must define the causality between digital technology and development. Longitudinal research in this area is urgent.

The main shortcoming of the present research is the approach that does not allow the findings to be generalized. More discussions including other teachers should be conducted or quantitative data should be obtained to support the conclusions.

References

Al-Ruz, J. A., & Khasawneh, S. (2011). Jordanian pre-service teachers' and technology integration: A human resource development approach. *Journal of Educational Technology & Society*, *14*(4), 77–87.

Alsaeed, M. S. (2017). Using the internet in teaching algebra to middle school students: A study of teacher perspectives and attitudes. *Contemporary Issues in Education Research*, *10*(2), 121–136.

APA. (2013). *Diagnostic and Statistical Manual of Mental Disorders,* Fifth Edition. Arlington, VA: APA Publishing.

Apple, M. W. (1988). *Teachers and Texts: A Political Economy of Class and Gender Relations in Education*. NY, London: Routledge.

Baumgartner, S. E., Weeda, W. D., van der Heijden, L. L., & Huizinga, M. (2014). The relationship between media multitasking and executive function in early adolescents. *The Journal of Early Adolescence*, *34*(8), 1120-1144. doi: 10.1177/0272431614523133

Beheshti, J., & Large, A. (2013). *The Information Behavior of a New Generation: Children and Teens in the 21st Century.* Lanham, Maryland: The Scarecrow press.

Beland, L., & Murphy, R. (2016). Ill Communication: Technology, distraction & student performance. *Labour Economics*, *41*, 61–76. doi:10.1016/j.labeco.2016.04.004

Bindu, C. N. (2017). Attitude towards, and awareness of using ICT in classrooms: A case of expatriate Indian teachers in UAE. *Journal of Education and Practice*, *8*(1), 10–17.

Bowler, L., & Nesset, V. (2013). Information literacy. In J. Beheshti & A. Large (Eds.), *The Information Behavior of a New Generation: Children and Teens in the 21st Century* (pp. 45–63). Lanham, Maryland: The Scarecrow press.

Castro Sánchez, J. J., & Chirino Alemán, E. (2011). Teachers' opinion survey on the use of ICT tools to support attendance-based teaching. *Computers & Education*, *56*, 911–915. doi:10.1016/j.compedu.2010.11.005

Chen, Q., & Yan, Z. (2016). Does multitasking with mobile phones affect learning? A review. *Computers in Human Behavior*, *54*, 34–42. doi:10.1016/j.chb.2015.07.047

Efe, R. (2011). Science student teachers and educational technology: Experience, intentions, and value. *Educational Technology & Society*, *14*(1), 228–240.

International Telecommunication Union. (2017). *ICT Facts and Figures*. Retrieved 20. 8. 2017 from http://www.itu.int/en/ITU-D/Statistics/Pages/facts/default.aspx

Fairchild, J. L., Meiners, E. B., & Violette, J. L. (2016). "I tolerate technology--I don't embrace it": instructor surprise and sensemaking in a technology-rich learning environment. *Journal of the Scholarship of Teaching and Learning, 16*(4), 92–108.

Flanigan, A. E., & Babchuk, W. A. (2015). Social media as academic quicksand: A phenomenological study of student experiences in and out of the classroom. *Learning and Individual Differences*, *44*, 40–45. doi:10.1016/j.lindif.2015.11.003

Foehr, U. G. (2006). *Media Multitasking Among American Youth: Prevalence, Predictors, and Pairings*. Menlo Park: The Henry J. Kaiser Family Foundation.

Folkesson, A., & Swalander, L. (2007). Self-regulated learning through writing on computers: Consequences for reading comprehension. *Computers in Human Behavior*, *23*(5), 2488–2508. doi:10.1016/j.chb.2006.04.003

Green, C. G., & Bavelier, D. (2003). Action video game modifies visual selective attention. *Nature*, *423*, 534–537.

Hismanoglu, M. (2012). Prospective EFL teachers' perceptions of ICT integration: A study of distance higher education in Turkey. *Journal of Educational Technology & Society*, *15*(1), 185–196.

Kaye, L. (2017). *Young children in a digital age*. London, New York: Routledge, Taylor & Francis Group.

Lee, Z. W. Z., Cheung, C. M. K., & Thadani, D. R. (2011). An investigation into the problematic use of Facebook. *Proceedings of the Annual Hawaii International Conference on System Sciences*, 1768–1776. doi:10.1109/HICSS.2012.106

Lillard, A. S., & Peterson, J. (2011). The immediate impact of different types of television on young children's executive function. *Pediatrics*, *128*(4), 644–649. doi: 10-1542/peds.2O10-191E

Macur, M., Király, O., Maraz, A., Nagygyörgy, K., & Demetrovics, Z. (2016). Prevalence of problematic internet use in Slovenia. *Slovenian Journal of Public Health, 55*(3), 202–211. doi: 10.1515/sjph-2016-0026

Mažgon, J., Kovač Šebart, M., & Štefanc, D. (2015). The role and use of e-materials in vocational education and training: The case of Slovenia. *Turkish Online Journal of Educational Technology*, *14*(4), 157–164.

McEwen, R. N., & Dubé, A. K. (2015). Engaging or distracting: Children's tablet computer use in education. *Journal of Educational Technology & Society*, *18*(4), 9–23.

OECD. (2015). *Students, computers, and learning: making the connection.* Paris: PISA, OECD Publishing.

Ofcom. (2016). *Children and parents: media use and attitudes report*. London: Ofcom.

Ophir, E., Nass, C., & Wagner, A. D. (2009). Cognitive control in media multitaskers. *Proceedings of the National Academy of Sciences of the United States of America*, *106*(37), 15583–15587. doi:10.1073/pnas.0903620106

Orhan-Karsak, H. G. (2017). Investigation of teacher candidates' opinions about instructional technologies and material usage. *Journal of Education and Training Studies*, *5*(5), 204–216.

Parsons, D., & Adhikari, J. (2016). Bring your own device to secondary school: The perceptions of teachers, students and parents. *Electronic Journal of E-Learning*, *14*(1), 66–80.

Perry, D., & Steck, A. (2015). Increasing student engagement, self-efficacy, and meta-cognitive self-regulation in the high school geometry classroom: Do iPads help?. *Computers in the Schools*, *32*(2), 122–143. doi:10.1080/07380569.2015.1036650

Peffer, T. E., Bodzin, A. M., & Duffield Smith, J. (2013). The use of technology by nonformal environmental educators. *Journal of Environmental Education*, *44*(1), 16–37.

Pontes, H. M., Macur, M., & Griffiths, M. D. (2016). Internet gaming disorder among Slovenian primary schoolchildren: Findings from a nationally representative sample of adolescents. *Journal of Behavioral Addictions, 5*(2), 304–310. doi:10.1556/2006.5.2016.042

Rideout, V. (2012). *Children, Teens, and Entertainment Media: The View from the Classroom*. San Francisco: A Common Sense Media Research Study.

Rideout, V., & Hamel, E. (2006). *The media family: electronic media in the lives of infants, toddlers, preschoolers, and their parents*. Menlo Park: The Henry J. Kaiser Family Foundation.

Roberts, D. F., Foehr, U. G., & Rideout, V. (2005). *Generation M: media in the lives of 8–18 year-olds*. Menlo Park: The Henry J. Kaiser Family Foundation.

Roberts, D. F., Foehr, U. G., & Rideout, V. (2010). *Generation M²: media in the lives of 8–18 year-olds*. Menlo Park: The Henry J. Kaiser Family Foundation.

Safe.si (2014). *Rezultati ankete: Spletne navade in trendi mladih v Sloveniji [Results of the survey: Internet habits and trends among youth in Slovenia*]. Retrieved 20. 8. 2017 from https://safe.si/novice/rezultati-ankete-spletne-navade-in-trendi-mladih-v-sloveniji

Scherer, R., Siddiq, F., & Teo, T. (2015). Becoming more specific: Measuring and modeling teachers' perceived usefulness of ICT in the context of teaching and learning. *Computers & Education*, *88*, 202–214. doi:10.1016/j.compedu.2015.05.005

Schofield Clark, L. S. (2013). *The parent app: understanding families in the digital*. New York: Oxford University Press.

Sherman, L. E., Greenfield, P. M., Hernandez, L. M., & Dapretto, M. (2017). Peer influence via instagram: Effects on brain and behavior in adolescence and young adulthood. *Child Development*, *89*(1), 1–11. doi:10.1111/cdev.12838

Skumavc, G. (2016). *Spletno nadlegovanje in učenci s posebnimi potrebami, magistrsko delo [Internet Harassment and Students with Special Needs, Master's Thesis*]. Ljubljana: University of Ljubljana, Faculty of Education.

Soror, A. A., Hammer, B. I., Steelman, Z. R., Davis, F. D., & Limayem, M. M. (2015). Good habits gone bad: Explaining negative consequences associated with the use of mobile phones from a dual-systems perspective. *Information Systems Journal*, *25*(4), 403–427. doi:10.1111/isj.12065

Soror, A., Steelman, Z., & Limayem, M. (2011). Discipline yourself before life disciplines you: Deficient self-regulation and mobile phone unregulated use. *Proceedings of the Annual Hawaii International Conference on System Sciences*, 849–858. doi:10.1109/HICSS.2012.219

Sprenger, M. (2010). *Brain-based teaching :) in the digital age*. Alexandria, Va.: Association for Supervision and Curriculum Development.

SURS. (2016). *Internet v 1. četrtletju 2016 uporabljalo 75 % oseb (16–74 let), 55 % prek mobilnega ali pametnega telefon [Internet used by 75 % of population in the 1st quarter of 2016 (16–74 years old), 55 % using a mobile or a smart phone]*. Retrieved 20. 8. 2017 from http://www.stat.si/StatWeb/News/Index/6263

Šarić, M. (2007). Fokus skupine v psihološkem raziskovanju [Focus groups in research in psychology]. *Psihološka Obzorja [Horizons of Psychology]*, *16*(3), 125–137.

Tancig, S. (2008). Razvoj empatije, teorije uma in metareprezentacije: interdisciplinarni pogledi [Development of empathy, theory of mind and meta-representations: interdisciplinary views]. In M. Bohanec et al. (Eds.), *Zbornik 11. mednarodne multikonference Informacijska družba [Proceedings of the 11th International Multi-Conference Information Society]* (pp. 353–357). Ljubljana: Mednarodna multikonferenca Informacijska družba [International Multi-Conference Information Society].

Tancig, S. (2015). Utelešena kognicija in možgani v digitalni dobi [Embodiment and brain in the digital age]. In J. Port (Ed.), *Telo in tehnologija: Zbornik 8. kulturološkega simpozija [Body and Technology: Proceedings of the Eight Culturology Symposium]* (pp. 79–92). Ljubljana: Kult.co, culturologists' society.

Tancig, S. (2016). Od Prousta do Twitterja – nevroedukacijske raziskave bralne pismenosti v

digitalni dobi [From Proust to Twitter – neuroeducation research on reading literacy in the digital age]. In T. Devjak & I. Saksida (Eds.), *Bralna pismenost kot izziv in odgovornost [Reading Literacy as a Challenge and Responsibility]* (pp. 9–26). Ljubljana: Faculty of Education.

Taylor, J. (2015). *Vzgajanje tehnološke generacije [Raising Generation Tech].* Maribor: Hiša knjig, Založba KMŠ.

Terras, M. M., & Ramsay, J. (2012). The five central psychological challenges facing effective mobile learning. *British Journal of Educational Technology*, *43*(5), 820–832. doi:10.1111/j.1467-8535.2012.01362.x

Thadani, D. R., & Cheung, C. M. K. (2011). Exploring the role of online social network dependency in habit formation. *32nd International Conference on Information Systems, Shanghai 2011,* (pp. 3446–3461). Retrieved from https://pdfs.semanticscholar.org/08c8/840587263e87b8478c84fd72bff5b096b7de.pdf

Veličković, S., & Stošić, L. (2016). Preparedness of educators to implement modern information technologies in their work with preschool children. *International Journal of Cognitive Research in Science, Engineering and Education, 4*(1), 23–30. doi: 10.5937/IJCRSEE1601023V

Verbrugge, K., Stevens, I., & de Marez, L. (2013). The role of an omnipresent pocket device: smartphone attendance and the role of user habits*. Crises, 'Creative Destruction' and the Global Power and Communication Orders, Proceedings.* Presented at the Crises, "Creative Destruction" and the Global Power and Communication Orders (IAMCR - 2013).

Vogrinc, J. (2008). *Kvalitativno raziskovanje na pedagoškem področju [Qualitative Research in the Field of Education]*. Ljubljana: Faculty of Education.

Zakon o spremembah in dopolnitvah Zakona o osnovni šoli (ZOsn-F) [Law on changes and supplements of the law on elementary school] (2007). *The Official Journal of the Republic of Slovenia*, no. 102/2007, 9. 11. 2007.

PRINCIPALS´ ROLE IN DEVELOPING PROFESSIONAL LEARNING COMMUNITIES

Rexhep Krasniqi

Abstract
Quality of teaching is a factor that has a great impact on students' attainment, therefore, the improvement of teachers' quality has generated endless debates for more than a century. Large amounts of financial resources are spent in supporting various methods that help teachers increase their pedagogical knowledge and skills. Professional learning communities is an approach that is widely utilized by well-performing systems for enhancement of teaching effectiveness. Thus, the goal of this paper is to offer a comprehensive framework about the concept of learning communities, their impact on teachers, factors affecting their activities, and the role of the principal in creating conditions for teachers' professional development. The topic of the paper has been explored by reviewing theoretical works and empirical research on learning communities. The paper also offers a set of recommendations about PLCs and their influence. Its findings will contribute to the literature on PLCs and will help principals to understand their role and impact in facilitating teacher learning.

Key words: professional learning communities, teachers, principals, learning, teaching, collaboration

Introduction

Teaching is both a collaborative and competitive, discrete and exposable, dynamic, nonlinear, and complex process. Inspite of such a complexity, teachers still prefer professional isolation and continue to "[…] operate their kingdoms behind classroom doors" (Fullan, 2014, p. 29). They may be unaware, but such seclusion has a great impact on the quality of their classroom practices, consequently on students' learning and achievement. The influence of teacher quality goes beyond the classroom walls, actually "The quality of an educational system cannot outperform the quality of its teachers" (Harris & Jones, 2010, p. 174).

Quality of teachers is an issue that has generated everlasting debates amongst scholars, practitioners, policy-makers, students, and parents. National governments and international organizations invest large amounts of financial resources in enhancing teacher's knowledge and skills because of their profound influence on the educational system directly, and the whole society indirectly. A growing body of literature provides examples which show that different nations apply a variety of methods to help teachers

improve their knowledge, skills, and practices. But Graham (2007) posits that, "The most effective way to improve teaching quality, however, is a contentious issue." (p. 1).

It is widely recognizable that pre-service education does not equip teachers with sufficient knowledge and skills for their professional engagements till the end of their career. All over the world, institutions in charge of education advise and even oblige teachers to attend various teacher professional development modules irrespective of their work experience. Usually, such undertakings aid teachers to become more skillful and knowledgeable.

Scholars have examined the impact of various methods designed to increase teacher quality. Amongst others, researchers have found positive links between professional learning communities (PLC) and improvement of teachers' instructional practices, assessment methods, professional knowledge and behavior (Goddard, Goddard, & Tschannen-Moran, 2007; Lyna, Loong Hung, & Chong, 2016). For instance, Hargreaves, and Fullan (2012) offer concrete examples showing how Finland, Canada, Singapore, Shanghai, Great Britain, United States, and other states help teachers to improve their instructional quality. The cases by these two authors indicate that these countries support and promote PLCs as one of key methods for improvement of teaching and learning process.

It needs to be emphasized that establishment and functionalization of PLCs in schools is a complex process that depends on a variety of factors and requires a clear guidance and sustained support. Successful PLCs are usually the ones supported and orchestrated by the school principal (Hargreaves & Fullan, 2012; Hord, 1997; Woodland, 2016; Whalstrom & Louis, 2008). Cultural, structural, and administrative factors also affect operation and success of a PLC within the school or network of schools (Cole, 2012; Chong & Kong, 2012; Hallam, Smith, Hite, & Wilcox, 2015; Finnigan & Daly, 2012)

Thus, this article will attempt to analyze the concept of PLCs, their impact on the educational process, factors that affect successful implementation of PLCs in schools, and the role of the principal in creating and sustaining a suitable environment for PLC activities. It has two main goals: 1) to offer a comprehensive framework that would help teachers and principals to better understand the impact of PLCs on the education process; 2) to elaborate the factors that affect implementation and functionalization of PLCs in schools. It will conclude with a set of practical recommendations that could be utilized by teachers, principals, and other educational stakeholders involved in PLC activities. The point of departure will be the five disciplines of a learning organization, coined by Senge (2006).

Attempts are made to spread the concept and practices of PLCs in

underperforming educational systems, too, but studies describing how PLCs are implemented in such contexts and if they succeed to make positive changes are scarce, if not inexistent.

What are PLCs?

As organizational structures, PLCs are collaborative forums that aid teachers to accumulate pedagogical knowledge, to enhance their instructional and assessment methods, and to implement curriculum successfully. They also help building of positive relationships inside and outside the school. When truly embraced by the teachers, PLCc are instruments that secure school effectiveness and better student attainment. Depending on series of factors, educationalists use a variety of definitions to describe PLCs, but the common denominator is that they are groups of professionals learning and working together to enhance their knowledge and skills as a way for improvement of students' attainment. For instance, Mitchell and Sackney (2000) define PLCs as "groups of people who take an active, reflective, collaborative, learning-oriented, and growth promoting approach toward both the mysteries and problems of teaching and learning" (p. 3). Bottery (2004) argues that PLCs are groups that "Continually expand their capacity, develop new and expansive patterns of thinking, have collective aspirations, learn together, and invest in their learning" (p. 180). Furthermore, Hord (1997) sees PLCs as forums "in which the teachers in a school and its administrators continuously seek and share learning, and act on their learning" (p. 6).

Describing the concept of learning communities, Kiefer and Senge (1982) theorized that members of learning communities are united people that "transcend their personal limitations and realize a collective synergy" (p. 1). Promoting a similar viewpoint, Hargreaves (2007) argued that sustainable PLCs manage to synergize their efforts by setting learning as their top priority. Illustrating PLC learning activities according to the social theory, Collay, Dunlap, Enloe, and Gagnon (1998) stipulated that learning in a community of professionals is the opposite of isolation as it develops in an interactive environment, where individual contribution is an integral part of a systematic learning process. Also, teachers are usually willing to contribute to positive transformation of their schools if they work together in a trusting, critical, and creative environment (Servage, 2008).

A true teacher collaboration depends on a set of preconditions, such as mutual respect, trust, reflective dialogue, cultural, structural, and social factors, school leadership, and personal attitudes and attitudes. Mitchell and Sackney (2007) identified five principles that bring teachers together in a PLC:

deep respect, collective responsibility, appreciation of diversity, problem solving orientation, and role modelling. In addition, Hargreaves and Fullan (2012) maintain that PLCs consist of three core components: *communities, learning communities, and professional learning communities.* According to their interpretation: a) communities are collectives committed to achievement of a common goal by working together and showing respect for each other; b) learning communities are groups of teachers dedicated to professional learning as a way leading to improvement of instructional practices, resulting in better student scores; and c) professional learning communities are collectives that collaborate and decide based on collective experience and learning rather than functioning strictly according to the book.

"Professional learning in effective schools: The seven principles of highly effective professional learning," a paper published by the Government of Victoria in Australia, investigated the methods implemented by effective schools for improvement of teachers' skills and knowledge. The point of departure of this paper was that teaching is a complex profession and "teachers need to update their skills and knowledge continuously, in order to fulfil their mission, respectively to prepare students for the highly dynamic and rapidly changing world" (p. 2). The findings of the paper show that teachers of these schools improve their skills in several ways, respectively through *action research, examination of student work, study groups, case discussions, peer observation,* and *lesson study.* Based on the findings, the paper expressed anticipations that continuous teacher professional learning would be fruitful if it is: *focused on students' outcomes*, *embedded in teacher practice, informed by best available research on teaching and learning, is collaborative and reflective, is based on evidence and data, is part of the culture, and is an individual and collective responsibility at all levels.*

Hargreaves and Fullan (2012) are promoters of the idea that social interaction and positive relationships are the driving force behind the professional capital of an organisation. Usually, positive relationships are based on reciprocity and are a source of collective support. Therefore, the success of PLCs, as goal-oriented support groups, depends on series of core values, such as building of relations, sharing of ideas, practices, and experiences, which usually happen in a trusting environment (Wahlstrom & Louis, 2008). Given that teachers are usually very busy with their daily professional engagements, their collaboration is a difficult developmental process affected by different challenges. But when teachers manage to create healthy relationships with each other, they manage to overcome the obstacles along the way.

Nevertheless, it should be recalled that "Having well-prepared teachers who focus on continually improving their instruction is only part of the solution"

(Darling-Hamond, 2007, p. 69). Thus, PLCs should not be seen as a silver bullet for all the teaching and learning problems, as they are only one of the approaches that help improve teacher's skills (Harris & Jones, 2010) and their success depends on a variety of factors that will be elaborated further below.

Origin of PLCs

The concept of PLCs is a derivative of the learning organization theory that has been originally conceived for the business world as a model that would assist commercial companies to increase their output through continuous professionalization of their respective staff. The theory of learning organization was coined by Senge back in 1990 and has been complemented with additional interpretations, data, and information by many other scholars until nowadays. Even though they sound similar and are often used interchangeably, scholars suggest that there is a difference between PLCs and learning organizations. Actually, Sackney and Mitchell (2001) explain that the difference is in the means and ends of the concept:

> The two terms, although similar, are not synonymous. At the risk of sounding somewhat simplistic, we believe that the key difference lies in the definition of ends and means. In learning organizations, the ends of importance are organizational growth, productivity, efficiency, and effectiveness. The means are the people and the learning that they do in support of organizational goals. […] By contrast, in a learning community, the ends of importance are growth and development of the people. The means are the ways in which community members work and learn together (p. 1).

The framework of learning organizations, conceived by Senge (2006), rests on five core disciplines: *personal mastery, mental models, shared vision, team learning, and systems thinking*. Senge (2006) also advised that an organization is a genuine learning organization only if "the five disciplines develop as an ensemble" (p. 11). Below is a brief description of each discipline of a learning organization and how they affect teachers' learning and schools work.

Personal mastery is the first discipline of a learning organization. As a standalone phrase, it implies and urges for commitment to individual development and lifelong learning. People possessing such a trait are not contended with the skills, capacities, and knowledge they possess and they are "continually expanding their ability to create the results they truly seek in life" (Senge, 2006, p. 131). This discipline encourages teachers to seek and find ways for transcending their expectations and standards.

Education systems aspiring to be and to remain on top urge their teachers to get rid of outdated information, to review their classroom practices, and to enrichen their content knowledge. They are encouraged to be life-long learners and it is widely known that learning is a social activity. Lieberman (2007) says that "Learning more can come from peers, research or knowledge that is generated together, but the starting point is one's own practice." (p. 200). It is worth recalling that access to limitless learning sources, online tutorials offered by experts, and forums of professionals and practitioners have made personal mastery journey easier and more tangible than ever before.

The rapid social, economic, and technological developments, which will probably become even more dynamic in the future, are turning *personal mastery* into a necessity for professional survival in the highly complex and competitive world. Given that individual learning does not automatically translate into organizational learning, school leaderships are advised to identify teachers that are committed to personal mastery and to promote them as agents of learning and change.

Mental models are the assumptions a person may have or create about the surrounding world. They are often roadblocks that hinder teacher's personal learning and readiness for change, which usually affect the end users, respectively the students. Senge (2006) considers mental models as very powerful factors that shape one's perceptions toward variety of components that are crucial for an organization. Due to mental models one person may have different perceptions about the same matter under different circumstances and various persons may come up with a similar perception about an issue under certain circumstances (Maund, 2003).

Mental models are a product of various experiences a person has had. They may also be "flawed or reflect a knowledge that no longer exists" (Chapman & Ferfolja, 2001, p. 399). Fullan (2011) provides vivid examples how mental models hamper teachers' work and have a negative impact on students. In order for teachers to challenge and alter their mental models, they should continually interact, exchange experiences, knowledge, and data (Hord, 1997). However, research into the impact of mental models on the educational process is sparse. Consequently, it is hard to believe that teachers are aware of the negative influence of the mental models that exist in their heads. For instance, Thompson, Gregg, and Niska (2004) conducted a mixed-method research with principals and teachers of six schools. Their goal was to understand if the participants see their schools as learning organizations. However, none of the principals spoke of mental models, which is a core discipline of a learning organization. Thus, lack of research on this discipline of a learning organization is a signal that principals and teachers

should be assisted to understand the power of mental models and their influence on the education process.

Shared vision is a force that synergizes and mobilizes organization's members toward achievement of the set goal because "When people truly share a vision, they are connected, bound together by a common aspiration" (Senge, 2006, p. 192). Differently from the two previous disciplines, shared vision seems to be clearer as a concept. For instance, all the participants of the aforementioned study conducted by Thompson et al. (2004) were aware of the importance of shared vision.

However, Senge (2006) cautions that there is a big difference between commitment to and compliance with a shared vision. He explains that shared vision is usually conceived and promoted by the leader and others are expected to comply with rather than to be committed to it. Such a practice is quite common in the business world and bureaucratic organizations, but that should not be the case in schools. Schools are expected to be organizations of equals, with flat structures, and shared responsibility. Thus, it is important for principals to be aware that if school's shared vision is shared and not imposed, it will change relationships within the organization, teachers will see the school as 'our school' and will be more committed to achievement of aimed results. Being the central school figures, principals are encouraged to involve the entire faculty in building school's vision together, which would contribute to a strong cohesion, a sustained learning environment, collective responsibilities, and easier achievement of foreseen goals. It would strengthen relationships between the teachers, as well as with the principal, students, and their parents, which are key components for collaboration between all the participants.

Team learning is the fourth discipline of a learning organization that facilitates development of entire collective through reflection, dialogue, constructive critique, and exchange of data, information, and knowledge. It enables one member to learn from the group and the group to learn from one member. In a way, team learning is a *group mastery.* The starting point of a successful team learning process is, "Collectively, we can bring more insightful, more intelligent than we can possibly be individually" (Senge, 2006, p. 221).

Team learning usually produces practical solution to classroom challenges, but it is also a long and complex process that depends to a great extent on the three aforementioned disciplines. In schools, it is empowered by encouraging commitment to *personal mastery,* by urging teachers to change negative *mental models,* and by involving them in building *shared vision.* It also depends on a set of prerequisites, such as mutual respect and trust,

which lead to sharing of information, data, and experiences safely. Collinson (2014) investigated the factors that motivated and restrained the dissemination of teachers' learning in three schools. The participants identified 43 factors that motivate and 35 factors that restrain dissemination of organisational learning. Some of the main motivators were: relationships with colleagues, personal attitudes, level of competences, principal's encouragement, suitable environment, and time for meetings inside and outside school. The main restrains included lack of time, peers' attitudes, lack of trust and reliability, technical issues, and lack of PLC culture.

Given that members of these teams are usually committed to learning, the factors that affect their joint ventures require principal's involvement in removing the possible obstacles. Thus, team learning is usually coordinated by the principal who is supposedly familiar with the personal traits and needs of the teachers as well as the culture of the school and beyond. For instance, Yuan and Zhang (2016) showed that principal's presence during the team learning process is decisive for paving the way to an open dialogue between participants.

Systems thinking is the fifth discipline that encapsulates the whole theory of the learning organization. It is a construct enabling one to see the parts working together and interconnectedly (Senge, 2006). It also has two main meanings: "rising above the separate components to see the whole system, and thinking about each separate component as a part of the whole system" (Shaked & Schechter, 2014, p. 794). Operating as part of a larger system and being a system on their own, schools are organizations whose work depends on interrelationships between instruction, curriculum, assessment, students' attitudes, class size, and other similar parts of the school. School's work is also influenced by relations between teachers, their attitude toward teaching and learning, their satisfaction with the job, incomes, and other incentives. Decisions of the past, present, and future as well as a conglomerate of other external factors affect school's operation and success, too.

Shaked and Schechter, (2014) posit that principals that work according system thinking framework do not try to fix the system by breaking it into parts, but rather by seeing the whole picture as one piece and by observing the hidden relations between the parts. If a school is not functioning well, then the principal, should step back, stand upfront as a conductor, and observe if something has been missed out and how constituents of the school are functioning separately and in concert with others (Barnard, 2013). In conclusion, Thompson et al. (2004) argues that "A school must understand and practice the five disciplines of a learning organization to be a true professional learning community" (p. 5).

PLCs' role in teaching and student attainment

Globalization, socio-economic developments, demographic diversity, standardized competitions, education internationalization projects, and rapid technological developments are some factors that indicate that education is becoming more complex and more important, therefore, additional efforts need to be made for enhancing teachers skills and knowledge (Liberman, 2007; Mitchell & Sackney, 2007; Stoll, Robertson, Butler-Kisber, Sklar, & Whittingham, 2007). These authors urge schools to establish structures that facilitate stronger ties in schools in order to be able to handle and respond to arising challenges duly and adequately. They also call upon teachers to abandon their 'private kingdoms,' to collaborate with peers that encounter similar challenges, to analyze problems and solution collectively, to apply innovative teaching methodologies, and to produce practical knowledge and data that would help their colleagues elsewhere.

PLCs are forums that provide a structured support for teacher collaboration. Their activities may be organized in formal or informal formats. They may be arranged internally, by bringing the teachers of the same departments, grades, or subjects together to address issues of common interest (Graham, 2007; Chong & Kong, 2012). They may also be inter-institutional activities, organized between several schools, where participants discuss common challenges or exchange ideas, experiences, practices related to the learning and teaching process, or other activities taking place in the school (Schulz & Geithner, 2010; Harris & Jones, 2010). Such a collaboration helps teachers to accumulate and share pedagogical knowledge rather than hold it individually (Brook, Sawyer, & Rimm-Kaufman, 2007). Such a professional openness allows participants to identify possible flaws in their classrooms or schools and to find the ways how to correct them.

Hargreaves and Fullan (2012) note that "Teachers will be short on professional capital if they spend most of their professional time alone, if they do not get feedback and support from colleagues, and if they are not connected to teachers of other schools" (p. 102). Teachers that are truly committed to learning contribute to and benefit from genuine collaborative activities through reflective dialogue, sharing experiences, knowledge, information with other participants. In this way, teachers enhance their instructional practices, implement curriculum more effectively, create a learning climate in the classroom, and perform adequate student assessment. These are some of the main factors that motivate students' learning and lead to better student attainment (Brook et al., 2007).

Research findings indicate existence of positive correlations between teacher

professional collaboration, instructional improvement, and better students' scores (Bruce & Ross, 2008; Goddard et al., 2007; Lyna et al., 2016). As a process, teacher professional collaboration helps increase of confidence for application of new approaches, which also led to improvement of student attainment (Yuan & Zhang, 2016). Graham (2007) examined the relationship between PLC activities and teacher improvement. The findings of his research indicated that PLC activities had a positive impact on the professional knowledge and skills of respondents, their teaching practices, and provision of opportunities for collaboration with peers. Furthermore, Chong and Kong (2012) found that collaborative work had a positive impact on participating teachers, it increased their confidence to apply new instructional methods, and triggered reflective dialogue.

Factors affecting PLC activities

PLCs are structures committed to aiding participants to gain new knowledge and skills (Caine & Caine, 2010). But establishment and functioning of PLCs is a difficult and complex process that requires serious and sustained commitment, proper support, and collective contribution. Researchers have identified personal attitudes, logistical, structural and cultural factors as serious distractors that may hamper teacher professional collaboration (Graham, 2007; Harris & Jones, 2010; Chong & Kong, 2012; Thompson et al., 2004; Bredeson, 2000; Kezar, 2006). If these challenges are not addressed adequately and duly, then collaborative efforts usually fail.

Stressing the importance of PLCs, Kwakman (2002) argued that "Collaboration is the most important method for teacher professional development as it not only provides necessary support for learning, but also provides teachers with feedback and brings new ideas and challenges" (p. 153). According to Kwakam, there are three major factors that affect teacher learning activities in schools – *personal factors, task factors,* and *work environment*. Furthermore, the findings of a meta-analysis on teacher professional learning, conducted by Opfer and Pedder (2011), show that teacher professional learning is affected by three overlapping systems: *the teacher, the school, and the activity.* Furthermore, Bredeson (2000) cautions that if no financial resources, institutional support, and proper infrastructure for collaboration are provided, then initiated collaboration projects usually fail.

Daily assignments, school climate, and structural challenges are some of the factors that complicate and often prevent teacher's participation in PLC activities (Brook et al., 2007). Teachers are also left a little time for collaboration with colleagues because they spend a lot of energy on paperwork, lesson preparation, classroom engagements, and responding to parents'

inquiries (McLaughlin & Talbert, 2007). Benoliel and Schechter (2017) found that teachers' personal characteristics, such as *extraversion, agreeableness, conscientiousness, neuroticism, and openness to criticism* influence participants' motivation to be part of collective learning efforts and to contribute to such endeavors. Unfortunately, collaboration per se "is neither taught nor modeled in university coursework" (Goddard et al., 2007, p. 878).

Lyna et al. (2016) maintain that cultural factors are more challenging than the logistical ones because they require deeper individual and collective changes. Culture is usually an embedded part of the organization and its transformation is a long and complex that develops gradually after the school leadership and staff are in contact with other cultures. Thus, PLCs are structures that provide participants with the possibility to identify their potential flaws and ways how to change them.

Principal's role in facilitating PLC activities

According to Hargreaves and Fullan (2012), anyone that aims at changing teaching as a process and teachers as professionals should have a profound knowledge of both. They provide examples from empirical studies, which show that exchange of experiences, knowledge, and data between teachers is crucial for improvement of the teaching and learning processes. They also posit that due to their central role in the schools, principals are agents that neutralize the disputes happening during professional collaboration, they help creation of collaborative cultures, monitor and assess the impact of such a collaboration, and adjust it accordingly in cooperation with teachers. Hargreaves and Fullan (2012) also caution that "If principals merely enable teachers to work together and do not help forge the final link to actual learning, the process will fail" (p. 65). Also, whenever organizational support is fragile, then peer-driven intervention produces no results (Riveros, Newton, & Burges 2012).

Links between the support provided by the principal and successful PLCs have been investigated by a vast number of researchers and most of them found positive correlations between the two variables. Best results are achieved by principals that are "cognizant of the essential actions needed to alter the lives of teachers in school" (Lambert et al., 2002, p. 35). This implies that as head teachers, they have to be reliable, supportive, and responsible persons that show a lot of care for the whole school. Also, findings of research conducted by Wahlstrom and Luois (2008) indicate that, "Elementary, middle, and high school principals can all have significant role on instruction" (p. 479). Principals manage to have a positive impact through shared leadership and investing in interactions between the school staff.

According to Bredeson (2002), one of the primary tasks of a school principal is to provide an environment for teacher professional growth and improvement. As the central school figure, principal's perceptions and attitudes are very important because they influence his or her decision to support initiatives and processes that may affect teaching and learning process. The findings of a longitudinal research conducted by Day (2012) with 300 experienced teachers reveal that the support provided by the principal was one of the most important factors that affected their professional lives positively or negatively. Principals were the ones that motivated these teachers to make tremendous efforts for their students and to see teaching more than a job.

Leclerc, Moreau, Dumouchel, and Sallafranque-St-Louis (2012) posit that support and encouragement provided by the principal is of profound importance for teachers to involve successfully in learning and collaborative activities. Thus, Hargreaves and Fullan (2012) call upon principals not only to support, but also to be the lead learners in their schools because that is the best way for them to create a collaborative and learning conducive culture amongst the teachers.

The findings of research conducted by Yuan and Zhang (2016) show that busy work schedule and external requirements, set by the district authorities, hindered the collaborative activities of teachers. Given that they were familiar with school needs and being in position to reconcile such requirements, principals of the schools examined by Yuan and Zhang (2016) negotiated teachers' schedules with district authorities and rearranged them in order to enable teachers to participate in learning activities. Furthermore, Bredeson (2000) found that the principal was the authority that allocated financial resources for participation of teachers in various learning activities. Respondents of this study specified that the principal secured the substitute teachers, learning materials, and external consultants, which, according to them, are crucial factors for teacher learning as a way for advancement of their instructional capacities.

Based on review of literature on PLCs, Hord (1997) came to a conclusion that schools may turn into learning communities only through leaders' support. She explains that PLC activities are led by reflective work, which may trigger conflicts between the participants, therefore, the principal is expected to mediate and reconcile the disagreeing sides. Hallam et al. (2015) found that principals have the main say about the composition of PLC since they group teachers into collaborative teams based on department, content area, and/or grade level. When PLCs are organised in such a format they are more productive because participating teachers encounter similar challenges in classroom, implement the same curriculum, and use the same content. The teachers that participated in the research conducted by Hallam et al. (2015)

explained the principal asked them to select their group mates and they usually chose colleagues they trusted. This had a multidimensional impact on them and on the learning process in general since they were able to express their opinions and experiences freely, they critiqued each other without being afraid of consequences, and they felt more responsible for the whole group.

Brook et al. (2007) explain that teacher collaboration may be formal and informal. They found that the first is initiated by principals and takes place in workshops, conferences, training programs, events with experts, school networks, or other similar opportunities. The latter is initiated by teachers and occurs before or after working hours, during breaks or events organized by the school. Informal collaboration is simple, practical, based on individual needs and challenges, and more open as teachers chose the learning mates. Nevertheless, one should not expect from teachers to involve in PLC activities if they are not given a clear instructions about the process (Woodland, 2006). Usually, principals with a systemic mindset and knowledge about teaching practices, learning methods, and curriculum implementation are the driving force for participation of teachers in collective learning (Wahlstrom & Louis, 2008).

Shaked and Schetcher (2016) found that school leaders support collaborative learning by applying a holistic approach, respectively by using student data and by monitoring various internal and external factors that affect their schools. According to Cole (2012), PLC activities usually fail to provide positive results in case principals show and express doubts about their positive contribution to the school. Also, when principals do not offer the necessary support, PLC may improve teachers' individual qualities but their impact usually declines quickly (Harris & Jones, 2010).

Thus, principals familiar with the five disciplines of learning organization are strong supporters of PLCs. Such principals encourage teachers to be committed to *personal mastery;* they are aware that negative *mental models* are obstacles that should be removed; they create conditions for *team learning;* they involve teachers in creating school's *shared vision;* and they see teachers, students, parents, pedagogical competence, curriculum requirements, and continuous teacher development that function like the wheels of a watch. Also, without a clear understanding and sustained support, teacher professional collaboration would remain only a futile attempt for improvement.

PLCs in underperforming systems

Political, historical, economic, and social developments of the last three decades have had a deep impact on Kosovo's educational system. From 1990 to 1999, Kosovo was under a military occupation and was forced to organize a rather improvised educational system with zero conditions for teacher professional development. After the end of the war in 1999, various international organizations arrived to help Kosovo to build public institutions. They also provided a lot of financial support and professional expertise to help improvement of Kosovo's education system. However, the projects and concepts funded and promoted by such organizations were often incompatible with Kosovo's context.

Repercussions of the afore-explained situation surfaced very clearly after the publication of PISA 2015 (OECD, 2016) test result. Kosovo students, who participated for the first time in this international competition in 2015, were ranked as one of the last three countries among the 72 participating nations. This was an eye-opening momentum for the whole society, particularly for the educational staff and policy-makers. It was realized that these schools were not preparing students for the knowledge society. The Ministry of Education, Science, and Technology (MEST), as the lead agent of the education system, launched almost immediately several steps for remedying this situation. It also adopted several strategic documents aiming at improving educational system and quality of teachers as issues that should be addressed seriously.

Many countries and education systems in the world may face with similar situations like Kosovo. According to Fullan (2010), it is not a good feeling to work in underperforming schools and systems because they are not attractive for students or teachers. Improvement of such systems is much harder, complicated, and requires wide-scale changes and measures. Researchers tend to avoid examining the factors that contribute to aggravation of such systems even though empirical data are fundamental for identification of teachers' needs and projects that could help their improvement. Due to lack of data and examples, it is difficult to design plans for implementation of PLCs in such schools, to describe the impact of PLCs, and the role of principals in supporting collaborative learning endeavors. In spite of this, as described in the introduction of this paper, international organizations often tend to replicate in such underperforming systems the projects that have been implemented elsewhere without taking into account the factors that affect development and results of the implemented projects.

Research into underperforming schools from different places in the world shows that despite the fact that they are located in geographically, culturally, and economically uncorrelated areas, they share similar characteristics.

For instance, Leithwood (2010) analyzed the main causes of underperformance of schools in Alberta, Canada. Some of the main factor that led these schools toward having low scores included: under-skilled and inexperienced school staff; student's personal obstacles, family conditions, inadequate curriculum, improper instructional practices, unsupportive school cultures, and leadership challenges. In addition, Van de Grift and Houtveen (2012) analysed the weaknesses of underperforming schools in Netherlands. Their findings show that underperformance was a consequence of series of factors, such as unsuitable learning material, insufficient time for reaching curriculum objectives, poor instructional skills, lack of support for struggling students, demographic factors, and non-functional school leadership. According to Finnigan and Daly (2012), who researched internal relationships in three underperforming schools, and the links of principals with their colleagues and district representatives, underperforming school tend to be turbulent all the time. The teachers of these schools tended to emphasise tension, confrontation, lack of trust rather than positive relations. Furthermore, the principals preferred isolation, did not count on support from other principals or district representatives. Collaboration in such an environment was not possible, which led to piling up of problem and affected everyone involved, particularly students.

Recommendations

Establishment of PLCs and implementation of their activities is a complex undertaking that requires a comprehensive and sustained support of school leadership. As central school figures, principals are equipped with competencies and responsibilities for coordination of pedagogical and technical aspects related to teachers' tasks. This gives them the possibility to see the needs and challenges encountered by the faculty members. Collective issues in school are best resolved collectively, by encouraging and giving the chance to everyone involved to contribute truly and safely. Such a contribution can be achieved through a systems thinking approach. Internalisation and application of systems mindset is a lengthy process and depends series of controllable and uncontrollable factors. Thus, before initiating establishment of PLCs and during implementation of their activities it is advisable to consider:

- **Purpose:** A clear definition of the purpose and the goals intended to be achieved would guide the PLC members as a beacon at night. A school or network of schools should motivate their staff to work continually on reaching the set goal as a way for continuous improvement, which is a requirement of 21st century. PLC's purpose is to enable its members to

learn together, share experiences, information, and knowledge for improvement of student attainment and school effectiveness.

- **Data:** Use of data showing student achievement and learning difficulties helps schools to identify potential weaknesses and obstacles. Through data, schools would understand if the problem is caused due to instructional practices, assessment methods, learning issues, curricula, content, or other issues. Through reflective dialogue and exchange of experiences in PLCs meetings, teachers and/or principals would tackle the existing challenges and would identify possible solutions.

- **Examples:** Use of concrete examples of successful PLCs would enable the participants to understand the power of PLCs. It may motivate teachers to abandon isolation and strengthen their relationships with their colleagues, who encounter similar challenges or may know how to resolve problems. Negative examples should also be utilised in order to identify and eliminate possible distractors.

- **Communication:** A clear and continuous communication with all the participants focused on tasks, expectations, outcomes, and obstacles of PLC activities would keep the members active, focused, and happy. Everyone needs to know their roles and responsibilities within the community. Timely identification and communication is essential for successful results.

- **Challenges:** Research findings indicate that there are three major factors that hinder PLC activities:
  - *Cultural challenges:* PLCs manage to have positive impact on organisations that offer collective support to such forums. Their activities need environments where opinions are expressed safely and no consequences follow.
  - *Structural challenges:* The best results are achieved when PLCs consists of teachers of the same subject, grade, and department. This may create problems in terms of finding substitute teachers if PLC activities are formal. Thus, principals should make the necessary arrangement since formal events are not held very frequently.
  - *Administrative challenges:* When organised outside the school, teachers should be offered financial support for covering eventual expenditures.

- **Leadership:** Being responsible for and on the lead of all the issues happening in and around the school, principals should be informed in details

about the importance of participating in PLCs, possible distractors, and the support they should provide. They should be also encouraged to take part in PLC activities since that would motivate the participants to contribute to collaborative efforts. Ensuring principals' trust and support is very important for PLCs, otherwise, they would be only a waste of time and recourses.

- **Assessment:** Formal PLC activities should be monitored and assessed on continuous bases in order to see if they are moving in the right direction, if interventions need to be made, and if the goals are being achieved. Their performance could be evaluated through a three phase assessment process: 1) setting of the goals and definition of tasks and responsibilities, b) revision for identification of possible obstacles and remedies; and c) final evaluation. Assessment of PLC activities at the end only is possible, but not sufficient.

Conclusion

Teachers and principals all over the world are under a high pressure for the results shown by their schools in various national and international tests. The pressure is exerted by the parents, decision-makers, media, and other communities. On the other hand, other factors affecting students' attainment are somehow being ignored. As a result, national institutions and international organizations are investing huge amounts of money in projects aiming at enhancing teachers' professional competencies and knowledge. Funds are spent on workshops, training programs, seminars, conferences, which are usually designed and implemented according to the one-size-fit-all approach.

However, PLCs remain an effective method for improvement of teachers' skills and knowledge. PLCs are forums where participants share and exchange experiences, knowledge, and information about various problems and their solution. They are led by commitment to learning, safe reflective dialogue, mutual respect, and trust in each other. PLC's success or failure depends on cultural, structural, and administrative factors. Being central school figures, principals hold competencies that enable them to reconcile the distractors that hinder PLCs' work.

PLCs are quite popular and effective in the countries with top performing education systems. Attempts are made to spread the concept in underperforming schools and countries, too, but such efforts often fail due to lack of

a comprehensive picture of the factors affecting PLCs and the impact they have on teachers. The literature reviewed in this article indicated that PLCs have a positive role in teachers' instructional practices, assessment methods, content knowledge, and other factors affecting students' learning and results. PLCs manage to have such a positive impact through forging relationships between the participants, who exchange various data, information, experience, knowledge related to their daily tasks.

The literature elaborated in this paper contributes to clearer understanding of PLCs as a concept as well as to factors leading to their failure or success, and their impact on enhancing school's effectiveness. Given that the vast majority of research on PLCs is conducted in well-performing systems and the results achieved by PLCs are positive, scholars are encouraged to research establishment and functionalization of PLCs in low-performing schools and systems. Such studies would shed light on the factors leading to failure of PLCs, which would help underperforming schools to avoid potential distractors at early stages.

References

Barnard, P. A. (2013). *The systems thinking school: Redesigning schools from the inside-out*. Plymouth, United Kingdom: Rowman & Littlefield Education.

Benoliel, P., & Schechter, C. (2017). Is it personal? Teacher's personality and the principal's role in professional learning communities. *Improving Schools, 20*(3), 222-235. doi.org/10.1177/1365480217703725

Bottery, M. (2004). *The challenges of educational leadership*. London: Sage.

Bredeson, P. (2000). The school principal's role in teacher professional development. *Journal of In-Service Education*, *26*(2), 385-401. https://doi.org/10.1080/13674580000200114

Brook, L., Sawyer, E., & Rimm-Kaufman, S. E. (2007). Teacher collaboration in the context of the responsive classroom approach. *Teachers and Teaching: Theory and practice 13*(3), 211–245. https://doi.org/10.1080/13540600701299767

Bruce, C. D., & Ross, J. A. (2008). A model for increasing reform implementation and teacher efficacy: Teacher peer coaching in grades 3 and 6 mathematics. *Canadian Journal of Education, 31*(2), 346-370.

Caine, G., & Caine, R. N. (2010). *Strengthening and enriching your professional learning community: The art of learning together*. Alexandria, VA: ASCD.

Chapman, J. A., & Ferfolja, T. (2001). Fatal flaws: The acquisition of imperfect mental models and their use in hazardous situations. *Journal of Intellectual Capital, 2*(4), 398-409. doi.org/10.1108/EUM0000000006087

Chong, W. H., & Kong, C. A. (2012). Teacher collaborative learning and teacher self-efficacy: The case of lesson study. *The Journal of Experimental Education, 80*(3), 263-283. doi.org/10.1080/00220973.2011.596854

Cole, P. (2012). Aligning professional learning, performance management and effective teaching. *Seminar Series 217 of the Centre for Strategic Education.* Melbourne, Australia.

Retrieved from http://www.ptrconsulting.com.au/sites/default/files/Aligning_professional_learning_performance_management_and_effective_teaching.pdf

Collay, M., Dunlap, D., Enloe, W., & Gagnon, G. W. (1998). *Learning circles: Creating conditions for professional development*. Thousand Oaks, CA: Sage Publications.

Collinson, V. (2004). Learning to share, sharing to learn: Fostering organizational learning through teachers' dissemination of knowledge. *Journal of Educational Administration, 42*(3), 312-332. https://doi.org/10.1108/09578230410534658

Darling-Hammond, L. (2007). Building a system for powerful teaching and learning. In B. Wheling (Ed.), *Building a 21st Century U.S. Education System*. Washington, WA: National Commission on Teaching and America's Future.

Day, C. (2012). New lives of teachers. *Teacher Education Quarterly, 39*(1), 7-26.

Finnigan, K. S., & Daly, A. J. (2012). Mind the gap: Organizational learning and improvement in an underperforming urban system. *American Journal of Education, 119*(1), 41-71. https://doi.org/10.1086/667700

Fullan, M. (2010). *All systems go: The change imperative for whole system reform*. Thousand Oaks, CA: Corwin.

Fullan, M. (2011) *Change leader: Learning to do what matters most.* San Francisco, CA: Jossey-Bass.

Fullan, M. (2014). *The principal: Three keys to maximizing impact*. San Francisco, CA: Jossey Bass.

Goddard, Y. L., Goddard, R. D., & Tschannen-Moran, M. (2007). A theoretical and empirical investigation of teacher collaboration for school improvement and student achievement in public elementary schools. *Teachers College Record*, *109*(4), 877-896.

Graham, P. (2007). Improving teacher effectiveness through structured collaboration: A case study of a professional learning community. *Research in Middle Level Education, 31*(1), 1-17.

Hallam, P. R., Smith, H. R., Hite, J. M., Hite, S. J., & Wilcox, B. R. (2015). Trust and collaboration in PLC Teams: Teacher relationships, principal support, and collaborative benefits. *NASSP Bulletin, 99*(3), 193-216.

Hargreaves, A. (2007). Sustainable professional learning communities. In L. Stoll & K. Louis (Eds.), *Professional Learning Communities Divergence, Depth and Dilemmas* (pp. 181-195). New York, NY: Open University Press.

Hargreaves, A., & Fullan, M. (2012). *Professional capital: Transforming teaching in every school*. New York, NY: Teachers College.

Harris, A., & Jones, M. (2010). Professional learning communities and system improvement. *Improving Schools, 3*(2), 172-181. https://doi.org/10.1177/1365480210376487

Hord, Sh. (1997). *Professional learning communities: Communities of continuous inquiry and improvement*. Austin, TX: Southwest Educational Development Laboratory.

Kezar, A. (2006). Redesigning for collaboration in learning initiatives: An examination of four highly collaborative campuses. *The Journal of Higher Education*, *77*(5), 804-838. https://doi.org/10.1080/00221546.2006.11778945

Kiefer, C., & Senge, P. (1982). Metaonic organizations: experiments in organizational innovation. In *EDER 617 L91 Book of Readings (2005)* (pp. 117-136). Calgary, Canada.

Kwakman, K. (2002). Factors affecting teachers' participation in professional learning activities. *Teaching and Teacher Education 19*(2), 149–170. https://doi.org/10.1016/S0742-051X(02)00101-4

Lambert, L., Walker, D., Zimmerman, D. P., Cooper, J. E., Lambert, M. D., Gardner, M. E., & Szabo, M. (2002). *The constructivist leader* (2nd ed.). New York, NY: Teachers College Press.

Leadership and Teacher Development Branch. (2005). *Professional learning in effective schools: The seven principles of highly effective professional learning*. Melbourne, Australia. Retrieved from http://www.education.vic.gov.au/documents/school/teachers/profdev/proflearningeffectivesch.pdf

Leclerc, M., Moreau, A. C., Dumouchel, C., & Sallafranque-St-Louis, F. (2012). Factors that promote progression in schools functioning as a professional learning community. *International Journal of Education Policy and Leadership*, *7*(7), 1-14.

Leithwood, K. (2010). Turning around underperforming school systems: Guidelines for district leaders. Paper commissioned by College of Alberta School Superintendents.

Lieberman, A. (2007). Professional learning communities: A reflection. In L. Stoll & K. S. Louis (Eds.), *Professional learning communities divergence, depth and dilemmas* (pp. 199-203). New York, NY: Open University Press.

Lyna, Loong Hung, D. W., & Chong, S. K. (2016). Promoting teachers' instructional practices in alternative assessment through teacher collaboration. *Education Research Policy Practice, 15*(2). DOI: 10.1007/s10671-015-9189-9

Maund, B. (2003). *Perception: Central problems of philosophy.* New York, NY: Routledge.

McLaughlin, M. W., & Talbert, J. E. (2007). Building professional learning communities in high schools: Challenges and promising practices. In L. Stoll & K. S. Louis (Eds.), *Professional learning communities divergence, depth and dilemmas* (pp. 151-165). New York, NY: Open University Press.

Mitchell, C., & Sackney, L. (2000). Extending the learning community: A broader perspective embedded in policy. In L. Stoll & K. S. Louis (Eds.), *Professional learning communities divergence, depth and dilemmas* (pp. 30-44). New York, NY: Open University Press.

Opfer, D. V., & Pedder, D. (2011). Conceptualizing teacher professional learning. *Review of Educational Research, 81*(3), 376-407.

Organisation for Economic Co-operation and Development. (2016). *PISA 2015 results in focus*. Retrieved from https://www.oecd.org/pisa/pisa-2015-results-in-focus.pdf

Riveros, A., Newton, P., & Burgess, D. (2012). A situated account of teacher agency and learning: Critical reflections on professional learning communities. *Canadian Journal of Education, 35*(1), 202-216.

Sackney, L., & Mitchell, C. (2001). *Building capacity for a learning community*. Retrieved January 12, 2007 from http://www.umanitoba.ca/publications/cjeap/articles/mitchellandsackney.html

Schulz, K. P., & Geithner, S. (2010). Between exchange and development: Organizational learning in schools through inter-organizational networks. *The Learning Organization, 17*(1), 69-85. https://doi.org/10.1108/09696471011008251

Senge, P. M. (2006). *The fifth discipline: the art & practice of the learning organization*. New York et al.: Doubleday.

Servage, L. (2008). Critical and transformative practices in professional learning communities. *Teacher Education Quarterly, 35*(1), 63-77.

Shaked, H., & Schechter, C. (2014). Systems school leadership: Exploring an emerging construct. *Journal of Educational Administration, 52*(6), 792-811. https://doi.org/10.1108/JEA-07-2013-0081

Shaked, H., & Schetchter, C. (2016). Holistic school leadership: Systems thinking as an

instructional leadership enabler. *NASSP Bulletin, 100*(4), 177-202.

Stoll, L., Robertson, J., Butler-Kisber, L., Sklar, S., & Whittingham, T. (2007). Beyond borders: Can international networks deepen professional learning community? In L. Stoll & K. S. Louis (Eds.), *Professional learning communities divergence, depth and dilemmas* (pp. 63-76). New York, NY: Open University Press.

Thompson, S. C., Gregg, L., & Niska, J. M. (2004). Professional learning communities, leadership, and student learning. *Research in Middle Level Education Online, 28*(1), 1-15.

Van de Grift, W., & Houtveen, Th. (2012). Weaknesses in Underperforming Schools. *Journal of Education for Students Placed at Risk, 12*(4), 383-403. https://doi.org/10.1080/10824660701758942

Wahlstrom, K. L., & Louis, K. S. (2008). How teachers experience principal leadership: The roles of professional community, trust, efficacy, and shared responsibility. *Educational Administration Quarterly, 44*(4), 458-495. https://doi.org/10.1177/0013161X08321502

Woodland, R. H. (2016). Evaluating PK-12 Professional learning communities: An improvement science perspective. *American Journal of Evaluation, 37*(4), 505-521. https://doi.org/10.1177/1098214016634203

Yuan, R., & Zhang, J. (2016). Promoting teacher collaboration through joint lesson planning: Challenges and coping strategies. *The Asia-Pacific Education Researcher, 25*(5-6), 817-826. https://doi.org/10.1007/s40299-016-0300-7

INSTITUTIONAL AUTONOMY OF PUBLIC UNIVERSITIES IN THE NEW CONTEXT: A PERSPECTIVE FROM A DEVELOPING COUNTRY

Iliriana Tahiraj

Abstract
The concept of academic autonomy has changed significantly in the new context and when implemented, the elements of academic autonomy may be interpreted and have a different impact, depending on the context. In Kosovo, the academic autonomy, institutional autonomy in particular, is reported as one of the main challenges that hinders development of the higher education. Thus, the aim of this article is to examine how institutional autonomy is regulated in Kosovo and how do elements of institutional autonomy impact the operation of the biggest public university in the country. The data were gathered through five semi-structured interviews with some of the main stakeholders of higher education and were analyzed within the framework of the four dimensions of institutional autonomy as set out in Lisbon Declaration (2007) and other relevant literature. The findings show that all respondents agree that the institutional autonomy as included in the existing laws is similar to most other countries in Europe, while the need to empower the position of the Rector and the need for increased cooperation to reduce the gap between the Ministry, Rector and the Deans were reported as main concerns.

Key words: academic autonomy, institutional autonomy, higher education, public university, developing country

Introduction

The concept of academic autonomy has changed significantly during the last decades and Weiler (2005) considers that the relative importance of the autonomy of the individual scholar and the autonomy of the institution is one of the ambivalences that universities have in the new context. Referring to the general developments of education in Europe after 1980, Henkel (2007) talks about two challenges that academic autonomy is facing: one is that governments preside over 'knowledge societies' in which they see knowledge as the main driver of economic and social prosperity, and the second one the redefinition of the relation of the state and market. It implies that the traditional concept of academic autonomy with clear boundaries and no state intrusion is not relevant in today's context and it is best described by Zgaga (2012) who argues that "the concept of university autonomy would be seriously simplified and endangered if it were put

together on a continuum with 'full state control and no autonomy on one end' and 'full autonomy and no more state control' on the other hand" (p. 5). According to Zgaga, the concept of academic autonomy is referred to a constantly changing relationship between the state and higher education institutions which depends on national contexts, circumstances, academic and political cultures.

Considering these circumstances, it is very difficult to define the concept of academic autonomy and analyze it in isolation without taking into consideration the context. Esterman and Nokkala (2009) claim that there is no 'ideal model of autonomy', suggesting that there are "a set of principles that constitute crucial elements of autonomy, and that, when implemented in the context of a given system, support universities in carrying out ever more complex missions" (p. 7). However, most of the literature is focused on the academic autonomy and the challenges that the developed countries are facing in the new context, but there are limited studies that would provide insights how certain principles of academic autonomy may function within the contexts of the developing countries, which struggle to enhance higher education within the specifics of the country itself and challenges of the globalized context.

In Kosovo, as a developing country, the academic autonomy has been subject of radical interrogations from the civil society in Kosovo since the end of the conflict in 1999. Although, over the last two decades, this issue has been addressed intensively by government, universities, and international organizations, still the international reports highlight the need for Kosovo to ensure the autonomy and independent operation of higher education institutions identifying it as one of the main challenges in attempt to improve the quality of education significantly and to strengthen research and innovation (Kosovo 2016 Report). Thus, the aim of this article is to examine how institutional autonomy is regulated in Kosovo and how do elements of institutional autonomy impact the operation of the biggest public university in the country context.

Academic autonomy in the new context

The globalization and neoliberalism had a significant impact to the social and economical context of the states in the last decades and it was inevitably reflected to the higher education as well. Becker and Trowler (2002) illustrate the relation of the university and new context claiming that "a scientific discovery in a university in one country will be exploited to make a technical advance by a company based in another and put into production

in yet another country, chosen for its low labour costs and offered for sale by that company's subsidiaries throughout the world" (p. 3). These new circumstances made the governments focus more on creating the 'knowledgeable society' resulting in the transition from 'elite' to 'mass' higher education, which begun in '80s, mainly in USA and UK, then followed by the other developed countries. This development, as well as the theory of knowledge, conceptualization of knowledge and the rapid developments of the technology changed the mission of the higher education, and consequently they undermined "…the idea of academe as well defined territory dedicated to its own specialized goals" (Henkel, 2007, p. 91).

In order to understand the academic autonomy in the new context, Zgaga (2012) makes a difference between 'philosophical' and 'managerial' discourses of academic autonomy by addressing them as academic individual freedom and institutional autonomy. According to Zgaga (2012), while academic freedom prevailed all debates during '60s to '80s, following the transformation from 'elite' to 'mass' system, academic freedom seems to be a serious issue only in certain countries where democracy is not a self-understandable condition of public life. Henkel (2007) also highlights that although most higher education institution continue to control internally process of preparing and managing academics, the freedom to determine curriculum content, degree standards and allocation of funds are not universally agreed. In relation to this, Apple (2016) also argues that the education institutions have become a subject of performance objectives, standards, national testing, and national curriculum. It implies that in the new context, the quality of education is not only the concern of higher education institutions, since the "…reliance on independent institutions or individual professional to ensure their own quality and standards has been replaced by national standardization" (Henkel, 2007, p. 93).

A crucial part of a self-governing institution is accountability and the new circumstances have imposed creation of the accountability mechanisms related to higher education. Although it has become a significant topic in the new context, the need for accountability of higher education has been highlighted even before, in different contexts. Upon establishing the Berlin Universität back in 1811, Wilhelm von Humbold claimed that the state must not intrude the university but at the same time, he reminded that the intellectual freedom "can be threatened not only by the state, but also by intellectual institutions which tend to develop, at their birth, a certain outlook and which will therefore readily resist the emergence of another outlook." (Humbold, 1970, as cited by Zgaga, 2012, pp. 224, 246). The same has been asserted by Weiler (2005) who argues that the ambivalence that exists related to academic autonomy in the new context can serve as a great

mechanism of defense for a university that tries to avoid accountability for its results and accomplishment. Therefore, the state must seek to avoid the harm, which can possibly arise from this source as "autonomy cannot be an excuse to exclude abuses of autonomy (e.g. corruption within institutions) from a critical discussion as well as prosecution (Zgaga, 2012).

These issues highlight the need for an increased cooperation between the higher education institutions and the relevant stakeholders in order to respond effectively to the demands of the new environment as academic autonomy can also function outside the 'traditional borders'. Zgaga (2012) suggests that the academic freedom is a matter of continues negotiation since "the university cannot live in its thoughts only and society needs knowledge to survive". Further, Zgaga considers that the countries shall focus on a set of recognized principles of values which should direct the actions of different actors rather than search for an "ideal" to move close to. Neave, as cited by Henkel (2007) also highlights that the outcomes of negotiations are not entirely predictable and thus the autonomy can be enhanced or reduced. It implies that it depends on the parties that are part of the negotiations, and if the parties are week, the decision will be week. It becomes a process, which comprises by setting limits and continuing the negotiation, since "academic freedom is not something given as a right; it is won and not once and for all" (Henkel, 2007, p. 96). Given the fact that in the new context, the autonomy does not include only the 'traditional' ability to decide on research and teaching but it also includes the managerial and financial autonomy, Westa (2017) highlights that "the state still plays a significant role in shaping universities as it provides the legal framework in which universities function and as it is still a major provider of university funding." (Westa, 2017, p. 35).

Although, most of the laws in Kosovo were drafted and tried to be aligned with the European legislation, academic autonomy remains one of the challenges, which is addressed by both civil society in Kosovo as well as by international reports. The public University of Prishtina (UP) is the most referred source to the public discourses related to the academic autonomy. Gashi (2013) claims that since it has been founded, the UP played a key role in political developments in Kosovo and it was, at the same time, a victim of political interferences. Pupovci (2015) highlights that there is a lot of political influence over the UP and lists nine challenges that the UP faces, among which irregular class teaching, unqualified academic personnel, lack of relevant programs that meet market needs, and plagiarism. There are also some other reports in Kosovo published by the civil society organization which monitor the work of the UP. Thus, influenced by what is perceived to be 'political intrusion over the university', the issue of academic autonomy

is mainly addressed within the 'myths of absolute autonomy', undermining discussions about academic autonomy and accountability as matter of negotiation between the state, society and universities. In addition, the concepts of academic freedom and institutional autonomy are still remaining vague terms.

Methodology

Given the fact that higher education institutions in European countries have different approaches toward the assessment academic autonomy, the European University Association (EUA) set out general principles of institutional autonomy which consists of academic, financial, organizational and staffing autonomy (Lisbon Declaration, 2007). These principles have been used as basis point by Estermann and Nokkala (2009) to analyze and assess the academic autonomy in 34 countries of Europe. These principles were also used as a framework for this study conducted in Kosovo context with the aim to answer two main questions: *(a) how is institutional autonomy regulated in Kosovo as compared to the four dimensions of institutional autonomy defined in Lisbon Declaration (2007)* and *(b) how do the elements of the institutional autonomy as included in the existing laws and regulations impact the operation of the University of Prishtina (UP).*

The study employed the qualitative approach and it is based on qualitative data from the semi-structured interviews with some of the main stakeholders in higher education. This sample was selected in order to cover different point of views on the institutional autonomy from each of these stakeholders. Thus, the request for interview has been sent to an administrator of UP, a professor of UP, a representative of the Ministry of Education, a representative of a local civil society organization (Non-government Organization), and two representatives of international organizations operating in Kosovo. Only the representative of the Ministry of Education could neither meet for the interview nor send written responses.

The interview questions were compiled based on the academic autonomy principles set out in the Lisbon Declaration (2007). The respondents were given equal time (one hour) and the interviews took place in their offices. Given the sensitivity of the topic, the interviews were not recorded but the researcher took notes. The data were analyzed in accordance within the framework of the four academic principles, the related literature and emerging analytical areas. In addition to the interviews, the analysis of documents and media coverage of the higher education developments during the research period December 2017 – March 2018 also were part of the study.

Findings

Organizational autonomy

The basic framework for electing of the decision-making bodies of the public university is set by the relevant law or regulations. The decision making bodies of the UP consist of Steering Committee and the Senate thus representing a dual structure. The Steering Committee consists of 9 members, four of which are external members appointed directly by the Ministry of the Education. The Rector is appointed through a two-step process in which both Steering Committee and Senate is involved and the rectors' term is stated in the law/statute and he/she should come from academic community. It should be noted that during the time this study had been taking place, the Ministry dismissed four external members of the UP Steering Committee and appointed four new members, referring to the Law on Higher Education. No specific reason for this decision was provided to the media.

Being asked about how do they assess the coordination of the responsibilities between the Steering Committee, Senate and the Rector, most of the respondents agreed that the Steering Committee in addition to the strategic objectives is dealing also with operational things which should be the responsibility of the Rector, such as the decision on the level of students' scholarships, approval of academics participations in international conferences etc. One of the respondents highlighted that:

> *"The position of the Rector is the most attacked one. He has to take responsibility and sign any decision that comes from the Senate or Steering Committee. The Rector has to work with the deans that were appointed before he takes the position, and if he is not happy with their performance, he can only address their case to the Council of Ethics as there is no other clear mechanism he can follow to make them work. The Senate can use the mechanism of vote and dismiss the Rector whenever they want, as there are no clear definitions of terms when and why the rector can be dismissed."*

Describing a protest of students against the UP Steering Board decision for reducing the amount of scholarships for students, which also took place during the period of this research, this respondent commented that "even these five students who protest can initiate the issue of rector's dismissal". The decision to reduce the amount of scholarships has been canceled after the UP discussed the issue with the students' representatives.

This is why, according to the respondents, the amendments in the new Law for Higher Education include a more specific definition of dismissal terms for

the position of rector in order not to leave space for different interpretation as it may have happen until now. In the new amended version of the Law, it is also included the distribution of the responsibilities between Deans and the Senate: assigning administrative responsibilities to the deans while academic responsibilities to the Senate which shall consist of academics other than Deans. The other change in this draft law is that the students in the Senate will not have the right of vote for academic issues as they are currently enjoying. One of the respondents commented that "I consider that it is not serious that students vote for the promotions of academics".

One respondent highlighted that autonomy means also the freedom that leadership has to execute his decisions but in Kosovo context, this is understood differently. Referring to a decision of a former Rector to stop academics having two full-time jobs at the same time, the respondent describes the position of the Rector as follows:

> *"Not only the Rector is able to keep them accountable, but they (academics) go even further and sue the Rector personally. The Rector shall have his fundamental right to be the leader and the Government shall protect the decisions he makes. The academics may sue the institution, but not the Rector personally."*

He considers that as academics are going to work outside the UP and they are paid by someone else, the Rector as a manager cannot have their full attention and loyalty. The same respondent also argues that the Rector needs to have more support from Deans and at the same time have courage to take relevant decisions:

> *"The deans feel very strong and they do not listen to what Rector tells them. With this existing gap between the Rector and Deans, it is not possible to build a common mission regarding the changes. And of course, there is also a need for some courage to take decisions".*

Regarding the role of the Ministry of Education, all respondents agreed that until now, none of the Ministers had applied any serious approach in addressing the issue of administration of UP. Most of them consider that the UP used to be seen by politics as a place for employment as well as a voting mechanism. Commenting about this issue, one of the respondents said: "they [from the Ministry] all talk about how important institutional autonomy is, but the core problem is that they do not really want them to be truly autonomous". Two of the respondents highlight that the academics themselves, who are also members of the governing bodies such as Steering Committee or Senate use the academic autonomy to move forward interests which may be other than institution's interests.

"I believe that the issue of academic autonomy has been misunderstood in Kosovo. I have met many members of the Steering Committee and Senate who do not consider at all the academic responsibility and accountability. They may give their vote for issues that are influenced by outside but not in accordance with the responsibilities and rules included in the statute of the UP."

Financial autonomy

Regarding the financial autonomy, regarded as a very important dimension of the institutional autonomy in the new context, the UP receives a block-grants public funding.

There were different opinions regarding the financial autonomy. One respondent claimed that the distribution of public funding through block-grants is an advantage for the UP but, at the same time it leaves the possibility to avoid the responsibility and use these funds for something that may not be in accordance with the regulations, such as paying allowance to academics for the exams. The other respondent believes that in order to ensure the financial accountability, the UP shall be focused in empowering the reporting mechanisms such as Audit Office which until now operated with only one internal auditor, to establish another position just recently. This respondent considers that it is the Steering Committee that shall hold the institution accountable by asking the internal audit to look at everything and send a full report to them. One of the respondents considers that there is a need to raise the awareness over the importance of accountability even among the governing bodies of the UP claiming that "they still do not understand how important are these functions (such as that of Internal Audit) for the university."

Staff autonomy

The staff autonomy is related to the university ability and flexibility to recruit their staff and in case of the UP, the staff procedure recruitment are the responsibility of the University and relevant faculties. Being asked how the current recruitment procedures reflect the mission and strategy of the UP, most of the respondents considered that in the last few years, there has been advancement in complying with the written criteria during the process of selection of the new staff, still, they consider that it would be good that these criteria get revised. Most of the respondents agree that the compliance with the criteria of the staff recruitment and internal academic promotion in the last year came as a result of the pressure from the civil society

who begun to closely follow and publish the names of the academics that are being admitted as new employees or who are being promoted.

Commenting about the current academic staff of the UP and the academic freedom that they have, one of the respondents highlights that the academics consider that there is intrusion in their academic freedom if they are told in which journals they should publish their articles if they want to be promoted. In addition, he also recalls that in one of the latest research published by a local NGO which analyzed the CV of the current academics, it has been concluded that 72% of the academics do not justify their academic titles and do not meet performance standards. Although all the respondents agree that the role of the civil society has been significant in addressing several issues related to UP and they shall continue their monitoring, most of the respondents also consider that:

> *"It is very important that the members of the civil society have confidence in the important institutions. They (civil society) are also responsible to provide the context and quantify it – they do not do it. The civil society shall also be aware that for certain issues they do not have the relevant background and expertise to address concerns, particularly related to the academic issues such as academic performance or promotion of academics."*

The issue of the academic promotion seems to be one the main obstacles for proceeding the Law on Higher Education to the Parliament. One of the respondents claimed: "The revised Law on Higher Education has been ready since 2015 but due to the political interferences and interests, it has been kept there, and still, after two separate working groups contributed on that, it still has not been proceeded to the Parliament because they do not agree with the new proposed academic promotion criteria". Being asked if some of these contested issues may also involve complex processes to implement them in this current context and the UP may still not be ready for such changes, one of the respondents was firm: "*No, it is not that they cannot do it. They do not want to do it because this is a pure political case*."

Academic autonomy

In relation to academic autonomy, the UP decides about its own institutional strategy in compliance with the Ministry strategic plan and the national legislation, and it is a subject of different forms of accreditation, licensing or negotiation procedure. The degree programs are introduced by the faculties and university and must pass some type of accreditation. The decision on students' admissions and student numbers into programme disciplines

is regulated through a shared model, decided by university and agreed by the Ministry of Education. Commenting about academic autonomy, all respondents agreed that the coordination of this process between the University and the Ministry of Education involves all stakeholders and most of the time, the proposals that the UP sends are accepted and approved by the Ministry. One of the respondents claimed that there is a need to review the existing programs as well as consider the number of the students that shall be admitted in that program:

> *"There should be a process within the UP that every year assesses the need over the number of students needed for each program rather than have a routine process which is based on the number of the students that have been admitted a year ago, and just repeat that number".*

Other issues

Another topic discussed during the interviews was the lack of the bottom up initiatives by the academics. All respondents agreed that there have been very limited initiatives taken by the academics. Most of the respondents believe that this may be a results of the way how people are appointed in the leading positions (at the faculty or university level) because they do not meet the basic criteria that other academics would expect:

> *"If the Senate members would be selected based on merits, such as who is the best teacher, who is the best researcher, who is more accountable – it would motivate the other academics. There should be empowering of academics as I noticed that there has been a great interest from the teachers to participate in one of the trainings for teacher excellence. They came to these trainings because they wanted to get better, showing that they do get their ownership."*

The need for the UP to recognize academic values and the lack of trust of the academics toward those who get promoted has been raised by another respondent:

> *"An academic could see his friend being promoted or take leadership positions not because of merits he possesses but because he knew somebody out there (from the leading structures within the university or outside), and it is really discouraging. Of course, these cases will not motivate other academics to do research or develop further their professional background because nobody appreciates or takes into consideration what they do."*

Being asked about how they see the future of the University of Prishtina, most of the respondents had positive expectations highlighting that with all

the difficulties and challenges that it faced, there have been many positive developments within the University of Prishtina.

> *"I definitely see progress and although this debate which has commenced over the University of Prishtina seems to be a very tough, still there are positive points emerging. The University of Prishtina continues to attract the best students of Kosovo which I believe is a great advantage which shall be used in the years to come. "*

Discussion and conclusions

The results of this study illustrate few insights related to the institutional autonomy, which are mostly related to the particular context of a developing country and the way how the stakeholders interpret certain elements of the institutional autonomy. In addressing the first research question, *how is institutional autonomy regulated in Kosovo as compared to the four dimensions of autonomy defined in Lisbon Declaration*, the results suggest that the way how institutional autonomy is defined in the Law on Higher Education and Statute of the University of Prishtina aligns Kosovo alongside most of the European countries as included in the study of Esterman and Nokkala (2009). This has also been agreed by all respondents.

However, the results affirm that this seem not to be the 'ideal model of autonomy' in Kosovo. Going further to address the second question, *(b) how do the elements of the institutional autonomy as included in the existing laws and regulations impact the operation of the University of Prishtina (UP)*, the triangle between the decision bodies of the UP: Steering Committee, Senate and the Rector seems not to be functional enough that would enable the UP to carry out a wide range of changes that are planned. The key finding was the lack of competences that the position of the Rector needs to have to perform its duties effectively. In the literature, it is highlighted that leading a university has its specific challenges given the unique culture of the university as compared to other organizations, such as externally imposed government regulations, informal positions of leadership, academic traditions, and structures that eliminate the need for leaders are some of the factors that make academic leaders have the minimal power to influence an outcome (Coates & Anderson, 2007, as cited in Parrish, 2011). This is why there are several authors who claim that given this situation, adopting more corporate forms of management in the universities, should be considered a better solution to deal with the pressures and opportunities in the society (Henkel, 2007; Becher & Trowler, 2001; Fredman & Doughney, 2012). The Rector has to have authority over its organization in order to achieve the

desired goals (such as the staff promotion criteria, better management of finances within university, which were some of the identified challenges by the respondents), otherwise as one of the respondents claimed "autonomy does not exist if the Rectors are not able to execute their decisions".

The gap between the Ministry, Rector and the deans is another finding. During the time this research took place, there were few articles published in the media reflecting the clashes between the Minister and the Rector over an administrative instruction related to the list of journals that the higher education institutions shall use for academic publications. Although most of the respondents mentioned the 'political influence' was the main obstacle, it shall also considered that many authors claim that in the new context, the academic autonomy has become a process that comprises by setting limits and continuing the negotiation since the state plays a significant role in shaping universities, as it provides the legal framework and funding (Henkel, 2007; Zgaga, 2012; Westa, 2017). Moreover, in these processes it is very important that "we refrain from jumping to conclusions … we seek out diverse views, contrarians, and devil's advocates because we want to base our decisions on the fullest information possible, and we often gain new perspectives from those who do not agree with us." (Buller, 2013, p. 94). So, there is a need to establish and encourage a constant process of direct and transparent negotiations between institutions, since even the respondents claimed that from these "very tough debates" that are taking place over the university, there are positive points emerging. In relation to culture of debate and argumentation, one of the respondents noted: "you in Kosovo, do not tell people what they do not want to hear". It should also be taken into consideration that this process of negotiation between Ministry and UP does not end here, because as Schidt and Langberg (2008) remind, there is the other challenge that proceeds since "the implementation process is an open question, as it is not obvious that the policy and decisions, adopted by the government on the one hand and the leadership and management of institutions on the other, will be accepted and implemented by the academic staff". (p. 90).

The third finding was related to cooperation between all stakeholders of the higher education. The respondents mentioned that there is an amended draft of Law on Higher Education but it is being delayed to be proceeded to the Parliament. Again, one of the justifications that most of the respondents was that the Law is being delayed because there is a political influence behind it, particularly related to the academic issues such as criteria for academics' promotion. Although not named as 'political influence', Apple (2016) recognizes that nowadays there are a lot of pressures toward education from dominant groups. Moreover, changes such as promotion criteria

which change significantly the way how academics used to work so far are classified as second-order changes. The second-order changes require to alter the operating system, underlying values and culture of an organization or system (Kezar, 2014) and the change process may be more effective if initiated and implemented by the university itself rather than by specifying it in the Law or by imposing a regulation from outside.

The other finding is related to the composition of the working group on the Law on Higher Education and the specifics of the country. In Kosovo, there are different influencing parties involved in the working group over the Law on Higher Education, such as representatives of higher education, representatives of Ministry, independent advisors, representatives of the local civil society, and representatives of international organizations, which may have different perspective over the development of the higher education, based on their countries they come from. Of course, the advantage of this diverse working group is that it brings to the discussion table different alternatives, but at the same time, it is much more difficult to negotiate all these changes that the parties involved may argue are necessary. In relation to this, Brennan (2008) highlights that the diversity of communities-stakeholders and the demands of these clients place on higher education institutions require an ability to device efficient means of accommodating these demands, something which Kosovo is still not able to do. Higher education in Kosovo is being faced with various problems, some of which the developed countries have overcome many years ago. Thus, being unable to address and solve all the problems at the same time, one of the possibilities that could be considered is to proceed the Law on Higher Education with the content that was 'negotiable', since given the position of the UP and higher education in Kosovo, it is crucial to keep the changes ongoing, even if these changes are limited.

Finally, although higher education needs to be open to all stakeholders, it is also important to highlight and support the importance of the academic autonomy of an institution. Warnock (1992) claimed that the concept of autonomy means that institutions are self-governing and as such, they "can govern itself well or ill, despotically or democratically but the principles it adopts and the decisions it makes shall not be dictated from outside, by no outside power. This is much central to the concept of autonomy." (p. 1). Given the context of Kosovo, there is a need for lasting effective change in the UP and in order to do it, Buller (2014) suggests that it is necessary to change the way how the issues are approached, interact with stakeholders and refocus the energy toward people and processes rather than outcomes and metrics.

References

Apple, W. M. (2016). Challenging the epistemological for: The roles of the scholar / activist in education. *European Educational Research Journal*, *1*(2).

Becher, T., & Trowler, R. P. (2001). *Academic tribes and territories: intellectual inquiry and the culture of disciplines (2nd ed.)*. Buckingham, UK. The SRHE and Open University Press.

Brennan, J. (2008). Higher education and social change. *Higher Education 56*, 381-393.

Buller, J. (2013). *Positive academic leadership: How to stop putting out fires and start making a difference* (1). Somerset, US: Jossey-Bass. ProQuest ebrary.

Buller, J. (2014). *Change leadership in higher education: A practical guide to academic transformation* (1). Somerset, US: Jossey-Bass. ProQuest ebrary.

Estermann, T., & Nokkala, T. (2009). *University Autonomy in Europe I*. European University Association (EUA).

Fredman, N., & Doughney, J. (2012). Academic dissatisfaction, managerial change and neo-liberalism. *Higher Education, 64*(1), 41+. Retrieved from http://elibraryusa.state.gov/primo?url=http://go.galegroup.com.vlib.interchange.at/ps/i.do?p=AONE&sw=w&u=wash894608&v=2.1&it=r&id=GALE%7CA373677971&asid=1cfc37edcdf796a8ba7e64fde8e64d40

Gashi, R. Q. (2014). Kosovo's public universities – academic integrity in jeopardy. *Konrad Adenauer Stiftung*. Prishtina, Kosovo.

Henkel, M. (2007). Can academic autonomy survive in the knowledge society? A perspective from Britain. *Higher Education Research and Development*, *26*(1), pp. 87-99.

Kezar, A. (2014). *How colleges change: Understanding, leading and enacting change*. New York, NY: Routledge. Taylor & Francis.

Kosovo 2016 Report (2016). European Commission (EC). Retrieved from https://ec.europa.eu/neighbourhood-enlargement/sites/near/files/pdf/key_documents/2016/20161109_report_kosovo.pdf

Krivenjeva, A. (2018). The Minister of Education and the Rector of UP are having serious clashes over an administrative instruction. *Gazeta Express*, February 13 2018. Retrieved from http://www.gazetaexpress.com/lajme/ministri-i-arsimit-dhe-rektori-i-up-se-po-perplasen-fort-per-nje-udhezim-administrativ-499205/

Law on Higher Education in Kosovo, 2011. Retrieved from: https://masht.rks-gov.net/uploads/2015/06/02-ligji-per-arsimin-e-larte-anglisht.pdf

Lisbon Declaration (2007). European University Association (EUA). Retrieved from https://eua.eu/resources/publications/619:lisbon-declaration.html

Parrish, D. (2011) *developing emotionally intelligent leadership in higher education*. Bern, CHE: Peter Lang AG. ProQuest ebrary.

Pupovci, D. (2015). Reforming University of Prishtina, Mission Possible? Top nine challenges and remedies, Democracy for Development Institute.

Schidt, K. E. & Langberg, K. (2008). Academic Autonomy in a Rapidly Changing Higher Education. *European Education*, *39*(4), pp. 80–94.

Statute of the University of Prishtina, "Hasan Prishtina". Retrieved from: https://www.uni-pr.edu/inc/doc/statuti2.pdf

The Minister of Education dismisses the members of Ministry of Education, Science and Technology (MEST) in the UP Steering Committee (2018). Indeksonline, January 12 2018. Retrieved from http://indeksonline.net/ministri-i-arsimit-shkarkon-anetaret-e-masht-it-ne-bordin-e-up-se/

Warnock, M. (1992). Higher education: The concept of autonomy. *Oxford Review Of Education*, *18*(2), 119.

Weiler, N. H. (2005). Ambivalence and the politics of knowledge: The struggle or change in German higher education. *Higher Education*, 49, 177–195.

Westa, S. (2017). Academic freedom in teaching in higher education in Europe and the Asia Pacific RIM, PhD dissertation, University of Ljubljana.

Zgaga, P. (2012). University autonomy and governance between academic freedom and institutional autonomy. *University Governance and Reform: Policy, fads, and experience in international perspective* (pp. 11–22). New York, NY: Palgrave Macmillan.

THE SIGNIFICANCE OF VIRTUAL EXPERIENCE FOR DRAWING PERFORMANCE OF A 7-YEAR-OLD CHILD

Nina Rupel and Jurij Selan

Abstract
Digital and virtual worlds have brought new challenges and possibilities to the field of education. Since the world of the youngest generation is awe-struck by technology, the question arises how to use it in school subjects that are not inclined to the new media due to their distinctly bodily nature. Visual art education is one of such subjects. Therefore, the challenge is to use digital technology, which we often see as having negative effects on body and artistic abilities, in a way that fosters artistic competence and development. For this purpose, we have executed a case study in which we observed how delivering a motif in three different ways – in a direct physical interaction, on a (tablet) screen, and with virtual reality glasses – affected the drawing performance of a 7-year-old boy. First, we assessed the initial level of the child`s artistic competence by testing his drawing ability. Then, after experiencing the motif in three different ways, the child was given various drawing assignments. In the interpretation, we correlated qualitative analysis of child's drawings with the data we have obtained in triangulation – observations of the child in the process of research and interviews we have made with the child and his parents. The interpretation of the data indicates a potential benefit of using screen and virtual media in artistic development, which is above all important for 7-year-olds during their transition to literacy. The results of the study show the practical, motivational, and semantical usefulness of new technologies in art education, worthy of further research.

Key words: visual art education, interactive screen media, virtual reality, senses, drawing ability, artistic development, visual art language

Introduction

Art senses between tactile and visual

In recent years, technology has rapidly changed our environment, the way of life and thinking, with inventions beginning to shrink our perception of time (Bailey & Bailenson, 2017). Significant changes have evolved over the course of several generations; today, changes are creating new generations – the newest one, born around 2010, already has a name: the generation alpha (Carter, 2016). Data on the penultimate generation of people, generation Z, born after 1998, show that they are on average digitally connected 9 hours a day (Meet Generation Z, 2016). Changed conditions, new expectations, and

availability of technologies indicate the need to reconsider how to work in schools.

The school shapes experiences that are the basis for learning. An experience is an essential element of art education (Belamarić, 1986, 1987; Duh & Zupančič, 2003; Lowenfeld & Brittain, 1949; Matthews, 2003; Tacol, 1999, 2012; Tomšič-Čerkez, 2003, 2011; Vrlič, 2001). Artistic expression is in its basis physical – an artist thinks with his or her senses (Arnheim, 1969). Senses direct a person into space and to things and they transfer information back from surroundings. The four senses that are especially important for artistic creativity are the sense of one`s own body, the sense of balance, the sense of touch, and the sense of sight. The last one can integrate experiences and perceptions of all the others, which is why it is the most important sense (Butina, 1997a; Muhovič, 2015).

The characteristic of visible space is all-embracement, while the tactile space is characterized by individuality. Vision tells the person the most about the outside world and its integrity (Arnheim, 1986). Being geared towards space is also one of the most important social senses. Visible perceptions are therefore the main area of thought. It is particularly important that the vision can transmit many experiences of other senses. Much of tactile perception can be detected and controlled by the sense of sight based on previous experiences and learning. A child must first experience the object, get to know it, and feel it, before they become aware of it and can understand it. This is particularly important for texture – in order to recognize texture only by watching it, the person must have a previous tactile experience with it (Muhovič, 2015, p. 831).

The relationship between visual and tactile is important in virtual media study, where the perception of virtual textures is at the forefront, that is, of those surface properties which we simulate with an image. Digitally generated objects have a computer-generated texture, but they are truly understood only by individuals who have physically experienced what they represent. The deficit therefore arises if there was no such experience (Frelih, 2012). In the future, it may happen that young observers of the screen world will first encounter virtual, imitated textures, before or if at all they have the opportunity to experience things in nature.

Virtual experience and art education

Virtual reality is the technology of computer-simulated environments, offering many developmental and useful features in various sciences, especially in architecture, design, medicine, and the entertainment industry. Its

usefulness is mainly reflected in the testing of new products, user reactions, and visualizations; it is faster and cheaper to build a simulator or a virtual model than to build a physical model (Marks, 2016).

Virtual reality is also a philosophical concept that deals with the relationship between virtual and real. In this way, the body, upgraded with technological add-ons, plays the main role. Technological equipment gives impulses to senses that make the individual feel like entering a new world. A combination of hardware, programs, and sensory synchronization empowerss the sense of presence (How Do Virtual Reality Glasses Work, n.d.). Strehovec (1994) calls this body "a techno-prosthetic body". Through interface, head-mounted display, data glove, and data suit it can stimulate the senses.

Virtual reality is determined by three elements: immersion, interaction, and imagination (Xi, 2010). Lévy (2000; Bučkova, 2016) sees virtual reality as a type of interactive simulation, in which the user experiences the physical sense of being pulled into a situation defined by a database.

The experience of virtual reality seems particularly interesting because it can bring things that would otherwise be unavailable due to distance or risks – this makes it particularly interesting for education. Research on virtual reality with children is limited, despite the intense use of virtual reality technology in present times. Bailey and Bailenson (2017, p. 194) list the various research areas of immersive virtual environments, the most interesting for education being the study of effects on child development.

Virtual reality is often understood as only an approximation of reality, especially in the field of visual art with emphasized physical character, where a "live" experience is very important. Muhovič (2007) warns that virtual can also mean easiness, similar to that in computer games - because virtual presentation is flexible (errors can be eliminated and reversibly removed), life can also be perceived similary.

Physical and virtual contents can also coexist. There are two ways worth highlighting. The first is through complementarity: virtual worlds promise new, complex experiences that can complement physical ones. This aspect is very welcome in education. Another way is through replacement, but this can be questioned from an educational perspective. Virtual worlds can replace physical ones in a pleasant, complete, undemanding way, which are ubiquitously available – this can lead to deprivation on the physical level. As nature is replaced with representations, physical experience of nature seems no longer necessary.

Due to this duality, we are challenged to incorporate new technologies into the art education system so that virtual experience will complement

physical experience rather than replace it (and thus curtail). Šupšak, Tacol, and Tomšič Čerkez (2007) therefore point out the division between the old and the new paradigm in visual art education; the former not sympathetic to technology, while the latter sees its potential. Knosala (2017) also speaks of sensible and perceptive changes that have emerged with new technologies throughout human history, and attributes to the multisensory medium of electronic culture the potential for reuniting the mind and senses.

Artistic development and a 7-year old child

In the middle of the 20th century, children's creative work began to be understood and respected as an expression of their personal choices and valued by its own criteria (Lowenfeld & Brittain, 1949). Free creative expression (Arnheim, 1986, p. 240) changed the teaching of visual art. Now we know children draw because this way they communicate and explore the world (Karlavaris & Berce-Golob, 1991; Butina, 1997b; Selan, 2014; Adams, 2017).

Artistic development starts when a child first holds a pen in their hand and notices it is leaving a trace on paper. Development is gradual, through typical phases, which develop at a different pace, and are influenced by socio-cultural factors (Ferrara, 1991). Phases of children's artistic development were defined and described by many authors and although there are authors with different interpretations (Fawson, 2009), the interpretation phase is still widely accepted. Various researchers listed characteristic elements of children's drawings for periods between ages 6 and 7 and after the age of 7. Tacol (1999, 2012, 2016) attributes spontaneous expression and coherence of visual and cognitive development to the period of about 7 years of age. Later, developments start separating. This is followed by rational and planned acquisition of knowledge. Karlavaris and Berce-Golob (1991, p. 25) names the phase between the ages of 6 and 7 "the transition phase", which is also associated with a sudden decline in creativity. An important role here play the transition to abstract thinking as well as the adaptation to predominantly reproductive operations in writing, reading, and computing.

It is characteristic of 6-year-olds to portray shapes as they see them and not as much based on what they know about them (Tacol, 2016, p. 25). Hollow objects are drawn transparently, tables and chairs have straight lines for upper plates and two straight lines for legs. When working with dry materials, they first draw the shape and then paint individual surfaces. At the age of 7, cognitive development of a child progresses and the observation ability increases. A child uses several floor lines, objects are drawn in profile, legs of chairs and tables thicken, and the circle is drawn up above the object of cylindrical shape. The head of a figure is still disproportionately large,

clothing is drawn with attention to detail. Animals are also drawn from the profile and they can have two or four legs; if there are more animals, they are similar, arranged along the floor line and with details for better recognition. Color detection is increased. A child separates all colors and names many of them. An individual color is connected with the color in nature (green for grass), and similar to 6-year-olds, the color for individual shape is still selected according to popularity. For 7-year-olds, artistic expression is one of the games that enable them to become involved in the activity. They seem to be able to portray everything and are proud of it. They think they have presented things as they look in real life. The outcome is direct and fast – children can be brilliant at the beginning. Then, their motivation drops, so they quickly finish their work. They often "make mistakes" and start again.

Methodology

Research problem and objectives

The development of information and communication technology (ICT) is changing children's experiences, which not only influences artistic expression and creativity, but above all, presents a challenge to it. Modern research in the fields of visual art explores the use of digital technology as a tool for creating (e.g. children draw on tablet screens and change characteristics of the drawing with preset functions). Our research was opposite – we were interested in different kinds of experiences and their meaning for the child's artistic (drawing) abilities. In the case of artistic expression of a 7-year-old, we compared the physical experience of the motif (as is usually done in visual art education) with virtual experience in two sub-modalities: experience of the motif with an interactive screen medium (the tablet) and experience of the motif with the help of virtual reality glasses. We chose drawing as the form of visual expression as it is the basic form of visual arts (Frelih, 2013). Also, more than a hundred years of research in this field confirms its significance for the child's development (Didkowska, 2017).

The aim of the study was therefore to compare how physical and virtual experiences affect artistic articulation of a 7-year-old child, and based on these findings consider how to use a virtual experience in visual art education to develop artistic competence. We also paid attention to the environment which could influence the child's drawing – especially the child's previous artistic activities and the active use of digital media and content by. We have asked the following research questions in which we distinguished the importance of experience for the final art product (the drawing) and the importance of experience for the process of its creation:

RQ1: Is it possible to deduce from the child's drawings and/or drawing process that they are based on various types of experiences (physical, on-screen, virtual)?

RQ2: Which qualities of screen and virtual experiences can be summed up as positive for the child's drawings and/or drawing process?

The participant and the time frame of the study

We conducted a case study. We observed a boy who was 7 years and 5 months old at the time of the study. The boy was chosen with a purpose. We searched for a child, who was of a suitable age (7 years), included in the school system (second grade elementary school), and also an active user of digital media and content – this was mainly related to the use of computer programs, computer games and related digital media: computer, tablet and mobile phone. The boy played computer games on his parents` mobile phone (about half an hour a day) and he also owned a tablet with limited usage time (one hour a day). Outside regular pre-school and school activities, he was not involved in the field of visual art. The research lasted about one month. It started during school holidays in August 2017 and lasted until the end of the first month of school in September 2017.

Conducting the study

With the use of semi-structured interviews with the child and his parents, we first gathered information about the child's active use of digital media and content, and involvement in the visual art environments and activities. Then, eleven meetings were held, which were intended for the boy to draw the planned artistic tasks. Meetings were held over a period of one month with gaps of several days. The boy was drawing in prepared spaces with selected art materials (A4 paper size, a set of colored pencils). During the first two meetings, two test drawings were done, with no special introductory experience. The child received only brief instructions and was drawing from imagination. The purpose of initial drawings was to assess the level of artistic development of the child.

The next nine meetings were designed as follows:

1. We presented the introductory experience to the child in three ways, in three different media.
   - The first kind of experience was physical, as is the nature of art. In this way, all four visual art senses were actively used. For this experience, we prepared varied objects of interesting shapes and textures

and of appropriate sizes to layon the table in front of the child. He could`vecould observed objects from all sides, raised, weighed and turned them, and felt el their surface with his fingertips. This experience was in line with current visual art education practice, which strives for personal, direct, and physical contact with the studied.

– The second kind of experience were as withobjects, observed on an interactive screen medium – a tablet. Objects were three-dimensional and were located in an interactive digital environment., Iit was also possible to turn and approach them for a better view.

– The third type of experience was also related to virtual reality. The child observed objects with the help of virtual reality glasses and films recorded for this type of medium. Three visual art senses were used: sense of sight, sense of one's own body, and sense of balance.

2. Based on the experience, the child then performed the visual art activity.

– Artistic tasks were designed in three ways: the child was drawing from imagination, from memory, and from observation. We chose varied, age and experientially appropriate motifs: for drawing from imagination, we chose a figure; for drawing from memory, an abstract layout with emphasis on texture and color; and for drawing from observation, we focused on shapes, directions and branched forms. Motifs were chosen to maintain similarity in all media.

In this way, we obtained nine (9) combinations as we checked each method of drawing in each type of medium (Table 1).

Table 1. *Visual art tasks according to three types of introductory experience*

		visual art tasks		
		drawing from imagination	**drawing from memory**	**drawing from observation**
introductory experience	physical	physical introductory experience (a clay figure)	physical introductory experience (a plate, full of objects)	physical introductory experience (a typewriter)
	on-screen	interactive on-screen experience with a tablet (3d spider model)	interactive on-screen experience with a tablet (accurate display of the cell structure)	interactive on-screen experience with a tablet (a robot)
	virtual	experience with glasses for virtual reality (movie with elephants)	experience with glasses for virtual reality (coral reef)	experience with glasses for virtual reality (dog-like robots)

In addition to drawings, we were also interested in the process of drawing; the thought process and the creative process. We observed how the child was solving artistic problems, what kind of "aids" he was choosing and how he was circumventing established rules of realistic depiction. We also observed and recorded everything the child was saying, his non-verbal communication and everything else that helped us understand the whole situation: time of activity, general mood, use of materials, etc. After each task, a discussion about the work was held. The child explained what, how, and why he drew.

Results

The purpose of test drawings (Figure 1) was to check the level of child's artistic development. Test drawings also show child's doubts: „Will he succeed in correctly portraying what he imagined? What will he do if he makes a mistake or is not able to draw something?" The child also wanted to please and even entertain.

Both tasks were related to his environment. In the first task, he had to imagine a pet: "What animal would it be, what would he do with it, where would it reside?" The second task was: "Draw your room." In both cases, the lively boy acted energetically. He did two drawings for each task. The first drawing was done immediately, then the boy turned the paper around in discontent with the outcome and drew another one on the same topic. This time, he left out what he did not like or did not know how to draw.

Test drawings showed that problem solving is one of the child`s stronger features. If he did not know how to draw something, he tried to bypass it; for example, when drawing the space (the hamster cage and his room, where he undertook the construction approach) and a hamster (he did not remember exactly what it looks like). Finally, he drew the cage as a confined quadrangle space. The spinning wheel was important for him so he drew it big. The animal itself, a hamster, is small and fuzzy. He used the same approach with his room. The space was limited with a rectangle to which he added few lines. He placed everything at the bottom part of the paper, which substituted the floor line. In the second – the "real" drawing – the space was indicated by a floor surface at the bottom part of the paper, on which the presented objects were placed. Toys were placed in the contextual meaning of a falling bomb, as a sign of disorder and a general mess.

The second drawing of a hamster is a sketch; it represents the boy's face while imitating a hamster and is drawn in the middle of a striped colored rectangle, which represents a cage. While drawing, the child was impersonating

"a hamster face", exclaiming a lot and commenting on the drawing: "I have to paint it – skin color, great!" and "I will make a pattern of the cage." Both quickly done first drawings now appear as sketches, mental flashes, or introductions to the final "real" drawings that seem to be made for the public. In both cases, the boy also explained what he would draw differently if he knew how. Test drawings speak of a thoughtful child, full of witty ideas. Faced with emphasized sociality and the need for pleasing, the child was emphasizing the drawing's content, a combination of ideas, technical solutions and presentations for the audience, while neglecting the drawing side.

Figure 1. In the first line "hamster", in the second line "my room"

In the following chapter, we will present 9 drawing tasks with introductory experiences in various media.

Drawings are presented (Figure 2) in such a way that columns show artistic tasks: 1 – drawing from imagination, 2 – drawing from memory, 3 – drawing from observation. Rows show media: PH (physical), S (screen), V (virtual).

1PH	2PH	3PH
1S	2S	3S
1V	2V	3V

Figure 2

Figure 3. Contents of physical experiences and drawings based on this from imagination (1), memory (2) and observation (3).

1PH

The first drawing from imagination based on physical experience (Figure 3 – above: clay crocodile-like sculpture) shows the true value of the story told by the child while drawing. The boy did not want to hold the object in his hand and touch it, but only observed it. On the incentive: "Where does it live? Who lives with it? Does it have a mother, father, brother, sister?" the boy recalled alligators and emphasized that he knew exactly where they lived: under water, in fresh water, unlike the crocodiles living in salty water. The child later mentioned he learned this from the documentary cartoon *Wild Kratts*.

On the lower left side – parallel to the bottom side – the boy drew an alligator from the side, exactly as the clay object lay on the table in front of him. He used similar color arrangements for the figure, except that the white parts were replaced with purple. The alligator is stiff and without details, it seems that the child was more interested in the story. As before, he "made a mistake", which was solved by painting the right part of the blue surface with the "skin" color, as he called it, which formed the land. This was one of the shorter drawings; along with the observation of the media it lasted about 5 minutes.

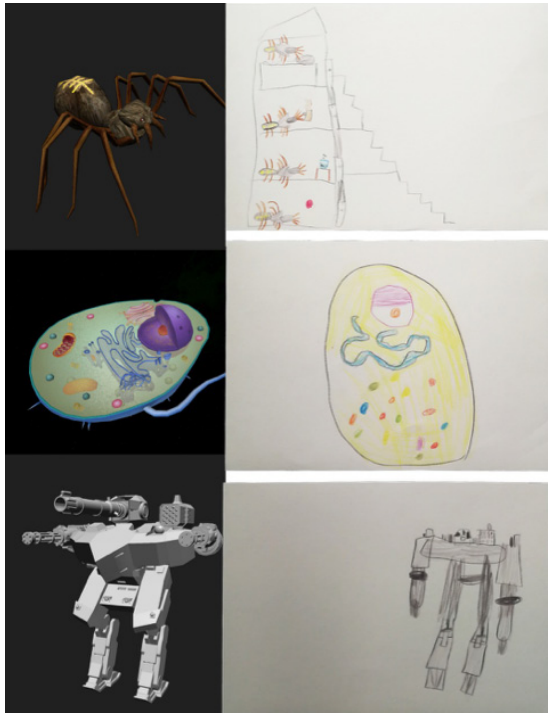


Figure 4. Contents of the screen medium (tablet) and drawings based on this were made from imagination (1), memory (2) and observation (3).

1S

The second drawing from imagination was encouraged by observing the three-dimensional spider model on the interactive tablet (Figure 4 – above). The spider could be enlarged, shrunk and rotated for better viewing. In his drawing, the boy continued the story of a spider, who has many friends, all of whom live together in a large house. For the task the boy requested a larger set of color pencils because the former one did not contain the desired shades. The entire activity lasted more than 15 minutes. He devoted a lot of attention to the color and determined colors for depicting the spider in advance. The building itself was made transparent, with constructive view; we see a spider and what it's doing on each floor. When the tablet device suddenly turned off and the digital spider disappeared, the boy responded: "Now I no longer need to watch the spider because I can copy it from already drawn spiders." The boy thought his drawing was excellent, "probably the best he had ever drawn", and immediately showed it to his father.

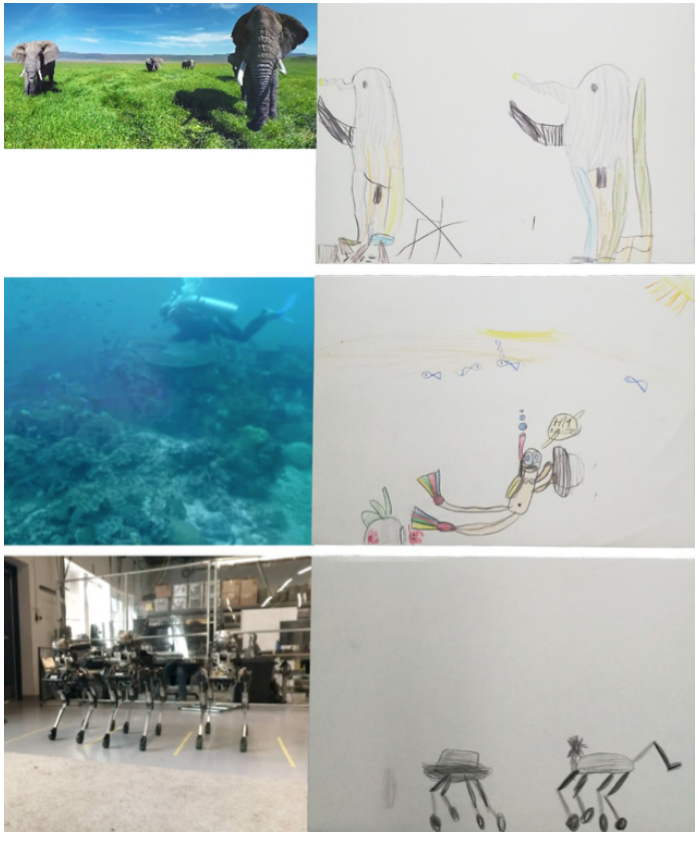


Figure 5. Content of virtual medium (VR glasses) and drawing from imagination (1), memory (2) and observation (3).

1V

The third drawing from imagination was created after observing wild elephants with virtual reality glasses (Figure 5 – above) and with instruction to draw elephants at school. The chance to use virtual reality glasses motivated the boy very much. He became deeply involved in the film, and as he tried to follow the elephants, he almost climbed the locker in the room. "I already know! This elephant will be magical, it will be like a rainbow – I cannot say it differently," he said, and started drawing. Later he explained: "Elephants sit on chairs. They raised their tusks to say something. Then the chair on the left broke. I made a mistake here (pointing to a crossed chair). There is also a crack on the second chair because it is about to break. Both elephants pee. Okay, I'll paint their willies..." The elephants are drawn from the side and do not have all the body parts. Tails and ears are missing, tusks are similar to hands and are very important – therefore they are even darker andmore thickly colored. Elephant bodies are similar, multicolored, with yellow emphasis at the tips of their trunks. An interesting detail is the elephant's "willy, which pees" and the event of the breaking of a chair. The boy made a mistake again, but was less stressed about it this time – he simply crossed over the unnecessary chair. He depicted the space by putting the elephant on the lower edge of the drawing. The remaining events in the elephant school continue – so it seems – over the left edge of the drawing.

2PH

At drawing from memory, we were particularly careful that we chose a diverse motif which included several different elements. We were interested in what the child`s focus would be on, what he would remember. To make the task difficult, the motif was abstract, with emphasis on texture, colors, materials. For a physical experience (Figure 3 – in the middle), we prepared a plate full of small ceramic objects and a pile of rubber eyes. The child observed these objects, touched them, this time very precisely and each of them separately. Then we took the objects away and he had to draw what he had just seen. The child was very attentive to details of the objects and the choice of colors, and he asked for a mirror to look at his own eye. During the drawing process, he stepped out of the room for a few moments for another quick glance at the previously observed objects. Again, he made a mistake but this time he asked for an eraser – in previous meetings he turned the paper around and drew on the other side. The drawing itself does not show all the complexity of the thought process, the exact opposite. It points to the child's difficulties in confronting the physical motif and transferring it to the drawing. The drawing talks about the whole event, in which the boy was involved – in the upper part he drew his own face, watching the plate full

of objects and thinking how he would draw it. The face is schematic, drawn in a quick, one-pointed way, as an open circle. However, he tried with some details: painted lips, eyes, hair, as well as the text bubble. The position of the face indicates spatial representation – looking from above, just as he leaned over the plate that was placed on the floor during the survey – the position of eyes and the mouth also indicate this. In the drawing the white plate became the brown bowl, drawn from the side and two-dimensional, the volume is indicated only by thicker and painted sides of the bowl, which are rounded at the top. The child placed all objects in this enclosure. "I also noticed the one which lies with its hands up (showing up with his body) and the other similar one, I just could not draw them," he said. The figures are simple and assembled – there is not yet an outline quality that would indicate that the object has already been examined and linked into the mind unit. Also, the considerably studied eyes do not yet have the details that we would expect from the boy's committed observations.

2S

The screen media introductory experience of the second drawing-from-memory task contained a clear display of the cell structure (Figure 4 – in the middle). A digital three-dimensional model displayed on the tablet can be rotated by the child, the cell can be viewed from all sides, enlarged or shrunk and can even get disassembled to the components. The boy began to examine the object with the words: "What is it, a spaceship?" After the experience we took the tablet away. He drew with both hands in an intense, determined, and concentrated manner, which could not be said for the previous meetings. Despite the initial hesitation – he was drawing a small, barely 3-centimeter drawing, which seemed to be a sketch, he later turned the paper around and drew a large, precise drawing. He remembered and drew almost everything and very similar to the object he observed. Nevertheless, the advantage of drawing from memory is in the absence of the object, so it is no longer necessary to keep the exact similarity.

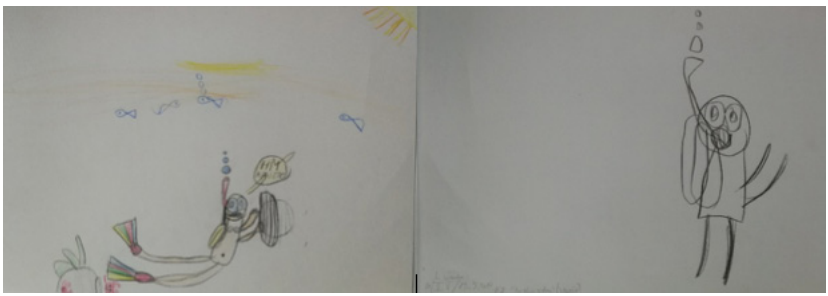


*Figure 6. T*he frontal, "real" drawing and the back side of the paper where the child drew what he tried to explain.

2V

The last drawing from memory was based on the viewing of a coral reef recording, using virtual reality glasses (Figure 5 – in the middle). The child was immersed in the film, he was describing the depth, shells, corals, movement of divers – how he went to the bottom, how he was running out of air and had to go to the surface and to the cave... During the process of drawing he was also erasing a few times, but there was something he drew on the back side of the paper (Figure 6) he had not done before and did not know how to do it – the diver's bomb from the side.

It was difficult for the boy to draw the surface; it is partially painted in yellow and orange, and in the corner, there is a template sun. The figure is composed; the neck is missing. Important things are painted with primary and secondary colors, and they lie in the lower, main part of the drawing where events occur.

3PH

The third part was devoted to drawing from observation. The child closely observed objects, each time in another medium.This time, objects remained by his side, so he could look at them while drawing. We selected objects with emphasis on shapes, directions, and branched forms. The physical experience here was represented by a typewriter which the child has never seen before (Figure 3 – below). The machine seemed interesting to him, he typed, listed letters, watched metal rods rise and fall, he was turning the machine. Drawing seemed difficult, it was slow. Suddenly he stopped, he could draw no longer. He only used black color, he drew a construction and designed it as a rectangle with thickened and painted sides. An empty central part was intended for the most important parts, the keys whose characters the child wanted to show as clearly as possible. The boy was especially disturbed by noticing the three-dimensionality of the machine, which he tried but could not draw. He even precisely pointed out the places where spatial solutions should have been found, but he was unable to find them. He did not want to show these drawings to his parents, although he had always enthusiastically done it before.

3S

Before the second task of drawing from observation (Fig. 4 – below), the boy observed a model of a robot on a tablet (the screen medium). Again, he could rotate, zoom in and out on the model of a robot itmself. The figure on the drawing is assembled from individual parts. He divided parts of the figure with borders and in some places he defined them with colored shapes.

Hand joints stand out with circular painting, which reminds us of a spiral movement as portrayed by younger children. The works with the emphasized third dimension were drawn as two-dimensional geometric shapes, for example, rectangles on feet. The child did not draw the space, he placed the figure on the right side of the paper, in the middle. Since he was not able to draw depth of a triangular convexed part on the frontal upper part of the robot, he simply straightened it out and also explained it – this was his drawing solution. During the observation process he was very concentrated, he carefully examined the motif and was solemnly solving this artistic task.

3V

The third drawing from observation started with observing dog-like-robots (Figure 5 – below) with virtual reality glasses. Because there were more robots, the boy returned to the glasses and repeatedly observed them. He had drawn only two robots, although he also tried to draw a third one which was facing him, but he said it was too difficult. Since he did not know how to draw depth, he erased some of the drawing. Virtual reality really attracted him. He was looking forward to watching with virtual reality glasses, but was also happy to draw. During observation and drawing, he was very focused, self-contained, without attention distractions, which was not typical for such a lively boy – usually every fingerling attracts his attention.

Discussion

Based on the results, we can respond to the research questions. Since this is a case study, the results cannot be generalized as they apply only to this case, but they provide important information for further research.

RQ1: Is it possible to deduce from the child's drawings and/or drawing process that they are based on various types of experiences (physical, on-screen, virtual)?

The comparison of introductory-experience drawings (Figure 2) with test drawings (Figure 1) reveals two things. Firstly, the level of the boy's artistic development corresponds to that of a typical 7-year-old with some elements that children master at 6 and are often exceeded at 7. The latter can be attributed to the unstimulative (school and home) artistic environment. His drawing has most characteristics of a typical 7-year-old (transparency, attention to colors, floor plane, etc.), but special features of the previous development period can be seen in details of drawings, where he "made a mistake". Making mistakes is characterized as a developmental phenomenon of 7-year-olds, which indicates that the drawing ability lags behind

their understanding and desires. The discrepancy between understanding, desires and artistic ability was especially revealed in the task in drawing from observation, where the boy had to draw a typewriter and which was the only drawing he did not want to show to his parents. Because he did not find a solution despite observation and awareness – he put a great deal of work in solving such artistic tasks – he skillfully circumvented some of the images and this way solved some of the problems. "I don't know how to draw," he said, and then new drawings brough new ideas to his mind, which led to other interesting drawing solutions. Thus, the new drawing was usually a major development leap, as if the first drawing would serve only as a sketch, a research, a matter of reflection. This is especially evident in the example of "elephants at school", where the first chair is linear, drawn at a level of a 6-year-old, but the new chair already proves the knowledge of a 7-year-old. Drawings show that the boy does not draw much. Although his perceptions about shapes and colors are good, the effects of templates are also detectable. Therefore, we believe that a more interesting art practice would have a positive impact on the child's artistic articulation, as he surprised us with his willingness for drawing challenges as well as his curiosity and intelligence that are reflected in his answers.

Secondly, we can see some differences in drawings that can be attributed to the type of introductory experience and differences in motifs. The representation of the space (the floor line or filled format) is shown in drawings that were prompted by a physical or virtual experience. This is attributed to the reality of the physical and to 'as' reality of the virtual media and, on the other hand, the lack of space in drawings based on the on-screen experience – the feature of on-screen templates is that they have no background. We believe this is the reason why the child did not draw the space in two drawings based on on-screen experience. He did it however in the first, imaginative drawing, where the essence of the drawing was a wider story and the observed element – the spider – was only a small part of the whole set. Nevertheless, drawings based on screen experience are more detailed. This can also be attributed to the fact that templates do not have backgrounds, so all attention is focused on shapes and their details. We can also see that drawings based on screen and virtual experience are to some extent more complex, with more details, such as in the case of drawing from imagination after on-screen and virtual media experience, and in the case of drawing from memory after virtual media experience (where the child added his own imaginative details). In the case of physical experience, however, drawings appear to be somewhat less complex, which points to certain problems that the child had in the drawing process.

The fact that final drawings in examples of physical experience do not reflect

the entire complexity of the drawing process confirmed our assumptions that we must distinguish between the influences of different experiences on the drawing process and the final drawing result. For 7-year-olds, it is characteristic that they can have a lot of problems at the executional level. It is precisely in solving and addressing these problems, as well as in the motivation for the artwork, that various introductory experiences can have a different impact on the drawing process itself.

Some questions were troubling the child within all media. For example, using and naming of colors – he devoted much time to it. He was also making mistakes and starting again – this is consistent with the artistic development stage of a 7-year-old. It is interesting that the boy's second drawings are a degree higher in artistic development.

The first drawing based on physical experience (drawing from imagination) indicated that physical media would not be a good motivator, the whole process lasted only 5 minutes and the child did not take the object into his hand to see it better. However, other physical experiences (the plate full of small items and the typewriter) attracted his attention, yet the drawings did not show that. The big gap between a complex physical medium and a poorer drawing (the plate with objects) and a complex screen image and its clear representation (the cell) shows the specificity of drawing after the physical experience: the child felt drawing was "hard" and the artistic task of translating from a three-dimensional real world into a two-dimensional art space was difficult. The screen medium, in some way, made this easier. The ability to rotate, enlarge and shrink helped to better observation, understanding, and learning. The fact that the child already had a lot of experience with a screen medium and was able to use it certainly helped as well-

If a feature of the on-screen experience was explicitness, motivation proved to be the greatest advantage of the virtual medium. The child wanted to use the virtual medium, was excited to draw and was also strongly focused during the drawing process. The screen medium was also quite motivating, but not as much as the virtual medium, which can be attributed to the fact that the child was already accustomed to the screen medium. Despite this, the child was highly focused during the screen medium experience in both observation and drawing (as is evident in the explicitness of drawings). The virtual medium also proved to be a powerful promoter of imagination and creativity (the child imaginatively made up a story).

RQ2: Which qualities of screen and virtual experiences can be summed up as positive for the child's drawings and/or drawing process?

Based on identified links between the introductory experiences and drawings and drawing processes, we can summarize positive attributes that can

effect the artistic creative process. Physical experience has proven its "classical" characteristics, which have always been the basis of art education. Physical experience is demanding, in the sense that translating a spatial physical experience into two-dimensionality can be very stressful for a child. Consequently, physical experience provoked most frustration to the child in our study. In this sense, physical experience serves as an essential basis for artistic development and creativity. However, just as a complement to the "demanding" physical experience, a virtual experience can play a useful role in today's time. According to Piaget, children learn best when their curiosity is not completely settled or is provoked in a special way (Mooney, 2000). However, different experiences can be challenging for children in different ways. Today's children use digital media and are able to use information they bring and incorporate them into artistic articulation. "I know how to draw an alligator!" exclaimed the boy – he learned this in the cartoon called *Wild Kratts*. The boy also self-explained *Pacman*'s computer game (Figure 8) with the drawing (Figure 7), which shows a positive influence of digital media in terms of learning with and from them.

Figures 7 and 8: description of operating the computer game (explanation) and a screenshot of the Pacman game

In our research, the virtual experience was found to be a good complement to the physical one. We could say that it helped the boy when he might have given up in the case of his physical experience. The on-screen experience's main advantage is the possibility of free manipulation of the observed object by rotating, enlarging and shrinking, which increased explicitness of the displayed image and made the observation easier. This is showing also in greater explicitness of the drawings. On the other hand, the problem of the on-screen experience is that the increased explicitness of the observed object goes at the expense of a background, which is missing. There was no space in the on-screen experience. Therefore, drawings based on on-screen experience did not contain backgrounds, only single shapes.

The virtual medium in the form of virtual glasses provides an integrated, immersive experience – for the boy the physical environment did not exist at the time. The experience of virtual reality is still mostly new and exciting for children, so it can be highly motivating and inspiring. As a novelty with the exciting prospect of new worlds and the inclusion of different senses, it acted on several levels, and, most of all, stimulated the imagination. From the visual art point of view, it is important that the virtual experience relates to the physical one, since it gives a similar and convincing perception of the whole space. This was also reflected in the drawing of space of the 7-year-old, which was related to his drawings based on physical experience. However, since the virtual experience is not physical, it can also bring closer things that would otherwise be inaccessible due to remoteness or risks. From this point of view, the virtual experience is interesting for visual art education as a supplement to a physical experience. Experiences of this type are quite similar to physical ones, but they are more intense, focused on the individual and interesting, special events. In this sense, they are an excellent polygon for displaying varied or even hard-to-reach things. By focusing on an individual for whom a new world is created, they have the power of precision and stimulation of intense experience, which is an excellent basis for creating. On the other hand, they can also work explicitly by educating and schooling. We saw excellent responses and results in the child's drawings within the first two tasks, in fantasy elephants and in the diver drawn from memory, which also contained many witty ideas. In the third case, in drawing from observation, the space seemed like a physical one, and the boy watched dog-like robots, something that would be hard to see live. We chose this motif, because we assumed it was close to the boy's area of interest. An age-appropriate and interestingly suitable choice of motif is also recommended by Slovenian Primary School Fine Art Education Curriculum (2011), which is why we consider this an important factor in artistic development and in the designing of visual art tasks.

Upon a comprehensive overview of drawings, we found two indicators of better drawing. The first is the absence of the real. A better, more versatile and multi-layered drawing is imaginative. The demands for tracking and imitating the existing came at the expense of ease, creativity, imagination and interesting solutions, and drawing became cumbersome, dreary, and self-censored. The second path to better drawing includes good motivation or an interesting introductory experience. In our case, this was virtual reality with the entire process of excited expectations, the use of special equipment, the experience of the recorded, and ultimately with vibrant imagination, which is evident in boy's drawings. These have become livelier and more creative, while drawing and motivational leaps were shown in richer and more linguistically elaborated drawings.

Conclusion

Through this case study we wanted to explore how different types of experiences and media, physical, on-screen, and virtual, are reflected in drawing skills and the visual art language of a child, while we were particularly interested in the process of the child's drawing.

This study is seen as a pilot study that reveals key issues for further exploring the integration of interactive screen and virtual media and content in the field of visual art education at a time which, due to its digital nature, calls for enrichment of traditionally designed lessons. The pilot study showed that the virtual experience cannot replace the physical experience in the art process, since the physical experience is the one which, by activating all the artistic senses, faces the child with complexity of the artistic process. Nevertheless, it can supplement it in terms of explicitness, compensation of inaccessibility, stimulation of imagination, as well as motivation for artistic creation.

Particular emphasis should be placed on the process of creating the child's drawing. It is a great source of information that works on many levels. It explains the mental flow of drawing, the content, and offers a lot of additional information that can be linked to resulting drawings in the final analysis, the digital practice and the environment in which the child is living. This has an impact on the construction of the visual language as well as on the overall development.

As a pilot study, the research therefore indicates that it is sensible to investigate this issue with a larger sample of children who have different previous experiences with digital media (extensive or minimal use) and in different age periods (along the education vertical).

References

Adams, E. (2017). Thinking drawing. *The international journal of art & design education, 36*(3), 244-252. Doi: 10.1111/jade.12153

Arnheim, R. (1969). *Visual thinking*. Berkley: University of California.

Arnheim, R. (1986). *New essays on the psychology of art*. Berkley: University of California.

Bailey, J. O., & Bailenson, J. N. (2017). Immersive virtual reality and the developing child. In P. Brooks & F. Blumberg (Eds.), *Cognitive development in digital contexts* (pp. 181–200). San Diego, CA: Elsevier.

Belamarić, D. (1986). *Dijete i oblik: likovni jezik predškolske djece. Knjiga za odgajatelje, roditelje, pedagoge, psihologe, psihijatre* [Child and Form: The Language of Preschool Children. Book for Educators, Parents, Pedagogues, Psychologists, Psychiatrists]. Zagreb: Školska knjiga.

Belamarić, D. (1987). Likovno stvaralaštvo djeteta [A Childs Creative Work]. In L. Kroflin (Ed.), *Dijete i kreativnost* [A Child and Creativity]. Zagreb: Globus.

Bučkova, Z. (2016). Historical reflection on game principle alea and its presence. *Communication Today, 7*(2), 30–45.

Butina, M. (1997a). *Prvine likovne prakse* [Principles of Fine Art Practice]. Ljubljana: Debora.

Butina, M. (1997b). *O slikarstvu* [On Painting]. Ljubljana: Debora.

Carter, C. M. (21. 12. 2016). The complete guide to generation alpha, the children of millennials. Obtained from: https://www.forbes.com/sites/christinecarter/2016/12/21/the-complete-guide-to-generation-alpha-the-children-of-millennials/#9f7c31536236

Didkowska, B. (2017). Selected concepts in the development of drawing activity in children aged 3 to 12. *De Gruyter Open, 4*(1), 65-79. Doi: 10.1515/ctra-2017-0003

Duh, M., & Zupančič, T. (2003). *Likovna vzgoja v prvi triadi devetletne osnovne šole. Priročnik za učitelje razrednega pouka* [Visual Art Education in the First Triad of the Nine-year Elementary School. A manual for classroom teachers]. Ljubljana: Rokus.

Fawson, S. (2009). Drawing development: Historical perspectives, developmental stages, current approaches. *The Psychology of Education Review, 33*(1), 3–9.

Ferrara, N. (1991). Art as reflection of child development. *American Journal of Art Therapy, 30*(2), 44–50.

Frelih, Č. (2012). Druga narava: razdalje med videzom in obliko [Second nature: distances between appearance and shape]. In Č. Frelih & J. Muhovič (Eds.), *Likovno/vizualno. Eseji o likovni in vizualni umetnosti* (pp. 11 - 26). Ljubljana: Pedagoška fakulteta [Faculty of Education].

Frelih, Č. (2013). Likovna vzgoja: likovno opismenjevanje ali zgodovinjenje prihodnosti [Visual Art Education: Development of the Visual Art Literacy or Historicizing the Future]. *Vzgoja in izobraževanje: revija za teoretična in praktična vprašanja vzgojno izobraževalnega dela, 44*(4/5), 48–49.

Karlavaris, B., & Berce-Golob, H. (1991). *Likovna vzgoja. Priročnik za učitelje razrednega pouka* [Visual Art Education. A Manual for Classroom Teachers]. Ljubljana: Državna založba Slovenije.

Knosala, B. (2017). Poetic wisdom, mind and senses, media. How to deal with phenomenon of crisis of humanities? *Journal of literature and Art Studies, 7*(1). doi: 10.17265/2159-5836/2017.01.009

Lowenfeld, V., & Brittain, W. L. (1949). *Creative and mental growth*. New York: The Macmillan Company.

Marks, T. (5.12.2016). Tech Tuesday: Integrating virtual reality into your business. *Daily Record*, Baltimore. Obtained from: http://eds.b.ebscohost.com/eds/detail/detail?vid=101&sid=45c6ca38-abab-4128-8b24-6bf86cc0ffb6%40sessionmgr102&bdata=Jmxhbmc9c2wmc2l0ZT1lZHMtbGl2ZQ%3d%3d#AN=L54978852DRMD&db=bwh

Matthews, J. (2003). *Drawing and painting: children and visual representation*. London: Sage.

Meet Generation Z (2016) (Video). The Washington Post. Obtained from: https:/www.washingtonpost.com/video/entertainment/meet-generation-z/2016/05/25/290c2c00-21db-11e6-b944 52f7b1793dae_video.html

Mooney, C. G. (2000).*Theories of Childhood. An Introduction to Dewey, Montessori, Erikson, Piaget, and Vygotskij*. ZDA: Redleaf Press.

Muhovič, J. (2007). Umetnost in izobraževanje za življenje med realnim in virtualnim [Art and education for life between real and virtual]. *Sodobna pedagogika, 58*(3), 48–65.

Muhovič, J. (2015). *Leksikon likovne teorije: slovar likovnoteoretskih izrazov z ustreznicami iz angleške, nemške in francoske terminologije* [A Lexicon of Art Theory: A Dictionary of Visual Art Theoretical Expressions with Equivalents from English, German and French Terminology]. Celje; Ljubljana: Celjska Mohorjeva družba; Društvo Mohorjeva družba.

Selan, J. (2014). Temelj in namen likovnega izobraževanja: likovni jezik in likovna kompetenca [The Foundation and Purpose of Art Education: Visual Art Language and Artistic Competence]. In T. Devjak (Ed.), *Sodobni pedagoški izzivi v teoriji in praksi* [Contemporary Pedagogical Challenges in Theory and Practice] (pp. 371–388). Ljubljana: Pedagoška fakulteta [Faculty of Education].

Strehovec, J. (1994). *Virtualni svetovi. K estetiki kibernetične umetnosti* [Virtual worlds. Aesthetics of Cybernetic Art.]. Ljubljana: Znanstveno in publicistično središče.

Šupšakova, B., Tacol, T., & Tomšič - Čerkez, B. (2007). *Art Education = Likovna vzgoja: retrospectives, perspectives, alternatives*. Ljubljana: Debora.

Tacol, T. (1999). *Didaktični pristopi k načrtovanju likovnih nalog* [Didactic Approaches to the Design of Artwork]. Izbrana poglavja iz likovne didaktike [Selected Chapters in Art Didactics]. Ljubljana: Debora.

Tacol, T. (2012). Vizualizacija – orodje učinkovitosti poučevanja in učenja pri likovni vzgoji [Visualization – an Efficiency Tool for Teaching and Learning in Visual Art Education]. In Č. Frelih & J. Muhovič (Eds.), *Likovno/vizualno. Eseji o likovni in vizualni umetnosti* [Fine art/Visual. Essays on Fine Art and Visual Art.] (pp. 11–26). Ljubljana: Pedagoška fakulteta [*Faculty* of Education].

Tacol, T. (2016). *Likovno izražanje 2* [Artistic expression 2]. Priročnik za učitelje 2. razreda osnovne šole [Secondary School Teachers Manual]. Ljubljana: Debora.

Tomšič-Čerkez, B. (2003). Likovna izkušnja kot izhodišče pri pouku likovnega snovanja: permanentno nadgrajevanje izkušenj poučevanja in učenja [Artistic Experience as a Starting Point for Lessons in Artistic Design]. In B. Marentič Požarnik (Ed.), *Konstruktivizem v šoli in izobraževanje učiteljev* [Constructivism in School and Teacher Education] (pp. 112–114). Ljubljana: Center za pedagoško izobraževanje Filozofske fakultete [Center for Pedagogical Education at the Faculty of Philosophy]: Slovensko društvo pedagogov [Slovenian Society of Pedagogues].

Tomšič-Čerkez, B. (2011). Medpredmetno povezovanje kot strategija dvigovanja ravni »estetske pismenosti« [Cross-curricular Integration as a Lifting Strategy of "Aesthetic Literacy"].

In M. Cotič, V. Medved-Udovič, S. Starc, & M. Razpet (Eds.), *Razvijanje različnih pismenosti* (pp. 372–379). Koper: Univerza na Primorskem, Univerzitetna založba Annales.

Učni načrt Likovna umetnost [Curriculum: Primary School Programme: Fine Art Education] (2011). Ljubljana: Ministrstvo za izobraževanje, znanost in šport [Ministry of Education and Sport, The National Education Institute of the Republic of Slovenia]. Obtained from: http://www.mizs.gov.si/si/delovna_podrocja/direktorat_za_predsolsko_vzgojo_in_osnovno_solstvo/osnovno_solstvo/ucni_nacrti/posodobljeni_ucni_nacrti_za_obvezne_predmete/

Vrlič, T. (2001). *Likovno-ustvarjalni razvoj otrok v predšolskem obdobju* [Artistic and Creative Development of Children in Pre-school Age]. Ljubljana: Debora.

Virtual Reality Society (VRS). (n. d.) How Do Virtual Reality Glasses Work. Obtained from: https://www.vrs.org.uk/virtual-reality-gear/glasses/how-do-they-work.html

Xi, S. (2010). Virtual reality for arts and design education. In *IEEE 11th International Conference on Computer-Aided Industrial Design & Conceptual Design CAIDCD* (pp. 679-682). Yiwu, China: IEEE.

MATERIALS

- interactive screen media:

  1D: [the spider] (https://play.google.com/store/apps/details?id=com.dukedev.hdmodelviewer)

  2D: [the cell structure] (https://play.google.com/store/apps/details?id=com.animalcell.android)

  3D: [the robot] (https://free3d.com/3d-model/leo--23413.html)

- VR:

  1V: [elephants] (https://www.youtube.com/watch?v=mlOiXMvMaZo)

  2V: [the coral reef] (http://www.conservation.org/stories/vr/Pages/valens-reef.aspx)

  3V: [dog-like robots] (https://with.in/watch/the-possible-hello-robot/)

  Kratt, C., & Kratt, M. (2011-2018). Wild Kratts. TV animated series.

  Pacman computer game, Namco Bandai Games. Obtained from: https://play.google.com/store/apps/details?id=com.namcobandaigames.pacmantournaments

DIFFERENCES IN STUDENTS' SELF-REGULATED LEARNING ACCORDING TO THEIR AGE AND GENDER

Urška Žerak, Mojca Juriševič and Sonja Pečjak

Abstract
In the modern times of information technology, in which we are faced with a large amount of information, the ability to self-regulate learning behaviour becomes crucial for student's successful performance at school and in the broader society. Therefore, the focus of this study was twofold. First, we have investigated the dominant learning type (i.e., external, impulsive, self-regulated) of 175 primary school students in Slovenia (M_{age} = 11.49, SD_{age} = 1.73; 84 girls and 91 boys), using the FSL-7 self-report questionnaire. Second, we have examined age and gender differences in students' self-regulated learning. The results revealed that the majority of students are self-regulated learners. Moreover, according to the students' age, it was found that older students are more impulsive learners than younger ones. Finally, results showed that female students are more self-regulated and less impulsive learners than male students. The study highlights the importance of understanding individual differences in learners' use of learning strategies and has meaningful implications for teachers in everyday practice.

Key words: students, learning strategies, gender, age, primary school

Literature review

Self-regulation learning (SRL) can be defined as the ability of learners to set their (learning) goals while monitoring, controlling and regulating their behaviour, motivation and cognition. In this process, learners are directed by their own goals, their characteristics and the contextual characteristics of the environment (Bakračevič Vukman, 2010; Dörrenbächer & Perels, 2015; Pintrich, 1999; Paris & Paris, 2001; Schunk & Zimmerman, 1998; Tomec, Pečjak, & Peklaj, 2006; Winnie, 2011; Zimmerman, 2013). SRL is a self-directed process through which the individuals transform their mental abilities into skills (Pečjak & Košir, 2003; Pečjak & Gradišar, 2012). In this process, individuals consider learning as a systematic process, which is largely under their control (Peklaj & Pečjak, 2002; Schunk & Usher, 2011). Self-regulated learners are attending to key features of the environment (e.g., listening for instructions), tailoring response to suit specific circumstances (e.g., relating to teachers versus relating to peers), resisting distractions and persisting in a task when they are challenged (Blair & Razza, 2007).

Learning strategies are an important element of SRL. Mayer (1988) defines them as learner's behaviours, which deliberately influence how the learner processes information. Learning strategies include all thoughts, behaviours, beliefs or emotions that enable the acquisition, understanding or subsequent transfer of new skills (Weinstein, Husman, & Dierking, 2005; Weinstein, Acee, & Jung, 2011). In terms of mental processes, learning strategies can be classified into three categories: cognitive (rehearsal, elaboration and organization), metacognitive (planning, monitoring and adjusting) and motivational (interest, self-efficacy beliefs, task value, goals, attributions) (Boekaerts, Pintrich, & Zeidner, 2005; Juriševič, 2012; Pečjak & Gradišar, 2012; Schunk & Zimmerman, 2008; Weinstein & Mayer, 1986; Wolters & Benzon, 2013).

Models of SRL are based on a dynamic conception of learning, whereby learners, independently and goal-oriented, disseminate their knowledge and skills in a particular field (e.g. mathematics, science) while at the same time improving their learning competencies by using appropriate cognitive, metacognitive and motivational learning strategies (Zimmerman, 2005). Learning is thus not conceived as a sequence (i.e., input–processing/storage–achievement), but as a cyclic process that takes place continuously through several steps (Ziegler, Stoeger, Vialle, & Wimmer, 2012).

Our study is based on the 7-level cyclical model of SRL by Ziegler and Stoeger (2005). In this model, the learning begins when learners *assess the learning challenges*, *the particularities in the learning content that they will have to learn and their own abilities or skills*. Then, based on self-assessment from the previous step, students *determine an appropriate learning goal*. In the third step of the cycle, *the strategic planning of the learning process* is carried out, which means that learners should think about how they learn best. Therefore, they must choose effective learning strategies to help them achieve the goal they have set in the previous step. In the fourth step of the cycle, the *strategic implementation of planned learning* is carried out. In this phase, students consistently use the chosen learning strategies and devote attention to the learning process. In the fifth step, learners *strategically monitor and reflect* their own progress in the learning process. If students recognize that they are not applying learning strategies optimally, they should undertake the sixth step of the cycle, *a strategy adjustment* in order to improve the learning process. The final step is the *evaluation of the learning outcome*; students assess to what extent the learning goal they have set has been achieved through a chosen learning strategy. Evaluation is the basis for new self-assessment, which represents the first step in a new cycle of SRL. The diagnosis of SRL requires consideration that each of the above described seven steps of the cycle had been taken into account.

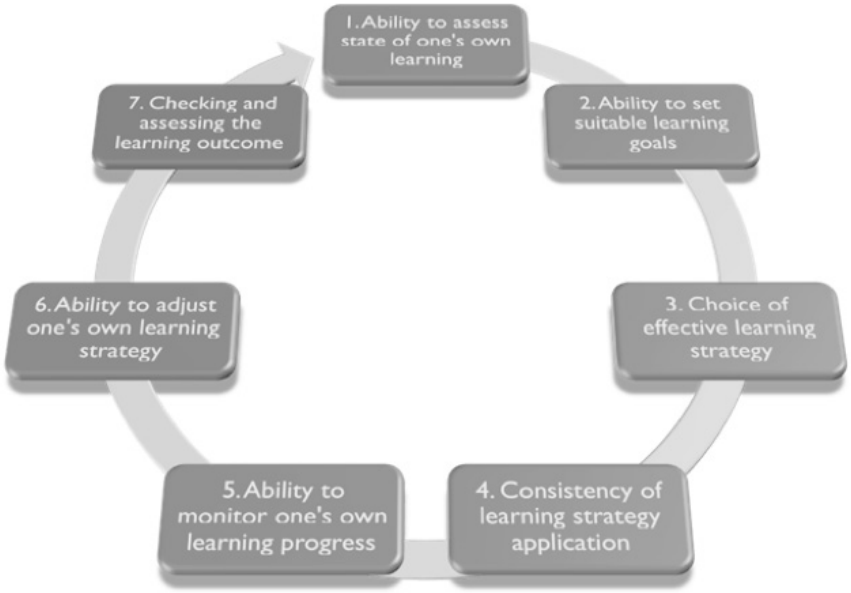


Figure 1. The seven-step cycle of SRL (Ziegler et al., 2012)

According to Ziegler et al. (2012), *external learners*, as opposed to self-regulated, rarely take the initiative. In the learning process, they rely on information (if available) and the support from significant others (e.g. parents, teachers). When they study, they are generally uncertain about whether their learning type is correct. This uncertainty applies to all aspects of the learning process. Their actual learning behaviours exhibit many deficits.

Learners with an *impulsive type* rarely plan their learning approach, are inconsistent, and unsystematic. In this learning type, the short phases of motivation, in which learners are intensely devoting themselves to learning process, alternate with often longer phases of apathy or indifference. This can also occur because these students do not have the correct learning strategies, which would enable them to learn in the right way. Learners with this learning type are usually not able to improve their learning behaviour without proper support. From an early age, *self-regulated learners*, show very mature learning behaviour. They are able to assess their own learning state and their strong and weak areas in the learning process. They can set an appropriate learning goal and use a wider range of learning strategies, from which they are able to choose accordingly. When they do not achieve a particular learning goal with a specific learning strategy, they do not give up, but try to balance their learning process by matching the learning achievement with the quality of their learning activity. All this allows them to make relatively independent decisions about their own learning activities. If these

students are motivated, they can achieve exceptional goals (Ziegler et al., 2012).

Research evidence suggests that by the child's age of three the mechanisms necessary for the development of metacognitive skills, which form the basis for self-regulation of behaviour, are formed (Kochanska, Coy, & Murray, 2001; Kopp, 1982). Between 3–5 years, children are able to distinguish among perception, behaviour and thinking (Flavell, Green, & Flavell, 1995). During this period, the ability of self-control develops, namely children are able to follow requirements and orders. By the age of five, most children are able to display delay of gratification, which is gradually developing during their schooling (Bembenutty, 2009; Mischerl, Shoda, & Roudriguez, 1989). At the beginning of schooling, students are already able to understand that they need certain skills to successfully solve a task and that tasks of varying difficulties require different skills. They are convinced that success depends primarily on effort (Folmer et al., 2008; Paris & Newman, 1990). Self-regulation develops between the age of 6–8 through internal speech (Flavell, Green, Flavell, & Grossman, 1997). Metacognitive skills are emerging between the age of 8–10 (Veenman, Van Hout-Wolters, & Afferbach, 2006), when students are able to differentiate between different cognitive processes and choose short-term goals (Demetriou, 2005). At around 9 years of age, the ability of planning develops (Unterrainer et al., 2015; Vurpillot, 1968). Students between 11–13 years of age are able to systematically regulate daily activities and plan mid-term goals. From the age of 13, the development of awareness of specific cognitive processes and operations begins, and the ability to plan and implement long-term goals. At that time, students are able to distinguish between problem solving and thinking strategies, while at the same time the capacity to assess their own abilities is developing. Students are aware that success depends upon effort and intellectual abilities (Demetriou, 2005). From the age of 15, learners are able to transfer metacognitive skills between individual learning tasks as well as between different subject areas (van der Stel & Veenman, 2010), which means that the teacher can, with systematic development of metacognitive skills, increase the transfer between different subjects (Pečjak & Gradišar, 2012).

Development of self-regulation learning does not happen automatically, but results from the interaction between the maturation process and the process of students' education (Hilden & Pressley, 2006; Moos & Ringdal, 2012; Paris & Newman, 1990; Paris & Paris, 2001; Pečjak & Košir, 2002). Self-regulation of learning activities begins from young age and becomes increasingly associated with students' academic learning achievements across primary and secondary schools (Dent & Koenka, 2016). Even though

young students may have a different pace of development in self-regulation, most SRL strategies related to the learning process must be acquired through learning from teachers and peers at the initial stage (King, Lengua, & Monahan, 2013; Usher & Schunk, 2018). Regarding maturity, research into language learning strategies found that strategy use was correlated with grade levels. Chen (2009) reported that students from higher-grade levels used learning strategies more frequently, e.g., memory, cognitive, metacognitive, affective and social strategies. On the other hand, Magogwe & Oliver (2007) found that students in primary school preferred social learning strategies and students of secondary and tertiary levels of education preferred metacognitive learning strategies. Research on application of learning strategies in SRL in elementary school has shown that fifth graders use cognitive strategies before reading more often compared to seventh graders (Pečjak & Košir, 2002).

Researchers in the field of individual differences between gender and self-regulation skills revealed differences in cognitive and motivational aspects of SRL. Peklaj and Pečjak (2002) have reported that girls in Slovenia know more about cognition related to self-regulation; they use more metacognitive strategies and are more intrinsically motivated. Furthermore, they found that girls express more feelings and use more strategies for controlling effort in learning situations. Similarly, research findings suggest that girls use learning strategies more often than boys, specifically the strategies between and after reading (Pečjak & Košir, 2002). Puklek Levpušček (2001) found that younger adolescents in Slovenia have higher learning self-efficacy than older adolescents and that older male adolescents use fewer learning strategies than younger female adolescents. Research on preschool and early school age students' self-regulation skills has shown that teacher see boys as less proficient at self-regulating in comparisson with girls on indices of cognitive and behaviour control as well as emotional control. Teachers have also reported that boys have fewer positive work habits and spend greater proportions of time off task (Cadima, Verschueren, Leal, & Guedes, 2016; Rimm-Kaufman, Curby, Grimm, Nathanson, & Brock, 2009).

Research problem and research questions

Aforementioned studies have generated useful insights into gender and age differences in SRL. However, there is still little research into young students' use of learning strategies. Understanding the role of learning strategies in young students is essential to help them become effective learners and achieve their goals. The present study aims to contribute to a clearer understanding of learning types of students in Slovenian primary schools

and their orientation towards SRL. Specifically, the first aim was to examine the dominant learning type (external, impulsive, self-regulated) of students in Slovenian primary schools as defined by Ziegler et al. (2012). Second, we have investigated differences in learning according to students' age and gender. Specifically, three research questions were set:

1. What is the dominant learning type of students in Slovenian primary schools?
2. What are the differences between younger and older students in their learning types?
3. What are the differences between male and female students in their learning types?

Method

Participants

The sample included 175 students from ten different primary schools in Slovenia. From the total sample, 26 (14.9%) were fourth graders (aged 9–10), 80 (44.7%) were fifth graders (aged 10–11), 54 (31.3%) were eight graders (aged 13–14), and 15 (9.5%) were ninth graders (aged 14–15); 85 (47.5%) were female and 94 (52.5%) were male. The mean age of students was 11.49 years (*SD* = 1.73). Students were randomly chosen from primary schools and agreed to voluntarily participate in this study. Consent forms were signed by parents/guardians and participants.

Instrument

FSL-7 Questionnaire on Self-Regulated Learning (ger. *Fragebogen Selbstreguliertes Lernen-7*, Ziegler, Stoeger, & Grassinger, 2010)

The FSL-7 questionnaire was designed for diagnosing different profiles in SRL of students (aged between 8–15). It comprises seven items referring to each of the three learning scenarios with a total of 21 items. These learning scenarios are: (1) How students learn for school; (2) How students prepare themselves for tests; (3) How students make up missed schoolwork after having been sick. Each of the seven items of a scenario refers to one of the steps in the 7-step cyclical model of SRL (described above). The students select one of the three answer options that best describes their approach to learning: external, unreflective-impulsive and self-regulated (Ziegler et al., 2012). Sontag and Stoeger (2015) have reported the following coefficients of

internal consistency: 0.83 (first measurement – before intervention), 0.90 (second measurement – after intervention) and 0.94 (third measurement – follow-up after intervention). In the present study, we were interested in the preference for a given type of learning approach. Thus, we counted the number of choices for a given learning approach (external, impulsive, self-regulated). The students with a majority of choices in SRL were labelled self-regulated learners. Students with a majority of choices in externally regulated learning were labelled externally regulated learners; and those who mostly chose impulsive learning alternative were labelled impulsive learners. The minimum of choices for one learning type could be zero and the maximum of choices could be 21. Results of reliability analysis of the sub-scales made with Kuder-Richardson reliability coefficient (KR20) were .62 for external, .88 for unreflective-impulsive and .83 for SRL.

Data collection

The questionnaire was group-administered to students during their regular classes in March and April 2018. The completion of the questionnaire was guided by a teacher and took approximately 30–45 minutes. The research was performed following the general code of ethics in the field of psychological science.

Data analysis

Students were classified according to their age into two groups: younger (aged 9–10) and older (aged 11–14); the classification was made on the basis of empirical evidence relating to the development of SRL (e. g., Demetriou, 2005; Unterrainer et al., 2015; van der Stel & Veenman, 2010). A series of *t*-tests were carried out to assess differences in learning approaches (external, unreflected-impulsive, self-regulated) according to students' age and gender, whereby due to multiple comparisons, Bonferroni's correction was taken into account. Statistical analyses, including descriptive and inferential statistical techniques, were used to evaluate the data. In addition, correlations between different learning types and demographic characteristics were calculated. The data were analysed using statistical software package SPSS v23 (IBM Corporation, 2016).

Results

The dominant learning type of students in Slovenian primary schools was the focus of the first research question. Based on students' answers, the dominant learning type for each student was calculated. For the total score, responses in all the items have been added up for a particular learning type (external, impulsive, self-regulated). Table 1 presents the descriptive statistics of the students' learning type. The preferred learning type of students in the sample was self-regulated (M = 11.34), the second was impulsive (M = 6.21) and the least preferred learning type was external (M = 4.10). The standard deviations of learning types were quite high; the lowest observed was for external (SD = 2.78), followed by self-regulated (SD = 4.86), and impulsive (SD = 4.97). Learning types were normally distributed. The coefficients of skewness and kurtosis were between values ± 1, as shown in Table 1.

Table 1. *Descriptive statistics for students' learning type (N = 175)*

	Skew	***Kurt***	***Min***	***Max***	***Mdn***	***M***	***SD***
External	.71	.30	0	13	4	4.10	2.78
Impulsive	.90	.28	0	21	5	6.21	4.97
Self-regulated	-.30	-.34	0	21	12	11.34	4.86

Secondly, we have investigated how grade levels relate to dominant learning style of primary school students. Students were classified according to their age into two groups: younger (aged 9–10) and older (aged 11–14). An independent-samples t-test was conducted in order to examine age related differences in learning approaches. The results of t-tests are presented in Table 2. There was a significant difference between younger (M = 4.30, SD = 4.07) and older (M = 7.32, SD = 5.12) students in impulsive learning approach; $t(173) = -4.04$, $p < .01$. The effect size was medium (d = .65). Older students are more likely to prefer impulsive learning style in comparison to younger students. Results revealed that younger and older students do not differ significantly in external or self-regulated learning style. The effect size was small (d = .13; d = .28).

In addition, calculated correlations between different learning types and students' age revealed weak relationships: moderate negative correlation between students' age and external type (r = -.30), moderate positive correlation between students' age and impulsive type (r = .44) and small negative correlation between students' age and self-regulated type (r = -.22). All correlations were statistically significant at p<.01. Results are congruent with t-tests, indicating increase in impulsive learning type.

Table 2. *T-test to examine differences in learning type according to students' age*

	Group									
	Younger			Older						
	N	*M*	*SD*	*N*	*M*	*SD*	95% CI for *M*	*t*	df	*p* (*d*)
External	64	4.34	3.07	111	3.96	2.61	[-0.47, 1.25]	0.89	173	.38 (.13)
Impulsive	64	4.30	4.07	111	7.32	5.12	[-4.49, -1.54]	-4.04	173	<.01 (.65)
Self-regulated	64	12.19	4.69	111	10.86	4.92	[-0.17, 2.83]	1.78	173	.08 (.28)

The last research objective was to determine gender differences in dominant learning types of primary school students. An independent-samples *t*-test was conducted in order to examine gender differences in learning approaches. The results of *t*-tests are presented in Table 3. There was a significant difference between girls (M = 5.25, SD = 4.71) and boys (M = 7.10, SD = 5.06) in impulsive learning approach; $t(173) = -2.50$, $p = .01$. The effect size was small (d = .38). Boys are more of an impulsive learning type in comparison to girls. There was a significant difference between girls (M = 12.30, SD = 4.89) and boys (M = 10.46, SD = 4.69) in SRL approach; $t(173) = 2.53$, $p = .01$. The effect size was small (d = .38). Girls are more of an SRL type in comparison to boys. Results revealed that girls and boys do not differ significantly in external learning type. The effect size was small (d = .27).

Furthermore, calculated correlations between different learning types and students' gender were small: positive correlation for external (r = .14, p<.05) and impulsive (r = .19, p<.05) learning type and negative and statistically insignificant for self-regulated learning type (r = -.19, p<.05).

Table 3. *T-test to examine differences in learning type according to students' gender*

	Group									
	Girls			Boys						
	N	*M*	*SD*	*N*	*M*	*SD*	95% CI for *M*	*t*	df	*p* (*d*)
External	84	3.70	2.75	91	4.46	2.78	[-1.59, 0.07]	-1.81	173	.07 (.27)
Impulsive	84	5.25	4.71	91	7.10	5.06	[-3.31, -0.39]	-2.50	173	.01 (.38)
Self-regulated	84	12.30	4.89	91	10.46	4.69	[0.40, 3.27]	2.53	173	.01 (.38)

Discussion

The study was conducted to explore the dominant learning type (external, impulsive, self-regulated) of students in Slovenian primary schools. The results revealed that the dominant learning type of students in Slovenian primary schools is self-regulated, followed by impulsive and external learning types. This means that a majority of primary school students are already able to identify which learning strategies work well for them and how to effectively apply them. They know that application of cognitive and metacognitive strategies can help them achieve good grades. Another explanation for this might be that students are challenged enough during classes and often experience situations in which successful learning is dependent upon SRL (Obergriesser & Stoeger, 2016). This is of great importance as the ability to self-regulate learning behaviour becomes crucial for students' successful performance in school and in broader society. Specifically, studies show that self-regulation is linked to both academic achievements in literacy and mathematics, as well as to social skills of students (Blair & Rauua, 2007; Dent & Koenka, 2016). Self-regulation is thought to be the key to successfully navigating (learning) challenges and achieving goals.

Observed high standard deviations in dominant learning type of students suggest that there are intra-individual differences in students' development of SRL. This finding may indicate the need to consider young students' learning environment more precisely, as teachers, peers and parents represent an important source of students' development in self-regulation learning skills (Bai, 2018; Usher & Schunk, 2018).

The research findings on different grade levels show that older students are more likely to be of an impulsive learning type in comparison to younger students. This means that older students do not plan their learning behaviour, are more unsystematic and use fewer learning strategies compared to younger students. This finding is in line with results from another Slovenian study, where researchers reported that fifth graders use strategies before reading more often compared to seventh graders (Pečjak & Košir, 2002). On the other hand, younger students are more self-regulated, and they are more likely to use external learning approach compared to older students, although differences were not statistically significant and effect sizes of differences were small. The greater use of external learning approach, which includes relying on support from significant others (e.g. parents, teachers), can be due to the maturation processes and developmental of cognitive and metacognitive skills (Demetriou, 2005; Veenman, Van Hout-Wolters, & Afferbach, 2006). The finding that younger students are also more self-regulated in comparison to older ones is not consistent with research findings

from Chen (2009), in which he reported that students from higher-grade level used learning strategies more frequently compared to younger students. One possible explanation of this might be cultural differences between Western and Eastern cultures, as Chen's study was conducted in Taiwan, Asia, and cultural differences have a strong influence on learning strategy use (Chen, 2009).

The overall results show differences in learning types between girls and boys. Boys show more impulsive learning type and less self-regulated in comparison to girls. Previous research on gender differences revealed similar findings: girls use more metacognitive strategies, are more intrinsically motivated, use learning strategies more often, they regulate their emotions during learning and use more strategies for controlling effort (Cadima, Verschueren, Leal, & Guedes, 2016; Pečjak & Košir, 2002; Peklaj & Pečjak, 2002; Puklek Levpušček, 2001; Rimm-Kaufman, Curby, Grimm, Nathanson, & Brock, 2009). We should also consider broader cultural context when explaining gender differences in SRL. In Slovene society, education is highly valued, and it is typical in our culture to have different expectations from girl and boys. Girls should be accurate at schoolwork, they should follow the teachers' and curriculum demands without objections and they should perform well and have good grades. For boys, not accomplishing these expectations is tolerable (Peklaj & Pečjak, 2002). The differences in expectations by parents and teachers may be one of the reasons for gender differences in SRL in favour of girls.

Some implications can be drawn from the study. SRL changes over time and learning strategies do not develop automatically (Moos & Ringdal, 2012; Paris & Newman, 1990; Paris & Paris, 2001). Therefore, most learning strategies must be acquired through learning from teachers and peers (King, Lengua, & Monahan, 2013; Usher & Schunk, 2018). When teachers try to foster learning strategy use among students, they should be alert to their learning type, as this factor seems to influence students' learning behaviours and implementation of learning strategies (Obergriesser & Stoeger, 2016). Students may be familiar with a limited subset of learning and keep employing them. Teachers can introduce different learning strategies, encourage and support students to apply a variety of learning strategies to achieve their goals. Being aware of the differences in learning types and use of learning strategies between different ages and genders, teachers should understand that students might experience differences in their developmental levels of learning strategies (Bai, 2018). Teachers should present specific instruction of learning strategies, including both metacognitive and cognitive strategies, as well as motivational strategies (i.e., interest, self-efficacy beliefs, task value, goals, attributions), directed at students of different developmental

stages. A learner might develop better learning strategies due to teacher's guidance in effective learning in class.

Students' individual differences play an important role in development of SRL (Cadima, Verschueren, Leal, & Guedes, 2016; Chen, 2009; Dent & Koenka, 2018; Pečjak & Košir, 2002; Peklaj & Pečjak, 2002). Individual differences include learning types, learning strategies, personality traits, age, gender, culture, and the non-cognitive domain (i.e., motivation, anxiety, self-efficacy, tolerance of ambiguity, etc.). In this study, we investigated age and gender as they are the most common used among demographic variables. Further studies should include aforementioned variables in order to get a better understanding of individual differences in SRL.

The main limitation of the present study is a relatively small sample size regarding students' age, especially because there is still a lack of research on age differences in the context of Slovenian primary schools (for exception see: Pečjak & Košir, 2002; Peklaj & Pečjak, 2002). The results for upper secondary school students show a decrease in learning strategies use with age (Puklek Levpušček, 2001), yet there are only cross-sectional studies within the Slovenian context (Pečjak & Košir, 2002; Peklaj & Pečjak, 2002; Puklek Levpušček, 2001; Tomec, Pečjak, & Peklaj, 2006). In accordance with the developmental trajectories of metacognitive skills (Demetriou, 2005; Unterreiner et al., 2015; van der Stel & Veenman, 2010), it would be necessary to explore the problem from longitudinal perspective to understand clearly the dynamics of SRL development. Furthermore, the instrument used in the study had not been validated beforehand in the Slovenian context, although it had been validated and used in German studies (Ziegler & Soeger, 2005; Ziegler, Stoeger, & Grassinger, 2010).

Additionally, studies should look at changes in students' learning types. Can interventions to foster SRL among students also change the use of learning strategies? It would be interesting to include selected personality variables (e.g., conscientiousness, openness, emotional stability) as mediators. Under which conditions, for example, might personality traits influence the frequency and selection of specific learning strategies? Knowledge about these relations might be supportive for teachers when enhancing SRL among students and especially for researchers in further exploration of SRL.

References

Bai, B. (2018). Understanding primary school students' use of self-regulated writing strategies through think-aloud protocols. *System, 78,* 15–26. doi.org/10.1016/j.system.2018.07.003

Bakračevič Vukman, K. (2010). *Psihološki korelati učenja učenja: Študije metakognicije in samoregulacije: razvoj in možne praktične aplikacije [Psychological correlates of learning learning: Studies of metacognition and self-regulation: Development and possible practical applications].* Maribor, Slovenia: Mednarodna založba Oddelka za slovanske jezike in književnosti, Filozofska fakulteta, Univerza v Mariboru.

Bembenutty, H. (2009). Academic delay of gratification, self-regulation of learning, gender differences, and expectancy-value. *Personality and Individual Differences, 46*, 347–352. DOI: 10.1016/j.paid.2008.10.028

Blair, C., & Razza, R. P. (2007). Relating effortful control, executive function, and false belief understanding to emerging math and literacy ability in kindergarten. *Child Development, 78*(2)*,* 647–663.

Boekaerts, M., Pintrich, P., & Zeidner, M. (Eds.). (2005). *Handbook of self-regulation.* Orlando, FL: Academic Press.

Cadima, J., Verschueren, K., Leal, T., & Guedes, C. (2016). Classroom interactions, dyadic teacher-child relationships, and self-regulation in socially disadvantaged young children. *Journal of Abnormal Chily Psychology, 44*(1)*,* 7–17.

Chen, M.-L. (2009). Influences of grade level on perceptual learning type preferences and language learning strategies of Taiwanese English as a foreign language learners. *Learning and Individual Differences, 19*(2), 304–308.

Demetriou, A. (2005). Organization and development of self-understanding and self-regulation: Toward a general theory. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation* (pp. 209–251). San Diego, CA: Academic Press.

Dent, A. L., & Koenka, A. C. (2016). The relation between self-regulated learning and academic achievement across childhood and adolescence: A meta-analysis. *Educational Psychology Review, 28*(3), 425–474. doi: 10.1007/s10648-015-9320-8

Dörrenbächer, L., & Perels, F. (2015). Volition completes the puzzle: Development and evaluation of an integrative trait model of self-regulated learning. *Frontline Learning Research, 3*(4), 14–36.

Flavell, H. H., Green, F. L., & Flavell, E. R. (1995). Young children's knowledge about thinking. *Monographs of the Society for Research in Child Development, 60*(1), 1–113.

Flavell, J. H., Green, F. L., Flavell, E. R., & Grossman, J. B. (1997). The development of children's knowledge about inner speech. *Child Development, 68*(1), 39–47.

Folmer, A. S., Cole, D. A., Sigal, A. B., Benbow, L. D., Satterwhite, L. F., & Swygert, K. E. (2008). Age-related changes in children's understanding of effort and ability: Implications for attribution theory and motivation. *Journal of Experimental Child Psychology, 99,* 114–134. doi: 10.1016/j.jecp.2007.09.003

Hilden, K. R., & Pressley, M. (2006). Self-regulation through transactional strategies instruction. *Reading & Writinq Quarterly, 23*(1), 51–75. DOI: 10.1080/10573560600837651

IBM Corporation (2016). *IBM SPSS Statistics for Macintosh*, Version 23.0. Armonk, NY, USA: IBM Corporation.

Juriševič, M. (2012). *Motiviranje učencev v šoli [Motivating students at school]*. Ljubljana, Slovenia: Pedagoška fakulteta.

King, K. M., Lengua, L. J., & Monahan, K. (2013). Individual differences in the development of self-regulation during pre-adolescence: Connections to context and adjustment. *Journal of Abnormal Child Psychology, 41*(1), 57–69.

Kochanska, G., Coy, K. C., & Murray, K. T. (2001). The development of self-regulation in the first four years of life. *Child Development, 72*(4), 1091–1111.

Kopp, C. B. (1982). Antecedents of self-regulation: A developmental perspective. *Developmental Psychology, 18*(2), 199–214.

Magogwe, J. M., & Oliver, R. (2007). The relationship between language learning strategies, proficiency, age and self-efficacy beliefs: A study of language learners in Botswana. *System, 35*(3), 338–352.

Mayer, R. E. (1988). *Learning strategies: An overview*. In: C. Weinstein, E. Goetz, & P. Alexander (Eds.), *Learning and study strategies: Issues in assessment, instruction, and evaluation* (pp. 11–22). New York, NY: Academic Press.

Mischel, W., Shoda, Y., & Rodriguez, M. L. (1989). Delay of gratification in children. *The American Association for the Advancement of Science, 244*(4907), 933–938.

Moos, D. C., & Ringdal, A. (2012). Self-regulated learning in the classroom: A literature review on the teacher's role. *Education Research International, 2012*(1), 1–15. doi: 10.1155/2012/423284

Obergriesser, S., & Stoeger, H. (2016). The influence of emotons and learning preferences on learning strategy use before transition into higher-achiever track secondary school. *High Ability Studies, 27*(1), 5–38.

Paris, S. G., & Newman, R. S. (1990). Developmental aspects of self-regulated learning. *Educational Psychologist, 25*(1), 87–102.

Paris, S. G., & Paris, A. H. (2001). Classroom applications of research on self-regulated learning. *Educational Psychologist, 36*(2), 89–101.

Pečjak, S., & Gradišar, A. (2012). *Bralne učne strategije [Reading learning strategies].* Ljubljana, Slovenia: Zavod Republike Slovenije za šolstvo.

Pečjak, S., & Košir, K. (2002). *Poglavja iz pedagoške psihologije: Izbrane teme [Chapters from educational psychology: Selected topics].* Ljubljana, Slovenia: Univerza v Ljubljani, Filozofska fakulteta.

Pečjak, S., & Košir, K. (2003). Pojmovanje in uporaba učnih strategij pri samoregulacijskem učenju pri učencih osnovne šole [Concept and use of learning strategies in self-regulated learning among primary school students]. *Psihološka obzorja, 12*(4), 49–70.

Peklaj, C., & Pečjak, S. (2002). Differences in students' self-regulated learning according to their achievement and sex. *Studia Psychologica, 44*(1), 29–43.

Pintrich, P. R. (1999). The role of motivation in promoting and sustaining self-regulated learning. *International Journal of Educational Research, 31*, 459–470.

Puklek Levpušček, M. (2001). Doživljanje vedenja učiteljev, motivacijska prepričanja in samoregulativno učenje pri različno starih mladostnikih [Perception of teachers' behaviour, motivational beliefs and self-regulated learning in different adolescent age groups]. *Psihološka obzorja, 10*(4), 49–61.

Rimm-Kaufman, S. E., Curby, T. W., Grimm, K. J., Nathanson, L., & Brock, L. L. (2009). The contribution of children's self-regulation and classroom quality to children's adaptive behaviors in the kindergarten classroom. *Developmental Psychology, 45*(4), 958–972.

Schunk, D. H., & Usher, E. L. (2011). Assessing self-efficacy for self-regulated learning. In B. J. Zimmerman & D. H. Schunk (Eds.), *Handbook of self-regulation of learning and*

performance (pp. 282–297). New York, NY: Routledge.

Schunk, D. H., & Zimmerman, B. J. (Eds.) (1998). *Self-regulated learning: From teaching to selfreflective practice.* New York, NY: Guilford Press.

Schunk, D. H., & Zimmerman, B. J. (2008). *Motivation and self-regulated learning: theory, research, and applications.* New York, NY: Lawrence Erlbaum.

Sontag, C., & Stoeger, H. (2015). Can highly intelligent and high-achieving students benefit from training in self-regulated learning in a regular classroom context? *Learning and Individual Differences, 41*, 43–53. doi: https://doi.org/10.1016/j.lindif.2015.07.008

Tomec, E., Pečjak, S., & Peklaj, C. (2006). Kognitivni in metakognitivni procesi pri samoregulaciji učenja [Cognitive in metacognitive processes in self-regulated learning]. *Psihološka obzorja, 15*(1), 72–92.

Unterrainer, J. M., Kaller, C. P., Loosli, S. V., Heinze, K., Ruh, N., Pasche-Müller, M., … Rahm, B. (2015). Looking ahead from age 6 to 13: A deeper insight into the development of planning ability. *British Journal of Psychology, 106*, 46–67. doi: 10.1111/bjop.12065

Usher, E. L., & Schunk, D. H. (2018). Social cognitive theoretical perspective of self-regulation. In D. H. Schunk & J. A. Greene (Eds.), *Handbook of self-regulation of learning and performance* (2nd ed., pp. 19–35). New York, NY: Routledge.

van der Stel, M., & Veenman, V. J. M. (2010). Development of metacognitive skillfulness: A longitudinal study. *Learning and Individual Differences, 20,* 220–224. doi: https://doi.org/10.1016/j.lindif.2009.11.005

Veenman, V. J. M., Van Hout-Wolters, B. H. A. M., & Afferbach, P. (2006). Metacognition and learning: conceptual and methodological consideration. *Metacognition and Learning, 1,* 3–14. doi: 10.1007/s11409-006-6893-0

Vurpillot, E. (1968). The development of scanning strategies and their relation to visual differentiation. *Journal of Experimental Child Psychology, 6*(4), 632–650.

Weinstein, C. E., Acee, T. Q., & Jung, J. (2011). Self-regulation and learning strategies. *New Directions for Teaching & Learning, 126,* 45–53. doi: 10.1002/tl.443

Weinstein, C. E., Husman, J., & Dierking, D. R. (2005). Self-regulation interventions with a focus on learning strategies. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation* (pp. 727–747). San Diego, CA: Academic Press.

Weinstein, C. E., & Mayer, R. E. (1986). The teaching of learning strategies. In M. C. Wittrock (Ed.), *Handbook of Research on Teaching* (3rd ed., pp. 315–327). New York, NY: MacMillan.

Winne, P. H. (2011). A cognitive and metacognitive analysis of self-regulated learning. In B. J. Zimmerman & D. J. Schunk (Eds.), *Handbook of self-regulation of learning and performance* (pp. 15–32). New York, NY: Routledge.

Wolters, C. A., & Benzon, M. B. (2013). Assessing and predicting college students' use of strategies for self-regulation of motivation. *The Journal of Experimental Education, 81*(2), 199–221.

Ziegler, A., & Stoeger, H. (2005). *Trainingshandbuch selbstreguliertes Lernen I: Lernökologische Strategien für Schüler der 4. Jahrgangsstufe zur Verbesserung mathematischer Kompetenzen. [Accompanying manual for a training of self-regulated learning I: Resource strategies for fourth-grade elementary school students to improve math skills]*. Lengerich: Pabst.

Ziegler, A., Stoeger, H., & Grassinger, R. (2010). Diagnostik selbstregulierten Lerners mit dem FSL-7 [Assessing self-regulated learning with the FSL-7]. *Journal für Begabtenförderung, 10*(1), 24–33.

Ziegler, A., Stoeger, H., Vialle, W., & Wimmer, B. (2012). Diagnosis of self-regulated learning profiles. *The Australasian Journal of Gifted Education, 21*(2), 62–69.

Zimmerman, B. J. (2005). Attaining self-regulation: A social cognitive perspective. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation* (pp. 13–39). San Diego, CA: Academic Press.

Zimmerman, B. J. (2013). From cognitive modelling to self-regulation: A social cognitive career path. *Educational Psychologist, 48*(3), 135–147.

THE POTENTIAL OF ONLINE PRACTICE MATERIALS IN ENGLISH LANGUAGE TEACHING TO INCREASE ACHIEVEMENT AND TO DECREASE ANXIETY

Eva Grösten berger

Abstract
This paper discusses the potential of online practice in English language teaching to cater to individual learners' needs and thus improve their performance. The aim of the article is to discuss the theoretical considerations and practical implications of the design of an online practice environment that can arguably support students in exam preparation, thereby reducing their anxiety and increasing their performance.

Key words: blended learning, computer-assisted language learning, English language teaching, language learner self-concept

Introduction

English language teachers in Austrian secondary education have observed that many students display signs of apprehension or nervousness when studying and using the foreign language, especially in test situations. Although these personal observations of the students' apparent feelings of unease or distress are merely based on anecdotal evidence, they may be supported by research in the field of foreign language anxiety (FLA), which was first defined and conceptualized by Horwitz, Horwitz, and Cope (1986). Indeed, FLA is considered a conceptually distinct variable in foreign language learning and has been widely investigated in different contexts, albeit with a clear focus on tertiary education (Horwitz, Horwitz, & Cope, 1986; MacIntyre, 1999; Young, 1991, 1999). In Austria, however, FLA seems to have remained a largely unexplored topic, with only few empirical studies among university students (Kostić-Bobanović, 2009) and none related to secondary education.

Generally speaking, a great number of studies on FLA have been published and a lot of practical advice on the creation of low-anxiety classrooms has been given (Aida, 1994; Ghorbandordinejad & Ahmadabad, 2016; Gregersen & Horwitz, 2002; Gregerson & MacIntyre, 2014; Hewitt & Stephenson, 2012; MacIntyre, 1999; MacIntyre & Gardner, 1994; Price, 1991, Young, 1986, 1991, 1999). The majority of studies – in a variety of different language courses and at various levels of proficiency – lend strong support to the hypothesis of high levels of FLA correlating with low levels of achievement. This seems

particularly true in exam situations, when FLA appears to be intensifying (Aida, 1994; Coulombe, 2001; Horwitz et al., 1986; MacIntyre & Gardner, 1989, 1991, 1994; Saito & Samimy, 1996; Young, 1986).

As concerns the reduction of FLA, the use of appropriate teaching and learning resources (Baker & MacIntyre, 2000; Dolean, 2016; Lee, Lee, Liao, & Wang, 2015; Suwantarathip & Wichadee, 2010; Tanaka & Ellis, 2003) as well as increased opportunities for language practice (Gregersen & MacIntyre, 2014; Young, 1991) have emerged to be beneficial. As concerns test anxiety in particular, it has been found to be lower when test formats have been previously practiced (Wu & Lee, 2017; Young, 1991). This idea is further reinforced by Mariani's (1997) and Gibbons's (2015) challenge/support framework, which links the reduction of anxiety to the provision of appropriate support, for example in terms of practice materials. However, studies on the interplay of teaching materials and anxiety in secondary education have so far not considered the use of online practice materials.

In this context, the introduction of an Austrian-wide standardized final exam (Matura) in the academic year 2015/16 seems to have caused feelings of worry and distress among some students. This concern is not unfounded, as there is a downward trend in the final English exam results with an increase of 2% in students' failing rate from 2016 (10.5%) to 2018 (12.5%) (Bundesministerium für Bildung, Wissenschaft und Kultur, 2018). At the same time, schools are faced with stagnating financial resources for additional English language courses in the form of elective subjects, remedial English classes or specific Matura preparation lessons. Consequently, it seems appropriate to consider alternative ways to additionally support students in exam preparation and to supposedly decrease their potential foreign language anxiety, in particular test anxiety.

Undoubtedly, due to the availability of new technologies, English language learners of all ages have seen increased opportunities for English language practice in both formal and informal learning contexts in recent years (Godwin-Jones, 2011; Trinder, 2017; Steel & Levy, 2013; Vetter, 2014). However, whilst learning technologies for English language teaching seem to have received a lot of attention regarding their definitions and advice on their successful implementation (Dewar & Whittington, 2004; Dudeney & Hockly, 2007; Hockly, 2015, 2016; Kiddle, 2013; Motteram, 2013; Neumeier, 2005; Sharma & Barret, 2007; Tomlinson & Whittaker, 2013), an insufficient number of studies (Kintu, Zhu, & Kagambe, 2017; Stacey & Gerbic, 2007; Oliver & Trigwell, 2005; Zhao, 2003) are dedicated to their actual effectiveness, let alone their potential to reduce anxiety. The question thus arises whether online practice materials in teaching English as a foreign language have the potential to support the language learning process and thus increase students' performance, while

decreasing their anxiety levels. Accordingly, one aim of the present paper is to review literature and effectiveness studies in the field of English language learning technologies. Moreover, the theoretical considerations and practical implications of the design of an online practice environment that can arguably support students in exam preparation will be discussed.

ReCalling the supportive nature of ict in English language teaching

Tutorial CALL reassessed

Information and communication technologies (ICT) have had a considerable impact on English language teaching (ELT). With the fast-paced development in technology, the field has been in constant and rapid transition, which is also reflected in the ever-changing terminology to discuss the use of ICT in ELT (Dudeney & Hockly, 2012; Whittaker, 2013). Moreover, there has been a vast number of studies focusing on how language teachers as well as learners use technological tools and programs. The majority of these have been conducted within the field of CALL (computer-assisted language learning) with a number of theoretical frameworks and research perspectives at work (Hockly, 2016; Thomas, Reinders, & Warschauer, 2012). In the present study, Egbert's (2005) useful conceptualization of CALL will be drawn on. She defines CALL as a process with the following variables in the "CALL equation".

Table 1. *"CALL equation"*

learners (with their thoughts, behaviors, motivations, experiences, and understandings) **+ language** (including its status and structure) **+ context** (physical and temporal environment and the social, economic, cultural, and linguistic influences) **+ one or more tools** (and the affordances the tool provides) **+ /- peers and teachers or others who can affect the process**
= CALL

Source: Egbert, 2005, p. 5

In this relatively broad definition, CALL can encompass platforms, learning management systems as well as a wide range of materials in various settings, with technology taking the place of the fourth supporting component in the language learning process, next to the teacher, the learner and the language itself (Wilkinson, 2016). Even more importantly, this framework considers learners with their individual differences, e.g. different levels of anxiety, and in interaction with their social environment.

For the purpose of this article, it seems appropriate to reassess the role of a seemingly less popular, almost discredited CALL perspective, namely tutorial CALL, which is concerned with language practice. According to Hubbard and Siskin (2004) as well as Garret (2009), tutorial CALL in its early stages in the 1980s and 1990s was rejected – and has never quite restored its reputation – for the following reasons: first, tutorial CALL is seen as being merely behaviorist, offering monotonous drill and practice exercises, over which leaners can exercise little control. Second, tutorial software has been rejected for not being communicative as it does usually not allow for interaction. Third, in tutorial CALL the teacher has been considered to be absent or to only play a minor role (Hubbard & Siskin, 2004). Such notions seem to have gained popularity through the influential work of Levy (1997), who lent support to the "tutor-tool framework" in CALL, which classifies technologies in either the tool or the tutor role (Levy, 1997, p. 180). For Levy (1997), in the tutor role of technology, the computer takes on the role of the teacher and the focus is on instruction, feedback and testing, for example in drill-and-practice grammar activities or vocabulary training programs. On the other hand, the tool character stresses the ready access to written, audio, and visual materials and reference tools through computers, enhancing the efficiency or effectiveness of learning activities.

Hubbard and Siskin (2004) reject this tutor-tool CALL dichotomy. First, learners may be in control of their learning in tutorial CALL and drill may be regarded as enhancing learning. Indeed, this assumption is supported by Hattie's (2012) meta-study on visible learning and teaching and the notion of deliberate practice. According to Hattie (2012), the ability to practice consciously, persistently or focused is one of the most important components of successful learning, which he describes as "visible learning". Hattie (2012) comments: "Sometimes, learning is not fun. Instead, it is just hard work; it is just deliberate practice; it is simply doing some things many times over." (Hattie, 2012, p. 120) Conscious practice is thus not understood as repetitive and meaningless practice, but rather as a conscious activity aimed at achieving transparent, predefined goals.

Second, Hubbard and Siskin (2004) claim that teachers are not necessarily absent from all tutorial CALL activities. This argument is further supported by Euler, Hasanbegovic, Kerres, and Seufert (2006), who define teachers as "gate keepers" (Euler, Hasanbegovic, Kerres, & Seufert, 2006, p. 3), as the critical success factor for the sustainable anchoring of any kind of technological innovation in teaching and learning. Similarly, Whittaker (2013) regards training and support for teachers as crucial in any blended learning design process. Third, Hubbard and Siskin (2004) argue for the role of tutorial CALL to improve reading and listening skills as well as pronunciation and conscious knowledge of the language studied. Likewise, Thornbury (2016) and Wilkinson

(2016) see a potential for CALL materials to support the process of noticing or consciousness-raising, i.e. directing the users' attention to features of input and highlighting their usefulness. Support for this line of argument is further provided by Garret (2009), who sees a need for "innovative drill-and-practice CALL" (Garret, 2009, p. 722), which she considers useful for dictations, listening, reading and writing exercises as well as pronunciation work.

The relevance of tutorial CALL is further justified by cognitive theories of language learning. These theories regard language acquisition as internal and unique to an individual. In interaction with comprehensible, meaningful input and based on their innate cognitive knowledge, learners construct a mental representation of the language system (Chomsky, 1986). 'Comprehensible input' (Krashen, 1985, 2003) refers to language input which is slightly beyond the current level of competence of the language learner. Wilkinson (2016) regards the input hypothesis as facilitated by learning technologies, which can heighten comprehensibility through multimedia integration. Furthermore, not only do we know that rich, comprehensible and engaging input is necessary for language acquisition to occur, research has also looked into the ideal amount of input in order for language acquisition to be successful. For example, in vocabulary acquisition several encounters with one word or phrase have been found to be required in order to remember it (Nation, 2001). This is also true for constructions: usage-based theories of second language acquisition (Ellis, 2003) claim that you need to be exposed to constructions many times in order to acquire them. Learning thus requires repeated encounters with language items. These encounters can also be increased as the use of learning platforms in blended learning settings arguably extends time and space for learning, whereas class hours are limited.

Besides, the sequencing of the online input or rather the nature of practice is an important aspect to be considered. Echoing Hattie's (2012) notion of deliberate practice, Thornbury (2016) recommends that language practice should replicate actual use of language forms and structure in real life and not just be drills and practice. This, of course, also presupposes that the practice tool is "sufficiently engaging and challenging to increase the likelihood of sustained and repeated use" (Thornbury, 2016, p.32). This seems crucial, as empirical research shows that the more time is spent on a learning task, the better (Muñoz, 2012). Egbert (2003) refers to this willingness to spend time on tasks or exercises as 'flow', which is achieved when the learners' skills are equal to task, the task requires attention and is intrinsically interesting, learners perceive they have control over the task and its outcomes.

According to Hattie (2012), conscious practice requires not only complete concentration but also that someone – either the pupil or the teacher – monitors the learning process and gives feedback. In fact, feedback is not only one

of Thornbury's (2016) principles to be considered in blended learning course design, but also an essential component of successful learning, and falls into the top ten influences on performance with an effect size of 0.79 in Hattie's (2009) meta-study on achievement. Indeed, Hattie states that the use of computers has a greater effect on achievement, when the feedback function is optimized. The other advantage is that computers react to all students in the same way, no matter who they are – male or female, fast or slow. In this way, no one can be overlooked or left out, which makes computer feedback potentially less threatening. Moreover, learning management systems can store and track answers that can be analyzed by learners and teachers alike.

Be that as it may, despite all these arguments in its favor, tutorial CALL may admittedly not fulfil the purpose of developing communicative competence in interaction, but can be supplementary rather than central to this overall aim. In other words, CALL cannot account for the entire learning process, which is actually a case for blended learning, regarded as "the latest 'stage' in the development of CALL" (Mishan, 2013, p. 207). In confirmation, Trinder's (2017) survey on deliberate and informal English online learning opportunities shows that learning management systems in blended learning settings may act as a necessary bridge between formal (classroom) and informal (at home) learning environments. This seems especially relevant with adolescent students, who are not necessarily aware of the great potential of online practice materials and do not automatically exploit them without any encouragement or support provided by teachers. Hence, digital practice or revision materials seem not to work on their own accord, but need to be integrated in a carefully designed blended course.

Blended learning for increased support and flexibility

As with CALL, blended learning in ELT has received a lot of attention as concerns advice on its successful implementation (Sharma & Barrett, 2007; Dudeney & Hockly, 2007), but seems to have resisted a single theoretical framework and to be lacking a coherent definition (Oliver & Trigwell, 2005). In line with Neumeier (2005), Dudeney and Hockly (2007) settle on the following definition, which will also be applied in the present paper: a "face-to face language learning course with additional online materials, where online tools are used to support and extend face-to-face lessons" (Dudeney & Hockly, 2007, p. 139). In fact, this understanding of the use of technology in ELT is grounded in constructivist theories of language learning. According to these theories, learners use previous experiences and assimilate new information, thus constructing their knowledge in interaction with the world around them. One key component of socio-constructivist theory is that of instructional scaffolding, which

also functions as one of Thornbury's (2016) design principles of blended learning courses. Gibbons (2015) defines the underlying principle of scaffolding as the notion of seeing learners in terms of their potential, as the language users they will become, as intelligent people who will achieve their goals with the right kind of support. Notably, Gibbons relates scaffolding to affective factors of language learning, as scaffolding will set students up "for success rather than allowing them to fail" (Gibbons, 2015, p. 3). Gibbons (2015) examines the work of Russian psychologist Lev Vygotsky (1978), who takes a sociocultural perspective on human development and learning. Development is seen as social rather than individualistic, with an individual's progress being the product of their social, historical and cultural experiences. Being a successful language learner is then not a question of innate aptitude or talent, but a matter of social contexts and situations the learners have experienced. Vygotsky conceptualized this belief in what is defined as the 'zone of proximal development', which refers to the cognitive gap, the distance between what a child can do on its own and what it can do jointly in coordination with others, in particular with experts, in goal-directed activities.

Relating this social view of learning to language learning, Gibbons (2015) defines language learning as "socially embedded, not simply a psychologically driven, process" (Gibbons, 2015, p. 13). In this sense, the way teachers instruct their students, in particular the kind of support they provide, has a significant impact on the students' success in language learning. Accordingly, Mariani (1997) provides a challenge/support framework, which he sees as the essential condition for learning to occur. In this framework, the assumption is made that in order to become an autonomous learner, a good balance between challenge and support is needed. Gibbons (2015) has further developed Mariani's challenge/support framework and provides a useful diagram.

Figure 1. Challenge-support framework (Source: Gibbons, 2015, p. 17)

What seems to be of particular relevance in the context of the present paper is the notion of frustration/anxiety, as it relates support to the degree of intellectual challenge and also to anxiety levels. Gibbons defines four quadrants: high challenge/low support (frustration/anxiety zone); low challenge, low support (boredom zone), low challenge, high support (comfort zone); high challenge, high support (learning/engagement zone – zone of proximal development). Notably, Mariani (1997) suggests applying the challenge/support framework to offline and online materials in order to evaluate them "in terms of the opportunities they provide for students to experience both challenge and support, and in terms of scaffolding they offer" (Mariani, 1997, p.7). In this context, flexibility in teaching becomes relevant, because in striking a balance between autonomy and dependence one has to respond to the ever-changing, individualistic conditions of learning. Neumeier (2005) regards one aspect of this flexibility as "the opportunity to let students decide whether they consider an online-activity worth engaging or not" (Neumeier, 2005, p. 171). This, of course, presupposes a low level of integration of the online component in the overall course, which makes the use of the online component optional rather than obligatory.

Evidence of ICT effectiveness in ELT

Learning technologies seem to have received a lot of attention as concerns their definitions and advice on their successful implementation. However, little is known about their empirical effectiveness, especially in the field of secondary education (Sharma & Barrett, 2007; Dudeney & Hockly, 2007; Young, 2008). Some researchers have, however, looked into how individual learner differences are related to blended learning effectiveness. In this context, Kintu, Zhu, and Kagambe (2017) examined the effectiveness of blended learning environments by investigating the relationship between student background characteristics, design features and learning outcomes. Their aim was to determine the significant predictors of blended learning effectiveness with 238 respondents in a Ugandan university context. They found that some design features, that is technology quality and online tools and resources, as well as learner characteristics, i.e. attitudes to blended learning and self-regulation, are significant predictors for effectiveness in terms of satisfaction, knowledge construction and motivation. Neither design features nor learner characteristics, however, predicted grades.

Generally speaking, experience in internet and computer application as well as confidence emerge as predictors of blended learning effectiveness in a number of studies (Kintu, Zhu, & Kagambe, 2017; Picciano & Seaman, 2007; Selim, 2007; Shraim & Khlaif, 2010). Selim (2007) equally notes that learners'

attitudes towards e-learning and blended learning are crucial. Lamy (2013) finds that the design of online materials plays a role in motivation maintenance. Generally, poor technological quality decreases user satisfaction (Piccoli, Ahmad, & Ives, 2001). In return, satisfaction with a learning management system can be a factor for blended learning effectiveness (Goyal & Tambe, 2015; Willging & Johnson, 2009). Success has also been shown to be influenced by learners' perceived quality, reliability, functionality and usability of the tool used (Loukis, Georgious, & Pazalo, 2007; Pitchu & Lee, 2006; Shraim, 2012). Above all, learning experience and performance have shown to improve when there is a blend of face-to-face and online learning (Stacey & Gerbic, 2007). This apparent advantage of blended learning over distance learning is supported by Oliver and Trigwell (2005). In their reassessment of blended learning, its beneficial impact on the learning outcome is attributed to the fact that this setting provides students with variation. Drawing on the work of Bowden and Marton (1998) as well as Marton and Tsui (2004), scholars take a look at blended learning through the eyes of the learners and argue that blended learning offers learners varied experiences through the use of different media.

When it comes to the effect of ELT technologies on affective factors, in particular foreign language anxiety (Horwitz, Horwitz, & Cope, 1986), there is only little research, most of which focuses on anxiety about speaking. Warschauer (1996), for instance, discovered that electronic discussion can have a tendency to create more equal participation among students and increase practice of anxious students. Özdener and Satar (2008) found computer-mediated communication to provide an ideal context for students with low proficiency and high foreign language anxiety levels. In their studies with French course students in a distance learning setting, Hauck and Hurd (2005) observed that what makes learners less anxious are: working at their own pace, the absence of public criticism, the lack of competition and pressure among peers, the chance to practice in private. On a similar note, Reinders and Hubbard (2012) argue that learning management systems enable learners to gain control over the learning process and develop self-management skills, which can arguably contribute to reducing anxiety.

Conclusion and practical implications

In conclusion, a review of literature has shown that language practice in digital learning environments, in particular in blended learning settings, can potentially support the language acquisition process. Moreover, the idea of a relationship between practice and anxiety can be supported by Mariani's (1997) and Gibbons's (2015) challenge/support framework, which links the

reduction of anxiety to the provision of appropriate support, for example in terms of online practice materials. Arguably, online learning environments that are designed in accordance with established language learning theories can thus cater to individual learners' needs due to their flexible and supportive nature.

Accordingly, in the course of the author's PhD research, an online learning environment will be designed for students in preparation of their final standardized English exam at the end of upper secondary education. This online learning environment will be implemented as an online course component to be used both outside the classroom or in face-to-face lessons. The overall aim of this additional practice space will be to offer support with reference to the performance required in the final written or oral exam. The online learning environment will not only attempt to visualize the skills and competence required in the exam, but will also make apparent the students' progress in the learning process with regard to these pre-defined goals. On the one hand, a self-assessment tool will make the learning intentions, derived from the curriculum and final exam requirements, visible and also provide teachers with the opportunity to give feedback on students' individual progress. On the other hand, the course will offer a number of writing and speaking tasks with pre-defined success criteria, sample answers and the possibility for teachers to provide online feedback in a transparent manner. Additionally, a choice of interactive reading, listening and vocabulary exercises as well as multimedia books on exam topics will enable students to practice and revise at their own pace. This structure, as shall be argued, will allow students to take on responsibility for their own progress and increase their self-confidence as language learners.

As there is generally little empirical evidence on the effectiveness of online practice materials, further research in the course of the author's PhD dissertation will investigate whether there is a significant relationship between foreign language anxiety, achievement and the use of online English practice materials at the end of Austrian upper secondary education. These findings might then increase an understanding of online practice material design and delivery in English language teaching that support the individual language learner's success and decrease their level of foreign language anxiety.

References

Aida, Y. (1994). Examination of Horwitz, Horwitz, and Cope's construct of foreign language anxiety: the case of students of Japanese. *The Modern Language Journal, 78*(2), 155-168.

Baker, S. C., & MacIntyre, P. D. (2000). The role of gender and immersion in communication and second language orientations. *Language Learning*, *50*(2), 311-341.

Bowden, J., & Marton, F. (1998). *The University of Learning: beyond quality and competence in higher education*. London: Kogan Page.

Bundesministerium für Bildung, Wissenschaft und Kultur. (2018). *Vorläufige Ergebnisse der standardisierten schriftlichen Reife-und Diplomprüfung Haupttermin 2017/18.* Available at https://bmbwf.gv.at/fileadmin/user_upload/Aussendung/PK_Matura_2018/PK-Unterlage_Ergebnisse_Matura_2018.pdf

Chomsky, N. (1986). *Knowledge of language: Its nature, origin, and use*. New York: Praeger.

Coulombe, D. (2001). *Anxiety and beliefs of French-as-a-second-language learners at the University Level*. Unpublished doctoral dissertation, University of Laval, Québec, Canada.

Dewar, T., & Whittington, D. (2004). Calliope learning: blended learning research report. Available at http://www.calliopelearning.com/wp-content/uploads/2012/08/blended.pdf

Dolean, D. D. (2016). The effects of teaching songs during foreign language classes on students' foreign language anxiety. *Language Teaching Research*, *20*(5), 638-653.

Dudeney, G., & Hockly, N. (2007). *How to teach English with technology*. Harlow: Pearson Longman.

Dudeney, G., & Hockly, N. (2012). ICT in ELT: how did we get there and where are we going?. *ELT Journal, 66*(4), 533–542.

Egbert, J. (2003). A study of flow theory in the foreign language classroom. *The Modern Language Journal*, *87*(4), 499-518.

Egbert, J. (2005). Conducting research on CALL. In E. Joy & G. M. Petrie (Eds.), *CALL Research perspectives* (pp. 5-8). United States: Lawrence Erlbaum Associates.

Ellis, N. (2003). Constructions, chunking, and connectionism. In C. Doughty & M. Long (Eds.), *The Handbook of Second Language Acquisition* (pp. 63-103). Oxford: Blackwell.

Euler, D., Hasanbegovic, J., Kerres, M., & Seufert, S. (2006). *Handbuch der Kompetenzentwicklung für E-Learning Innovationen*. Bern: Huber.

Garrett, N. (2009). Computer-assisted language learning trends and issues revisited: integrating innovation. *The Modern Language Journal, 93*(1), 719-740.

Ghorbandordinejad, F., & Ahmadabad, R. (2016). Examination of the relationship between autonomy and english achievement as mediated by foreign language classroom anxiety. *Journal of Psycholinguistic Research*, *45*(3), 739-752.

Gibbons, P. (2015) *Scaffolding language, scaffolding learning.* 2nd edn. Portsmouth, NH: Heinemann.

Godwin-Jones, R. (2011). Autonomous language learning. *Language Learning & Technology: A Refereed Journal for Second and Foreign Language Educators, 15*(3), 4-11.

Goyal, E., & Tambe, S. (2015). Effectiveness of moodle-enabled blended learning in Private Indian Business School Teaching NICHE Programs. *The Online Journal of New Horizons in Education*, *5*(2), 14-22.

Gregersen, T., & Horwitz, E. K. (2002). Language Learning and Perfectionism: anxious and non-anxious language learners' reactions to their own oral performance. *The Modern Language Journal, 86*(4), 562-570.

Gregersen, T., & MacIntyre, P. (2014). *Capitalizing on language learners' individuality.* Bristol: Multilingual Matters.

Hattie, J. (2009). *Visible learning*. 1. ed. London: Routledge.

Hattie, J. (2012). *Visible learning for teachers*. London: Routledge.

Hauck, M., & Hurd, S. (2005). Exploring the link between language anxiety and learner

self-management in open language learning contexts. *European Journal of Open, Distance and E-learning 2005/ II*. Available at http://oro.open.ac.uk/3542/1/Hurdeurodl.pdf (28/07/2018)

Hewitt, E., & Stephenson, J. (2012). Foreign language anxiety and oral exam performance: a replication of Phillips's MLJ Study. *The Modern Language Journal, 96*(2), 170-189.

Hockly, N. (2015). Developments in online language learning. *ELT Journal, 69*(3), 308–313.

Hockly, N. (2016). *Focus on Learning Technologies*. Oxford: Oxford University ELT.

Horwitz, E. K., Horwitz, M. B., & Cope, J. (1986). Foreign language classroom anxiety. *The Modern Language Journal, 70*(2), 125-132.

Hubbard, P., & Siskin, C. B. (2004). Another look at tutorial CALL. *ReCALL, 16*(2), 448-446.

Kiddle, T. (2013). Developing digital language learning materials. In B. Tomlinson (Ed.), *Developing Materials for Language Teaching* (pp. 198-206). London: Bloomsbury.

Kintu, M., Zhu, C., & Kagambe, E. (2017). Blended learning effectiveness: the relationship between student characteristics, design features and outcomes. *International Journal of Educational Technology in Higher Education, 14*(1), 1-20.

Kostić-Bobanović, M. (2009). Foreign language anxiety of university students. *Economic Research - Ekonomska Istraživanja, 22*(3), 47-55.

Krashen, S. D. (1985). *The Input Hypothesis: issues and implications.* 1st ed. London: Longman.

Krashen, S. D. (2003). *Explorations in language acquisition and use*. Portsmouth: Heinemann.

Lamy, M.-N. (2013). Distance CALL online. In M. Thomas, H. Reinders, & M. Warschauer (Eds.), *Contemporary Computer-Assisted Language Learning* (pp. 141-158). London: Continuum Books.

Lee, S., Lee, S., Liao, Y., & Wang, A. (2015). Effects of audio-visual aids on foreign language test anxiety, reading and listening comprehension, and retention in EFL learners. *Perceptual and Motor Skills, 120*(2), 576 - 590.

Levy, M. (1997). *Computer-assisted language learning*. Oxford: Clarendon.

Loukis, E., Georgiou, S., & Pazalo, K. (2007). A value flow model for the evaluation of an e-learning service. *ECIS, 2007 Proceedings*, paper 175.

MacIntyre, P. D. (1999). Language anxiety: a review of the research for language teachers. In D. J. Dolly (Ed.), *Affect in foreign and second language learning: a practical guide to creating a low-anxiety classroom atmosphere* (pp. 24-45). United States: McGraw-Hill Education.

MacIntyre, P. D., & Gardner, R. C. (1989). Anxiety and second-language learning: toward a theoretical clarification. *Language Learning*, *39*(2), 251-275.

MacIntyre, P. D., & Gardner, R. C. (1991). Methods and results in the study of anxiety and language learning: a review of the literature. *Language Learning, 41*(1), 85 - 117.

MacIntyre, P. D., & Gardner, R. C. (1994). The subtle effects of language anxiety on cognitive processing in the second language. *Language Learning*, *44*(2), 283 - 305.

Mariani, L. (1997). Teacher support and teacher challenge in promoting learner autonomy. *Perspectives: A Journal of TESOL Italy*, *23*(2), 5-19.

Marton, F., & Tsui, A. B. M. (2004). *Classroom discourse and the space of learnin*g. Mahwah: Lawrence Erlbaum Associates.

Mishan, F. (2013). Demystifying blended learning. In B. Tomlinson (Ed.), *Developing materials for language teaching* (pp. 207-224). London: Bloomsbury.

Motteram, G. (Ed.) (2013). *Innovations in learning technologies for English language teaching*. London: British Council.

Muñoz, C. (2012). *Intensive exposure experiences in second language learning.* 1st ed. GB: Multilingual Matters.

Nation, I. S. P. (2001). *Learning vocabulary in another language*. Cambridge: Cambridge University Press.

Neumeier, P. (2005). A closer look at blended learning - parameters for designing a blended learning environment for language teaching and learning. *ReCALL*, *17*(2), 163-178.

Oliver, M., & Trigwell, K. (2005). Can 'blended learning' be redeemed?. *E-Learning and Digital Media*, *2*(1), 17-26.

Özdener, N., & Satar, H. M. (2008). Computer-mediated communication in foreign language education: Use of Target Language and Learner Perceptions. *TOJDE/ Turkish Online Journal of Distance Education, 9*(2), 165 - 181.

Picciano, A. G., & Seaman, J. (2007). *K-12 online learning: a survey of U.S. school district administrators*. New York: Sloan-C.

Piccoli, G., Ahmad, R., & Ives, B. (2001). Web-based virtual learning environments: a research framework and a preliminary assessment of effectiveness in basic it skills training. *MIS Quarterly, 25*(4), 401 - 426.

Pituch, K. A., & Lee, Y. (2006). The influence of system characteristics on e-learning use. *Computers & Education, 47*(2), 222 - 244.

Price, M. L. (1991). The subjective experience of foreign language anxiety: Interviews with highly anxious students. In E. K. Horwitz & D. J. Young (Eds.), *Language Anxiety: From Theory and Research to Classroom Implications* (pp. 101-108). New Jersey: Prentice Hall.

Reinders, H., & Hubbard, P. (2012). CALL and learner autonomy: affordances and constraints. In M. Thomas, H. Reinders, & M. Warschauer (Eds.), *Contemporary Computer-Assisted Language Learning* (pp. 328 – 342). London: Continuum Books.

Saito, Y., & Samimy, K. K. (1996). Foreign language anxiety and language performance: a study of learner anxiety in beginning, intermediate and advanced-level college students of Japanese. *Foreign Language Annals, 29*(2), 239 - 251.

Selim, H. M. (2007). Critical success factors for e-learning acceptance: Confirmatory factor models. *Computers & Education, 49*(2), 396 - 413.

Sharma, P., & Barrett, B. (2007). *Blended Learning: Using technology in and beyond the language classroom*. Oxford: Macmillan.

Shraim, K., & Khlaif, Z. (2010). An e-learning approach to secondary education in Palestine: opportunities and challenges. *Information Technology for Development, 16*(3), 159-173.

Shraim, K. (2012). Moving towards e-learning paradigm: readiness of higher education instructors in Palestine. *International Journal on E-Learning, 11*(4), 441-463.

Stacey, E., & Gerbic, P. (2007). Teaching for blended learning—Research perspectives from on-campus and distance students. *Education and Information Technologies, 12*(3), 165-174.

Steel, C., & Levy, M. (2013). Language students and their technologies: Charting the evolution 2006-2011. *ReCALL, 25*(3), 306 - 320.

Suwantarathip, O., & Wichadee, S. (2010). The impacts of cooperative learning on anxiety and proficiency in an EFL class. *Journal of College Teaching & Learning*, *7*(11), 51 - 57.

Tanaka, K., & Ellis, R. (2003). Study-abroad, language proficiency, and learner beliefs about language learning. *JALT Journal, 25*(1), 63 - 85.

Thomas, M., Reinders, H., & Warschauer, M. (2012). The role of digital media and incremental change. In H. Reinders, M. Thomas, & M. Warschauer (Eds.), *Contemporary computer-assisted language learning* (pp. 21-31). London: Bloomsbury.

Thornbury, S. (2016). Educational technology: assessing its fitness for purpose. In M. McCarthy (Ed.), *The Cambridge Guide to Blended Learning for Language Teaching* (pp. 25-35). Cambridge: Cambridge University Press.

Tomlinson, B., & Whittaker, C. (Eds.) (2013). *Blended Learning in English Language Teaching: Course Design and Implementation*. London: British Council.

Trinder, R. (2017). Informal and deliberate learning with new technologies. *ELT Journal, 71*(4), 401 - 412.

Vetter, E. (2014). Combining formal and non-formal foreign language learning: first insights into a German-Spanish experiment at university level. *SALi. Special Issue: Teaching and Learning Foreign Languages*, 39 - 50.

Vygotsky, L. S. (1978). *Mind in society: the development of higher psychological processes.* London: Harvard University Press.

Warschauer, M. (1996). Comparing face-to-face and electronic discussion in the second language classroom. *CALICO Journal, 13*(2-3), 7 - 26.

Whittaker, C. (2013). Introduction. In B. Tomlinson & C. Whittaker (Eds.), *Blended Learning in English Language Teaching: Course Design and Implementation* (pp. 11 – 23). London: British Council.

Wilkinson, M. (2016). Language learning with ICT. In W. A. Renandya & H. P. Widodo (Eds.), *English Language Teaching Today. Linking Theory and Practice* (pp. 257 – 276). Switzerland: Springer.

Willging, P. A., & Johnson, S. D. (2009). Factors that influence students' decision to dropout of online courses. *Journal of Asynchronous Learning Networks*, *13*(3), 115 - 127.

Wu, J., & Lee, M. (2017). The relationships between test performance and students' perceptions of learning motivation, test value, and test anxiety in the context of the English benchmark requirement for graduation in Taiwan's universities. *Language Testing in Asia*, *7*(1), 1-21.

Young, D. J. (1986). The relationship between anxiety and foreign language oral proficiency ratings. *Foreign Language Annals*, *19*(5), 439 - 445.

Young, D. J. (1991). Creating a low-anxiety classroom environment: what does language anxiety research suggest?. *The Modern Language Journal, 75*(4), 426 - 439.

Young, D. J. (1999). A perspective on foreign language learning: from body to mind to emotions. In D. Young (Ed.), *Affect in foreign language and second language learning: a practical guide to creating a low-anxiety classroom atmosphere* (pp. 13 -23). United States: McGraw-Hill Education.

Young, D. J. (2008). An empirical investigation of the effects of blended learning on student outcomes in a redesigned intensive Spanish course. *CALICO Journal*, *26*(1), 160-181.

Zhao, Y. (2003). Recent developments in technology and language learning: a literature review and meta-analysis. *CALICO Journal*, *21*(1), 7 - 27.

EXPLORING THE CONTRIBUTION OF MENTOR'S FEEDBACK ON DEVELOPMENT OF STUDENT-TEACHER'S LESSON PLANNING SKILLS AND INSTRUCTIONAL STRATEGIES

Elmedina Nikoçeviq-Kurti and Blerim Saqipi

Abstract

The purpose of this study is to explore the student-teacher opportunities to teach lessons, student-teacher initiative for feedback and how school mentor feedback contributed to student-teacher lesson-planning skills and instructional strategies. This qualitative study used data from ten pre-service student-teachers (3rd year of studies at bachelor level) of the Faculty of Education at the University of Prishtina and five primary school mentor teachers. Data were collected through semi-structured interviews and analysed through the thematic analysis method. The findings of this research show that student-teacher do not seek enough feedback and hesitate to teach because of doubts about their teaching abilities. This affected the inability of school mentors to provide the feedback more often. It is noted that learning how to carefully construct lesson plans and develop instructional strategies allows student-teachers to manage the classroom with considerably more confidence. Mentor's feedback contributed to increasing awareness of student-teacher that preparation for lessons develop their confidence to teach and to manage the classroom, but also creates good habits of preparation and professional behaviour. The study provides a model for developing student teaching experience that is useful for student-teacher effectiveness and efficacy to perform adequate lesson planning and to develop instructional strategies.

Key words: feedback, lesson planning, instructional strategies, student-teachers, school mentors

Introduction

Teaching practice, also known as student teaching, within teacher education programming is a crucial part of the complex process of shaping the professional identity of prospective teachers and developing teacher professionalism. The quality of initial teacher education has become critical for the preparation of the teaching workforce that responds to the current realities in school systems. It is therefore appropriate for initial teacher preparation programmes to adequately prepare student-teachers to deal with the realities of school culture so that the early years of teaching can be turned into a positive experience, in which teachers are enabled to grow and develop their skills (Gratch, 2001). The process of becoming a teacher

develops from the student-teacher understanding and construction of personal knowledge, construction of self, and identity development (Connelly & Clandinin, 1999). Professional identity formation is a process that involves many knowledge sources, one of which is feedback on performance. This is how practice teaching experience becomes a critical component of teacher education.

The primary goal of the student teaching experience is to provide the student-teacher with the opportunity to apply effective teaching practices and develop understanding and behaviours under the guidance of an experienced and qualified mentor teacher and university supervisor. Being a mentor teacher and university supervisor is a critical responsibility in the complex task of teacher education. The teaching practice in the Primary Education study programme of the Faculty of Education at the University of Prishtina starts with four weeks of observation in the second year and ends with an eight-week-long practice. During the third year of study, students attend the six-week internship in public schools.

The reform of teacher education in Kosovo has been at the forefront of the education debate in recent decades. There have been numerous attempts to reform elements of teacher education to ensure that prospective teachers are of the quality that the school context demands. Reforming the student teaching component has been the focus of reform in recent years whereby the University of Prishtina's Faculty of Education aimed at training school mentors to equip them with the knowledge and skills of mentoring and providing experiences that help train new teachers. However, little is known on how mentor teachers are utilising those skills of providing students teachers with feedback that helps them grow as professionals. This study examines how student teaching experience and mentor teacher feedback helps student-teachers develop lesson planning skills and an understanding of instructional strategies.

Influence of the mentor's feedback on student-teachers' lesson-planning skills and instructional strategies

The poor academic performance of students is associated with low teacher self-efficacy, which indicates that teacher self-efficacy is very important for good teacher performance (Bandura, 1982; Pajares, 1996). Teacher self- efficacy (TSE) has been investigated in order to understand teachers' beliefs about their capabilities and subsequent decisions about practice. According to Bandura's social cognitive theory (1986), self-efficacy is developed over time based on the interaction between person, behaviour, and outcome;

learners obtain information to appraise their self-efficacy from their actual performances, their vicarious experiences, the persuasions they receive from others, and their physiological reactions. Students differ in their self-efficacy for learning as a function of their prior experiences, personal qualities, and social supports. (Schunk & Pajares, 2002).

Social support, such as feedback, is a crucial aspect of the environmental factors affecting teaching self-efficacy beliefs, as it may impact behaviour, and, accordingly, teaching performance (Bruning, Schraw, Norby, & Ronning, 2010). Feedback in the context of teacher education has been defined as information that is presented to an individual following a performance that reflects upon the adequacy, quantity, or quality of the teaching performance (Tower, 1999).

According to Chung (2002), quality feedback and dialogue appear to improve in: depth of knowledge of their subject area, dealing with complexity and contradictions in the knowledge-base, justifying and evaluating the approach(es), method(s), or technique(s) they use, the capacity to develop new approach(es), method(s), or technique(s) in new situations. Quality feedback involves helping student-teachers or teachers to think globally of the theory and to act locally in specific classroom situations. (Chung, 2002)

Feedback provides information that helps learners confirm, refine, or restructure various kinds of knowledge, strategies, and beliefs that are related to the learning objectives (Hattie & Timperley, 2007). The studies related to feedback underscore the importance of providing feedback that is instructive, timely, referenced to the actual task, and focused on what is correct and what to do next (Hattie & Timperley, 2007; Shute, 2008). According to Shute (2008), the timing of feedback depends to some extent on the nature of the task and on whether students are high performing or low performing. If the mentor provides immediate feedback, this could encourage students to practice, but also to improve the performance for the next lesson. Delaying feedback may encourage the development of cognitive and metacognitive processing for high-performing students, yet it may cause frustration for struggling and less-motivated students (Clariana & Koul, 2006; Shute, 2008).

However, feedback can influence student-teachers' performance differently, depending on their personality. Young (2000) reports that there is a tendency for students who are identified as having low self-esteem to take any comment as a reflection on them personally, whereas high self-esteem students see feedback as a reflection of their work. According to Carless (2006), students have identified time management and negative judgment as reasons to not seek feedback from tutors.

Feedback is critical because it influences students' cognitive processes. Professional practice should be focused on developing student-teachers' capacity to judge the successful transfer of the technique to the classroom and to measure different techniques effects on student achievement. This can help in the creation of effective lesson plans.

Teachers are working with increasingly diverse populations of students in the classroom. They should adapt lessons to a variety of students. Proper planning and well-structured lessons are essential in ensuring that all students achieve better results. Teaching lesson planning is 'teaching future educators how to think about the relationship between educational theories, lesson planning, instructional strategies, students and learning' (Theoharis, Theoharis, & Trezek, 2008). Therefore, lesson planning is one of the most difficult aspects of being a new teacher. Lesson plans are essential because they provide a structure for the session; set out important logistical issues such as who, what, where, when and how; establish the link between lesson objectives and assessment methods; give anyone having to cover a session vital information to work with; and provide anyone observing the lesson with information about the session that they may not be able to witness as part of the observation (Bates, 2016).

The processes of lesson planning is a complex activity that requires the planning teachers 1) to design lessons for activating learning by taking into account both learners' prior knowledge and learners' motivation; 2) to anticipate the kind of mental activities to take place when students learn the planned lesson, 3) to plan different kinds and levels of supporting individual students in their learning, and 4) to plan how to assess the outcomes of the implemented instructional plans (Oser & Baeriswyl, 2001)

A study by Duah (2010) showed that participants (mentors) thought to provide feedback after lesson observation, and they did not review the lesson plans of their mentees before they were taught. Because it is not clear whether mentors are not reviewing lesson plans given to them or student-teachers are not getting the lesson plans to the mentors for them to review, the author states that one reason may be the time factor. Moreover, the review of lesson plans prior to their live delivery is essential in order to avoid the negative impact that inappropriate lessons may have on pupils (Duah, 2001).

Another study by Ruys, Van Keer, and Aelterman (2012) investigates the quality of lesson plans, focusing on collaborative learning implementation. They analysed 323 lesson plans of second-year pre-service teachers; the results reveal both strengths (e.g., designing appropriate learning tasks, developing adequate learning materials) and weaknesses (e.g., including social objectives, rules and agreements for collaborative work) in the lesson plans.

Ruys, Van Keer, and Aelterman (2012) focus on the analysis of lesson plans to reveal student-teachers' competences, because literature analysis indicates that the analysis of lesson plans is a suitable approach of gaining insight into teacher competence, instructional planning is generally perceived as an important process in the professionalisation of teachers, and that previous studies have provided evidence for the relationship between lesson planning and teaching quality in terms of student achievement and instructional behaviour. They cite the work of Naafs et al. (2002, in Ruys, Van Keer, & Aelterman, 2012), who found a positive relationship between elaborate lesson plans and final student achievement, since a thorough preparation seemed to provide more time-on-task for the students and consequently more learning opportunities.

A good lesson plan does not automatically mean that it will be a good lesson, but it is an essential part of the process (Bates, 2016). Therefore, teachera should have both lesson preparation skills and knowledge of instructional strategies. In an education context, congruence between verbal and non-verbal messages from the teacher has been implicated as influencing the effectiveness of classroom management (Brown, 2005).

In education, vocal qualities, such as the teacher's rate of speaking, variability in tone and pitch, and volume, have been shown to enhance teacher clarity (McCroskey, Richmond, & McCroskey, 2006). Some of the skills that are important in spoken communication are choice of words, intensity, clear articulation, employing appropriate language, and demonstrating nonverbal behaviour that supports verbal behaviour. Therefore, preparation and knowledge are crucial for minimising anxiety, which can be manifested with a trembling voice, rapid breath, and loss of concentration.

Methodology

Data Collection Methods

"Qualitative researchers are interested in understanding how people interpret their experiences, how they construct their worlds and what meaning they attribute to their experiences" (Merriam, 2009, p. 5). This study employed qualitative methods of data collection as it was investigating the perceptions of the student-teachers and school mentors related to preservice teacher experience in lesson planning and instructional strategies. Semi-structured interviews were used to collect the data. Interviews lasted from 20 to 45 minutes and were recorded and transcribed for analysis. The interview had four questions related to opportunities for teaching lessons,

student-teacher initiative for feedback and contribution of mentor's feedback on student-teachers' lesson planning skills and instructional strategies.

Participants and settings

Ten 3rd year students (aged 20-22), who were randomly selected from around 400 students of Primary Education Programme at the Faculty of Education of the University of Prishtina initially signed the sound-recording agreement, which informed them that the interview is confidential and will only be used for research issues with the guarantee that their identity will not be revealed in any circumstance. They are interviewed after they had completed their six weeks of pedagogical practice in primary schools. Also, five school mentors who had been teaching from 5 to 19 years in schools were involved in interviews.

Data analysis

The semi-structured interviews were conducted with strict attention to rich data collection. Interviews were transcribed and initially read through to gain a general sense of the data. Patterns of responses were carefully coded and recorded. After coding, codes were grouped into themes to be able to draw conclusions about the data. The thematic approach to data analysis was adopted.

Research findings

The findings from the interviews are presented below in two sections: those from student interviews and those from mentor teacher interviews.

1. Findings from interviews with student-teachers

Table 1 presents an outline of the themes that derived from the interviews with student-teachers on the area of student-teacher opportunities to teach lessons, student-teacher initiative for feedback and their perception on the contribution of mentor's feedback on student-teachers' lesson-planning skills and instructional strategies.

Table 1. *Codes and themes derived from the thematic analysis of interview data with student-teachers*

Codes	Themes
Lack of student-teacher self-confidence Hesitation to be challenged in classroom management Hesitation to be challenged by different situations Low number of lessons planned Low number of lessons taught Lack of student-teacher observation by university mentors	Student-teacher hesitates to teach
Lack of initiative for feedback Lack of time Hesitation to pressure the mentor for feedback Student prefer oral feedback Student taught more lesson unsupervised More observation than teaching Engaged in assessing student's homework	Lack of possibility for feedback
Developing habit of lesson planning Preparation enhances confidence Giving model of lesson plans Sharing notebook of lesson plans with student-teachers Importance of knowing learners and content Appropriate activities for each stage Usage of concrete locations to find information Usage of appropriate activities for lesson Using concretising tools while explaining Usage of appropriate activities for students with disabilities that they like Usage of inclusive activities	Developing self-confidence in writing lesson plans
Importance of using a clear and strong voice Being active Talking slowly Keeping attitude Keeping appearance Using active listening and empathy Showing interest and enthusiasm Using attractive and interesting introductions	Development of instructional strategies

Hesitation to teach

Despite the fact that the interviewed students have enthusiasm about their experiences of the practice in the school and the benefit they have had in contrast to the practice in the second year that was just observation, they emphasise that during the practice they lack the initiative to teach more than required because of low self-confidence and doubts about whether they can manage the classroom. Student-teachers could have doubts about their ability to cope with unfamiliar situations, controlling and managing learners, or establishing a working relationship with the mentor or

supervisor. It is such mixed feelings that can contribute to the making or breaking of a student-teacher (Perry, 2004).

It was noted that they have prepared and teach only two to three lessons in front of a school mentor and taught only one lesson in front of a university mentor, which is not enough according to them.

> *The university mentor observed me just once. The school teacher helped me to prepare. In front of he school mentor, I taught just once under her supervision, but also some other times without her supervision. (Student 3).*

> *The school mentor showed me which teaching units to prepare. I have prepared three lessons in total (Student 4).*

Lack of possibility for feedback

Of the ten interviewed students, only four communicated with the school mentor via telephone or email about planning the lesson. Most of them did it when they were in school. It is noted that students preferred to receive oral feedback than written feedback on lesson plans, due to the limited time the mentor teachers were present in school. Students said that they did not take the initiative to request feedback as they did not want to pressure mentors. This also speaks about a mentoring culture in which mentor teachers do not seem to consider giving feedback as part of the duty while students tend to agree with such perceptions because they think asking for feedback is a form of pressure and demanding something extra.

> *I did not take the initiative to request written feedback on my lesson plans. The only time the school mentor provided written feedback was at the end of the practice in the student evaluation diary. I had the entire plan and the class books. I have watched them before every practice day. I didn't like that we hadn't communicated out of class with the school teacher, except for conversation at the school (Student 1).*

It is noted that student-teachers teach more classes unobserved because they had not requested observation from school mentors. While mentor teachers where teaching, student teachers assisted in activities or assessed the student's homework.

Developing self-confidence in writing lesson plans

The mentors advised the student-teachers to develop the habit of preparing daily lesson plans. Moreover, student-teachers emphasised the mentor

teacher's advice that preparing well for lessons is needed to achieve flexibility and enhance confidence. Four out of ten student-teachers point out that they have received emails with necessary materials from school mentor that help them prepare their lesson plan, like model plans, web sites, and video links. According to the students, the school mentors advised them that during the first two weeks of practice it is preferable to observe the students, and become acquainted with their needs and capacities. Then they can prepare effective lesson plans.

> *Every day, the school mentor had her notebook with a daily lesson plan. She planned her lessons daily and showed them to me. I learned a lot just seeing her lesson plans, what I should put in the each stage of the lesson plan (Student 6).*

The interviewed students explain that their school mentors were quite collaborative in sharing with them their personal notebooks with daily lesson plans and providing copies of model plans that they can use in the future.

Developing instructional strategies

Interviewed student-teachers noted that they benefited significantly from mentors' advise regarding their skills to deliver a lesson. They emphasised that there is much they have to work on regarding their presentation skills, especially speaking clearly, and holding children's attention and interest.

> *The school mentor's advice was to speak slowly and clearly. I talked too fast while explaining something to children (Student 1).*

> *School mentor's advice was to calm the pupils before I start teaching because their attention was not full when I started to talk. She suggested that I use an interesting introduction and a*ttractive activities to hold their attention and interest (Student 5).

From the responses of the student-teachers, we can see that the focus and emphasis of student teaching experience was more on the dimensions of teacher work that can be considered more superficial, such the students perceptions of the student-teachers and how to manage the class. The interviews do not reveal anything substantial in terms of how student-teachers develop the understanding and skills related to the complexity of teaching tasks, such as the need to ensure successful learning and addressing student diverse learning styles and dynamics. Novice teachers are expected to focus on more general aspects of teaching and on themselves as teachers. At the same time, it has to be recognised that it is the student teaching experience that can address these aspects of teaching, and it will be too late to address them when the student-teachers transition to teaching at schools full time.

2. Findings from mentor teacher's interviews

Table 2 presents an outline of the themes that derived from the interviews with mentor teachers regarding student-teachers opportunities to teach lessons, student-teacher initiative for feedback ,and contribution of their feedback to student-teachers' lesson planning skills and instructional strategies.

Table 2. *Codes and themes derived from the thematic analysis of interview data with school mentors*

Codes	**Themes**
Lack of student-teacher self-confidence Student-teacher hesitation to be challenged in different situations Insufficient initiative from student-teacher to teach Student-teacher refuses to teach more than is required by the university Student-teacher prefers to teach without observation Lack of student-teacher observation by university mentors	Lack of initiative to practice teaching
Student-teacher hesitation to teach lessons Lack of student-teacher initiative for feedback Lack of student-teacher interest to learn Lack of student-teacher ambition to become a teacher Lack of time Lack of student initiative to be observed	Inability to give feedback
Importance of knowing learners and content Designing measurable objectives Respecting stage timing Using techniques to achieve success Sharing online resources Usage of appropriate activities for lesson Selection of appropriate resources and equipment's to implement the activity Linking lessons with real life Changing of routine to achieve student's understanding of the lesson Usage of inclusive activities	Learning writing effective lesson plans
Act kindly and professionally Talk slowly and clear Keep attitude Be flexible Providing examples, illustrations Keep up appearance Hold attention and interest Use active listening and empathy Create a learning atmosphere Show interest and enthusiasm Provide enough time to discuss new knowledge Use body language	Learning appropriate instructional strategies for professional behaviour

Lack of initiative to practice teaching

According to school mentors, the student-teachers were claiming that they did not have the obligation from the faculty to teach more than one lecture a week and most had a dilemma if they could manage the class, so they refused to teach a lesson in front of the teacher but preferred to observe the school mentor teaching, or to teach when they replaced the teacher on some occasions. According to the mentors, student-teachers do not teach enough, and they should be encouraged to teach more. However, they agree that one of the reasons that student-teacher do not teach enough is lack of observation from university.

> *I suggest that student-teachers should be engaged more in teaching during practice, not just to observe. I know they can't give the maximum, but they should try to teach (Mentor 3).*

> *They hesitate to teach in front of us because they can be faced with different situations (Mentor 2).*

Inability to give feedback

Most of the school mentors emphasise that, because of the limited time, they preferred to give student's advice and comments during school time, especially during breaks.

> *More commonly, we have discussed their lessons during daily school long break; it's easier and takes less time (Mentor 3).*

Because of limited time, they encouraged and requested students to ask whatever were they interested in knowing, but the initiative was lacking. School mentors say that student-teachers' initiative for feedback depends significantly on the personal aspects, such as their interest, commitment, and career ambition to become a teacher in the future.

Learning student-teacher to write effective lesson plans

School mentor's suggested that student-teachers to know their learners and curriculum content well before lesson planning, but also they should understand the importance of teaching what students need to learn and choosing appropriate activities based the students' learning levels.

> *Use the strategy that leads you to success. When you arrive at the reflection stage during a lesson, it's important to understand if you have achieved what you wanted. The purpose is to use the techniques that*

> *help student-teachers achieve success, not just for saying oI used this technique […] Using a concretisation tool during lesson makes pupils more interested in listening and in remembering more. At the beginning of lesson, it's important to create a learning atmosphere (Mentor 4)*

School mentors noted that they advised student-teachers to formulate measurable objectives that can be easily assessed to determine if they were reached. Children learn easily and remember more if student-teachers use concretisation tools and link the lesson with real life.

Learning appropriate instructional strategies for professional behaviour

The interviewed school mentors emphasise the importance of instructional strategies to ensure the success of the lesson plan. They spoke about the significance of acting kindly and professionally to achieve student's respect and love.

Without appropriate presentation skills, it is difficult to achieve the interest and commitment of learners in the classroom. Most significantly, they mention the teacher's voice, appearance, attitude, and empathy. School mentors noted it happened that they had a problem to make pupils like student-teacher because of their voice or behavior.

> *I had a student-teacher that was not accepted by the children. I talked to them about this. They didn't like her voice. It was hard to listen to her. Also, she shouted at the children […] My first advice for my student-teacher was to be close to children, to make them feel that you love them, tp listen to them, to help them. Create good rapport. It's easier to teach if they like you. It can disrupt your lesson if just one child doesn't like you (Mentor 4)*

Conclusions

Planning is one of the crucial skills that pre-service teachers should gain during their pedagogical practice; therefore, qualitative mentoring has a very important role in creating and developing student-teachers' self-efficacy and teaching skills.

The participants of this study tend to agree that the teaching practicum has an immediate impact in terms of helping student-teachers to develop their lesson planning skills, managing class activities, and developing instructional strategies through the observation of good practices, teaching lessons, support from school mentors, and developing their self-efficacy. Based

on the findings of this research, the number of lessons taught by student-teachers during teaching practice is quite low, which prevents students from strengthening their confidence, self-control, lesson preparation, and teaching skills development. Student-teachers emphasise that the lack of self-confidence and classroom management skills prevented their initiative to teach more often under the supervision of school mentors. On the other side, school mentors criticise the Faculty of Education for not requesting more engagement of students in teaching and for not being able to monitor their work in school. Mentor teachers agree that student-teacher initiatives for feedback depend greatly on the personal aspect, such as their interest, commitment, and career ambition to become a teacher. It is obvious that feedback is given very rarely because student-teachers were not engaged substantially in teaching. They were more observing the mentors teaching and assessing student's homework. Student-teachers agree that they benefited from teaching practice in terms of organisational skills and lesson-planning skills.

Based on the findings, there is a need for more collaboration between schools and universities, especially in the definition of goals, supervision, and assessment. It is recommended that student-teachers have more organised opportunities to engage in lesson planning and teaching in all subjects. For this to happen, school mentors need to have regular meetings with university supervisors to identify how school placement can lead to the development of student-teacher capacities and skills that are targeted. As general measures, the student-teacher school experience needs to focus on student presentation skills and to offer peer review opportunities for student-teachers. To develop student-teaching capacities for effective lesson planning and instructional strategies, it is necessary to offer more opportunities to practice teaching, to encourage them to seek feedback, and to help them develop self-confidence.

To conclude, the cooperation between universities and schools needs to be more structured in order to ensure student-teachers' experience in school is more meaningful and valuable to the development of their teaching potential. It is critical that school placement provides student-teachers with the environment and experience that is congruent with what the role of beginner teachers is nowadays. This demand for a new professionalism means the development of teaching potential that responds to teaching as a complex process that meets the needs of diverse learners in post-modern society. The role of student-teacher practice and the quality feedback students receive are a critical dimension of this vision to succeed.

References

Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist, 37*(2), 122 -147.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice- Hall, Inc.

Bates, B (2016). *Learning theories simplified.* London: Sage publications.

Brown, D. F. (2005). The significance of congruent communication in effective classroom management. *Clearing House: A Journal of Educational Strategies, Issues and Ideas*, *79*(1), 12.

Bruning, R. H., Schraw, G. J., Norby, M., & Ronning, R. R. (2004). *Cognitive psychology and instruction* (4th ed.). Upper Saddle River, New Jersey: Pearson Education Inc..

Carless, D. (2006). Differing perceptions in the feedback process. *Studies in Higher Education, 31*(2), 219–233.

Chung, J. S. L. (2002). Developing teaching strategies through quality feedback. *European Conference on Educational Research.* University of Lisbon. Retrived from http://www.leeds.ac.uk/educol/documents/00002297.htm

Clariana, R. B., & Koul, R. (2006). The effects of different forms of feedback on fuzzy and verbatim memory of science principles. *Br J Educ Psychol, 76*(2), 259-70.

Connelly, F. M., & Clandinin, D. J. (1999). *Shaping a professional identity*. New York: Teachers College Press.

Duah, F. K. (2010). Benchmarking mentoring practices for effective teaching of mathematics and science. *BSRLM Proceedings, 30*(3). Newcastle University. Retrived from http://www.bsrlm.org.uk/wp-content/uploads/2016/02/BSRLM-IP-30-3-06.pdf

Gratch, A. (2001). The culture of teaching and beginning teacher development. *Teacher Education Quarterly*, *28*(4), 121–136.

Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of Educational Research, 77*(1), 81-112

McCroskey, J. C., Richmond, V. P., & McCroskey, L. L. (2006). The role of communication in instruction: The first three decades. In B. Y. Gayle, R. W. Preiss, N. Burrell, & M. Allen (Eds.), *Classroom Communication and Instructional Processes: Advances Through Meta Analysis.* Mahwah, NJ: Lawrence Erlbaum.

Merriam, S. (2009). *Qualitative research*. San Francisco: Jossey-Bass.

Oser, F. K., & Baeriswyl, F. J. (2001). Choreographies of teaching: Bridging instruction to learning. In V. Richardson (Ed.), *Handbook of Research on Teaching*, – 4th ed. Washington: American Educational Research Association.

Pajares, F. (1996). Self-efficacy beliefs in academic settings. *Review of Educational Research, 66*(4), 543-578.

Perry, R. (2004). *Teaching practice for early childhood. A guide for students*. RoutledgeFalmer.

Ruys, I., Van Keer, H., & Aelterman, A. (2012). Examining pre-service teacher competence in lesson planning pertaining to collaborative learning. *Journal of Curriculum Studies*, *44*(3), 349-379.

Schunk, D. H., & Pajares, F. (2002). The development of academic self-efficacy. In A. Wigfield & J. Eccles (Eds.), *Development of achievement motivation* (pp. 16-31). San Diego: Academic Press.

Shute, V. (2008). *Focus on Formative Feedback, Educational Testing Service (ETS) Report*. Princeton, NJ.

Theoharis, J. N. C., Theoharis, G. T., & Trezek, B. J. (2008). Teaching pre-service teachers to design inclusive instruction: a lesson planning template, *International Journals of Inclusive Education*, *12*(4), 381-399.

Tower, S. L. (1999). Reactions to negative feedback: The influence of goal orientation, self-efficacy and public or private feedback delivery on task choice and changes in self-efficacy. *Dissertation*. Michigan State University, USA.

Young, P. (2000). 'I Might as well give up': self-esteem and mature students' feelings about feedback on assignments. *Journal of Further and Higher Education*, *24*(3), 409-418.

DESIGN-BASED RESEARCH – A MODEL TO CONNECT THEORY AND PRACTICE IN RESEARCH

Rudloff Christian

Abstract
Practitioners often criticize the lack of practical use of hermeneutical and empirical research results. There is often the impression that there is a gap between theory and practice. The transfer of scientific results into practical innovations is often criticized. There are many models that are intended to establish a link between research and practice. One of the models that combine theory and practice is the Design-Based Research Approach. The aim of this approach is to solve problems in educational practice. Development and research take place in continuous cycles of design, implementation, analysis and re-design. In the Design-Based Research Approach, the initial situation is first analyzed, an intervention is developed, described and tested, and lastly evaluated and modified in iterative cycles.

Key words: design-based research, educational research, practitioner research, theory, practice

Educational research and practice

Educational scientists, brain researchers and neuroscientists continuously present new results of their studies, point out the principles of teaching and learning and put forward recommendations for practitioner research. However, these recommendations are often ineffective because, due to the complexity of the reality of the teaching process, they have not taken into account all the factors that prevail in practice or are often contradictory in their statements. Practitioners can hardly make use of the results of educational research in their teaching. Often the impression arises that educational research and practice have nothing to do with each other, that they are two irreconcilable opposites in education (Euler, 2013, p. 35). This is because educational science is understood as empirical basic research, which leads to a drifting apart of educational research and educational practice (Kahlert, 2005, p. 851). The main aim of this article is to present how the Design-Based Research Approach can connect theory and practice in research.

Reinmann and Sesink (2011, p. 5) share the criticism over the lack of practical use of both hermeneutical and empirical methods and their results despite their goal of delivering socially relevant results in educational science. Thus, they make it clear that there is not only a profound difference between these two approaches, but also a decisive agreement. This agreement consists in

the fact that empirical as well as hermeneutic procedures are ultimately oriented towards the past.

Kahlert (2005, p. 851) says that teaching is not so much a controlled application of researched laws of action, perception and learning but more something like experimenting in an enlightened way. Sufficiently meaningful assumptions about effects guide the action, which should be accompanied by the search for indicators of success. In teaching and learning research, the gap between research and innovation in education is repeatedly pointed out. The issue of transferring new findings into practical innovations has been frequently criticised. It is recognized as a theory-practice problem and it has been documented several times. This problem can be seen not only in the implementation of innovations in teaching, but also in the empirical testing of innovative concepts through experimental studies. The complexity of teaching and learning situations represents a special challenge for teaching and learning research (Reinmann, 2005, p. 57).

The aspects described above probably leave the practitioner who is seeking advice, confused rather than enlightened. Depending on the study, the practitioner receives arguments for or against the use of action-oriented teaching arrangements for the development of the examined competence constructs. Ultimately, despite the numerous studies, it is neither possible to prove nor to disprove the connections between the differentiated basic methodological decisions and the development of competences (Euler, 2013, p. 35). Consequently, research should be developed from the logic of the practitioner, actually implemented and processed. Practically relevant knowledge is about developing a didactic-methodical scenario for a concrete problem in practice in order to achieve a very specific goal, such as the development of a very specific competence (Jahn, 2014, p. 4).

There are many models that are intended to establish a connection between research and practice. Six of them were distinguished and investigated by Burkhardt and Schoenfeld (2003, p. 4):

1st Self-initiative of practitioners: In this model, teachers apply the results of research to their "teaching reality". Often, however, these research results cannot be put into practice. Therefore, this procedure is not widespread.

2nd Summary guides: Research results from professional organisations are prepared for practical use and made available to the practitioner. However, Burkhardt and Schoenfeld (2003, p. 4), supported by their research results, doubt the effective support for the practitioner in this model.

3rd General professional development: Within the framework of in-service teacher training, new findings from research are brought to the relevant persons (practitioners). The ones responsible for education organize the distribution of knowledge. The focus of interest today is less on fundamental structural reforms and the associated hopes for radical reforms and nationwide innovation , but more on the actions of the subjects who shape the reality of education as teachers, vocational training policemen and trainers (Clement & Lipsmeier, 2003, p. 8).

4th The policy route: The Austrian school and university system has been reformed in almost all areas and at all levels in recent decades (Altrichter, Brüsemeister, & Heinrich, 2005, p. 6ff). Discussions are currently underway again on the planned school and university reform in the form of «full autonomy» (Weissengruber, 2014, p. 2ff). Most reforms will only be implemented for politically motivated reasons, rather than on the basis of new research results.

5th The long route: According to this model, results of research will become standards that gradually find their way into practice. This development usually spans over a longer period of time. The two authors point out that there are very few examples of this model in reality.

6th Design experiments: Design-oriented research is one of the few research approaches that aim at the innovation function of science in practice. Design-Based Research is characterized by the use of various research methods. Many of these methods are also used in other research approaches (Anderson & Shattuck, 2012, p. 17; Euler, 2013, p. 39).

The gap between theory and practice becomes clear again and again in teaching and learning research with different research approaches. According to the research models distinguished and examined by Burkhardt and Schoenfeld (2003, p. 4), the Design-Based Research Approach is appropriate for establishing a connection between theory and practice. This approach is discussed in more detail in the following paragraph.

Design-Based Research Approach

The term „design“ plays a significant role in various areas of research. This approach is characterised by planning, designing and creating action (Reinmann, 2005, p. 59). The design should then fulfil a certain function in practical application. For example, it should support or cause a certain learning action. Designing is a complex, creative and iterative design process between

the designer, contextually prevailing restrictions and a desired form of an artefact that is to fulfil a very specific function for solving a problem in practice (Jahn, 2014, p. 5).

The "Design-Based Research Approach" (DBR) has been used since the beginning of the 1990s. This term is increasingly used in teaching and learning research. It was mainly characterized by the Design-Based Research Collective and the English-speaking region in general (Raatz, 2016, p. 38; Reinmann, 2005, p. 53). Furthermore, Raatz (2016, p. 38f.) says it should be an overarching notion of design and application-oriented 'design experiments' (Brown, 1992), 'design research' (Collins, Joseph, & Bielaczyc, 2004), 'educational design research' (McKenney & Reeves, 2012), 'education design studies' (Shavelson, Phillips, Towne, & Feuer, 2003) or 'developmental research' (Akkeret et al., 1999). Raatz (2016, p. 39) further adds German-speaking countries, where the approaches also fall under the term Design-Based Research. Such approaches are: the approach of action and practice research by Altrichter and Posch (2011), the approach of development-oriented educational research by Reinmann and Sesink (2011), the approach of a practice- and theory-oriented development and empirical evaluation of concepts for teaching by Tulodziecki, Grafe and Herzig (2011), the approach of design development by Allerts and Richter (2011), and the approach of Design-Based Research by Euler (2014b).

It can be seen that all the approaches under this term have the same basic motivation. These research approaches are looking for innovative solutions for the educational practice. They are also interested in the development of new scientific findings (Raatz, 2016, p. 39; Reinmann, 2005, p. 61; Euler, 2014, p. 16). The Design-Based Research Collective (2003, p. 5) explains that DBR is an important method for understanding how, when and why educational science innovations work in practice. Traditional teaching and learning research is often criticised as research that is lacking in practice (Euler & Sloane, 2014, p. 16; Reinmann, 2005, p. 55).

Reinmann (2005, p.58) criticizes the classical research methods because they do not offer practical concepts and instruments with which concrete teaching- and learning problems can be solved in specific situations.

Referring to this criticism, Collins, Joseph, and Bielaczyc (2004, p. 16) argues that Design Research was developed to address the following key points of learning research:

- "The need to address theoretical questions about the nature of learning in context.
- The need for approaches to the study of learning phenomena in the real world rather than the laboratory.

- The need to go beyond narrow measures of learning.
- The need to derive research findings from formative evaluation."

The presentation of design-oriented approaches shows that development and research take place in continuous cycles in the context of the Design-Based Research Approach. The first step is problem analysis, literature research and design, followed by testing, evaluation, modification of the design and derivation of design principles.

Didactic design takes place through the inclusion of materials, media and tasks in order to positively influence the teaching and learning environment. When designing the didactic design, the

- learners,
- learning content,
- learning media,
- learning tasks,
- learning environments and
- the pedagogical procedures are included
  (Jahn, 2014, p. 5).

> "We suggest that the value of Design-Based Research should be measured by its ability to improve educational practice. We see four areas where Design-Based Research methods provide the most promise: (a) exploring possibilities for creating novel learning and teaching environments, (b) developing theories of learning and instruction that are contextually based, (c) advancing and consolidating design knowledge, and (d) increasing our capacity for educational innovation." (The Design-Based Research Collective, 2003, p. 8).

Through the circular approach in Design-Based Research, the design of the prototype can be modified, refined, improved or even discarded step by step. The end result is the practical output. The assumptions made at the beginning can be checked in the actual implementation in the complexity of the concrete environment. The effects of interactions between methods, media, materials, teachers and learners can be better understood, resulting in the theoretical output (Cobb, Confrey, diSessa, Lehrer, & Schauble, 2003, p. 10).

With the help of the Design Research Approach, innovative solutions for practice are to be developed, requiring new solution approaches and allowing to examine their potentials. According to this approach, the recurring research and development process take place in a necessary cooperation between science and practice. There are three main phases for design

research: Analysis/exploration, design/construction (development) and evaluation/reflection (McKenney & Reeves, 2014, p. 143).

The "Design-Based Research Approach" is a research approach that is particularly appropriate for the educational field, as it represents a link between applied and knowledge-oriented research (Reinmann, 2005; Mandl & Kopp, 2006; Design-Based Research Collective, 2003). The Design-Based Research format is especially suitable for increasing the innovative performance of teaching and learning research and for gaining insights in a concrete practical relation to this teaching and learning process. The transfer between theory and practice is particularly supported, since the basic implementation features can be demonstrated from the outset during the development while the effect of innovation is examined from a learning theory background (Stark, 2004, p. 268ff; Einsiedler, 2010, p. 59ff).

With the help of Design-Based Research, a learning environment can be designed in a practical context and learning theories can be tested, designed and further developed (Einsiedler, 2010, p. 67). The research approach of Design-Based Research can be considered as use-oriented basic research in which design is understood as a theory-oriented process for solving concrete practical problems in education (Reinmann, 2005, p. 62f).

Design-Based Research can be applied in the direction of basic research as well as applied research and evaluation research. It can be descriptive-narrative (Beireiter, 2002). It is not the methods themselves that are characteristic, but rather their intervention-oriented use and the way in which they implement the approach: Development and research take place in continuous cycles of design, implementation, analysis and re-design. Design-Based Research is forward-looking and reflective. It is foresighted, because designs are designed against the background of hypothetical learning processes and are implemented and investigated on the basis of theoretical models. Secondly, it is reflective, since the assumptions in the research process are analysed and repeated and can be evaluated. Investigation units can be used by individuals and small social groups as well as organisations and regional units (Reinmann & Sesink, 2011, S. 10).

Researchers from the Design-Based Research Approach want to change something. They are dedicated to the continuous improvement of the Educational practice. One central aspect of this is the close connection between theoretical development and optimization of design processes. The other central aspect is that of "research community driven by potentiality" (Beireiter, 2002, p. 331). There is a community of researchers who in addition to the academic "belief of mode" also realized the "design mode". They believe in the potential for change (Reinmann, 2015, p. 10).

The following definition sums up the central features of the Design-Based Research Approach particularly well: "Design experiments are extended (iterative), interventionist (innovative and design-based), and theory-oriented enterprises whose 'theories' do real work in practical educational contexts". (Cobb et al., 2003, p. 13)

Reinmann sees three arguments for scientific recognition of the Design-Based Research Approach:

> First, the Design-Based Research Approach offers practical solutions in addition to the theory. Secondly, the DBR approach is willing to cooperate with other research approaches and proves to be adaptable to traditional directions of teaching-learning research. Thirdly, in spite of the practical problem solving, the question of the scientific approach is not neglected in the Design-Based Research Approach. (Reinmann, 2015, p. 14)

Phases of the Design-Based Research Approach

Reinmann and Sesink (2011, p. 10), McKenney and Reeves (2014, p. 72ff.), and Euler and Sloane (2014, p. 19) found during their analysis of Anglo-American and/or German Design-Based Research Approaches that the research and development process of this approach is determined by a majority over an equal phase. Although the individual process models differ with regard to the designation of the individual phases, the differentiated or rather abstract descriptions of the activities within phases, and the number of phases, they nevertheless show a high similarity in their structure. Design-oriented research has characterized an iterative and circular sequence of research and development phases in which problem analysis, design, implementation, testing and re-design follow one another.

The following overview illustration shows the basic structure of the research and development cycles of a design-oriented research process.

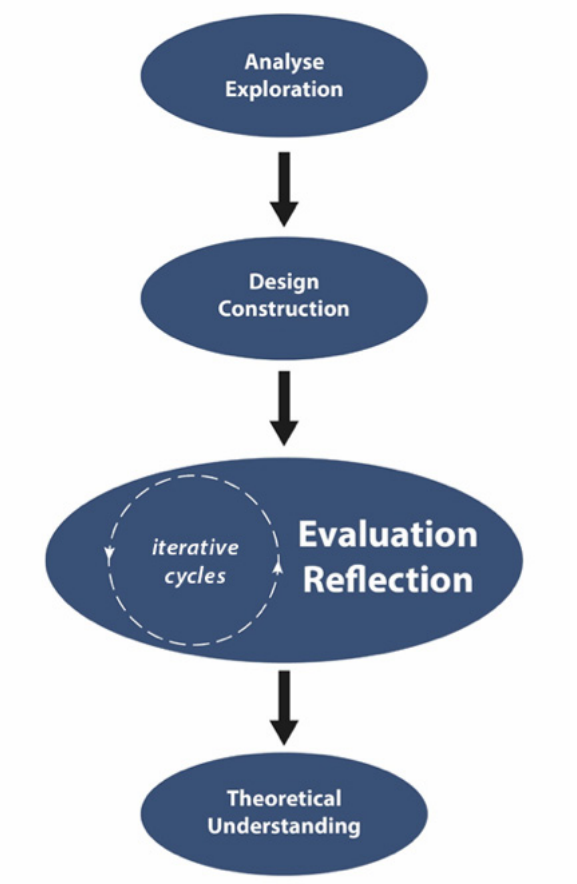


Figure 1. Design-Based Research Approach, McKenney & Reeves, 2014, p. 143

Jahn (2014, p. 10) describes the following phases:

- **Phase I** - Analysis of the initial situation: The goals and the research question are formulated in the theoretical part and the necessary terms, theoretical concepts and concrete recommendations for action are defined and described after a detailed study of the scientific literature.

With the help of the Design-Based Research Approach, the use of a concrete didactic design in an "uncontrolled" reality is researched. Complex problems in the practical field of teaching and learning are solved through innovative interventions and theoretical conclusions can be drawn (Jahn, 2014, p. 14).

According to Hoadley (2004, p. 204), the Design-Based Research Approach aims to eliminate deficits in teaching research. Scientific transfer is to be

improved above all through the participation of teachers in "classroom research".

> "Design-Based Research, therefore, proceeds in a very different manner than experimental research. For one, the research program often involves a tight relationship between researchers and teachers or implementers, blurring the "objective" researcher–participant distinction. A second distinction is the use of tentative generalization; results are shared without the expectation that universality will hold. Third, although planned comparisons do occur, the design-based researcher frequently follows new revelations where they lead, tweaking both the intervention and the measurement as the research progresses. Fourth and finally, the design-based researcher, to treat enacted interventions as an outcome, often documents what has been designed, the rationale for this design, and the changing understanding over time of both implementers and researchers of how a particular enactment embodies or does not embody the hypothesis that is to be tested (Hoadley, 2004, p. 204)"

In addition to the recognition of the performance of Design-Based Research, the research character, supported by theory, is also largely undisputed. However, there are contradictory opinions regarding the scientific claim of this research approach with regard to generalizable results (Euler, 2014, p. 98). The special added value is the generation of knowledge through the design process in the special teaching and learning environment in which the design is used. The design and the artefacts are determining factors, formulated in the hypothesis during the research process. Theories and design principles can be generated in the research process. They are distinguished by their application orientation and connection to the special environment and can therefore be clearly differentiated (Allert & Richter, 2011, p. 4).

Design-Based Research can be interpreted as:

> "(…) the systematic study of designing, developing and evaluating educational interventions (such as programs, teaching-learning strategies and materials, products and systems) as solutions for complex problems in educational practice, which also aims at advancing our knowledge about the characteristics of these interventions and the processes of designing and developing it" (Plomp, 207, p. 13).

In order to design an intervention for existing problems in practice in a context-related manner, an analysis of the problem, condition analysis and context analysis are necessary as the first step (Reinmann, 2005, p. 65; Jahn, 2014, p. 43; Collins, Joseph, & Bielaczyc, 2004, p. 34).

In order to be able to realize a context-sensitive design for the planned intervention, it is important to precisely illuminate the respective context in which the problem is to be solved and thereby to highlight restrictions for the development and implementation of the design. The development of a didactic design therefore requires a comprehensive description of the context so as to increase the accuracy and suitability of the planned intervention. As an instrument, a structural analysis of the condition levels can help to collect important characteristics that must be taken into account when developing the design, and to relate the characteristics to the design of the prototype (Jahn, 2014, p. 7). Likewise, objectives, content, methods and suitable media must be thought through for the framework conditions (Jahn, 2014, p. 8). The first ideas can only be developed through a thorough analysis of the state of research and the examples of good practice (Jahn, 2014, p. 7).

After the target problem has been thoroughly analysed and initial ideas for the design of the intervention have been crystallized, the first research questions can be formulated. The research questions arise from the findings of the analysis phase. Normally, the questions are overarching and related to the intervention as well as the the product. The next step is to formulate the objectives from the research questions. These verifiable objectives are to be achieved through design research. The objectives must be formulated in such a way that they can be operationalised. It must be possible to check the level of availability. Examples of this could be specific learning objectives, as is usually the case in the descriptions of the different subjects (Jahn 2014, p. 9).

A precise formulation of the competences to be achieved is of particular importance. At the end of the analysis phase, the first theoretical framework is formulated on the basis of design principles for the development of a prototype.

- **Phase II** - Development/description of the prototype: In this phase the development of the prototype is described and the prototype itself is presented.

In the phase of the development of the prototype, the concrete teaching-learning situation is grasped and the basic theory-based implementation features are identified in the actual context. The research focus during the prototype development lies in the application-oriented area (Klees & Tillmann, 2015, p. 93).

The design process of the prototype is always based on scientific theory. Didactic recommendations for action can be derived from theoretical but

rather abstract assumptions. In the development of interventions in the context of teaching-learning situations, the design principles are also didactic principles. It is according to them that the design is created, e.g. to achieve certain learning goals. The design allows more concrete recommendations for an action to be derived. In addition to content, recommendations always contain an action component. These can be, for example, designed phases of teaching or an action phase. Scientific theory not only determines the guidelines for design but also gives recommendations for implementation. This is particularly important for the development of didactic design for the specific context (Jahn, 2014, p. 9).

The prototype must be developed for the specific context. Experienced practitioners and scientists should work together to develop the prototype, both in the theoretical concept and in the concrete design of the prototype.

- **Phase III** - Cycles of testing, evaluation and modification (re-design): This phase is characterized by iterative cycles of testing, evaluation and modification of the prototype. After each modification, a new test phase is carried out.

For example, the first cycle of evaluation can be carried out by various experts to evaluate the prototype. In some cases, it makes sense for people from different disciplines and hierarchical levels to test the prototype from different perspectives.

Testing the prototype involves both the differentiation of the design guidelines and the revision of the prototype. The didactic design is progressively improved under the natural conditions of teaching and learning by being tested in practice in several iterations. The prototype is modified with the help of the knowledge gained. These cycles of testing, evaluation and modification continue until all identified difficulties have been eliminated and the desired goals have been successfully achieved (Jahn, 2014, p. 10).

There are no fundamental limitations in the scientific methodical approach. The prototype is tested using a methodologically multifaceted and suitable procedure. In the sense of triangulation, all methods of qualitative and quantitative social research should be used. Depending on the existing subject matter and the associated restrictions, the design researcher chooses the methods (Jahn, 2014, p. 11).

- **Phase IV** - Reporting: After the interventions in several iterations in practice, the findings are analysed, discussed, summarised and compared with the described theoretical foundations in order to finally give

recommendations for the practical development and implementation of the intervention or similar interventions.

Conclusion

The demand for research results that serve the practitioner cannot be overlooked. If we take a closer look at research, we can see time and again that it is often not possible to resolve this issue. The gap between theory and practice is often criticised.

There are many models that try to establish the connection between theory and practice. Burkhardt and Schoenfeld (2003, p. 4) named six models of the design experiment. Design-oriented research is one of the few research approaches that aim at the innovation function of science in practice.

Because there are many terms for design and application-oriented research, the Design-Based Research Approach should serve as an overarching term. A closer look at these terms shows that each has the same basic motivation. They are all looking for innovative solutions for educational practice and are also interested in the development of new scientific findings. Traditional research methods are often criticised because they do not offer practical concepts and instruments with which actual teaching and learning problems can be solved in concrete situations. Through the Design-Based Research Approach, a learning environment can be designed and further developed in a practical context where learning theories can be tested. It can be said that design experiments are extended (iterative), interventionist (innovative and design-oriented) and theory-oriented interventions whose „theories" perform real work in practical educational contexts. The research question „How can the Design-Based Research Approach connect theory and practice in research?" can be clearly answered. The Design-Based Research Approach is a method which solves the theory practice problem in research.

It was found that the majority of all Design-Based Research Approaches are characterized by equal phases in the research and development process. Design-oriented research is distinguished by an iterative and circular sequence of research and development phases in which problem analysis, design, implementation, testing and re-design follow one another. There are no fundamental restrictions on research methods. All methods of qualitative and quantitative social research should be used.

In addition to the positive aspects, however, the stumbling blocks of this Design-Based Research Approach must also be considered. This research approach places very high demands on researchers. Collins et al. (2004, p.

30) say that this approach „requires much more effort than any one human being can carry out".

References

Allert, H., & Richter, C. (2011). Designentwicklung. Anregungen aus Designtheorie und Designforschung. In M. Ebner & S. Schön (Eds.), *Lehrbuch für Lernen und Lehren mit Technologien* (pp. 1–14). E-Book: L3T.

Altrichter, H., Brüsemeister, T., & Heinrich, M. (2005). Merkmale und Fragen einer Governance-Reform am Beispiel des österreichischen Schulwesens. *ÖZS (Österreichische Zeitschrift für Soziologie), 30*(4), 6–28. doi:10.1007/s11614-006-0063-0

Anderson, T., & Shattuck, J. (2012). Design-Based Research. A Decade of Progress in Education Research? *Educational Researcher, 41*(1), 16–25. doi:10.3102/0013189X11428813

Bereiter, C. (2002). Design Research for Sustained Inovation. *Cognitive Studies. Bulletin of the Japanese Cognitive Science Society*, *9*(3), 321–327.

Burkhardt, H., & Schoenfeld, A. H. (2003). Improving Educational Research: Toward a More Useful, More Influential, and Better-Funded Enterprise. *Educational Researcher, 32*(9), 3–14.

Clement, U., & Lipsmeier, A. (2003). Einleitung. *Zeitschrift für Berufs- und Wirtschaftspädagogik* (Beiheft 17), 7–8.

Cobb, P., Confrey, J., diSessa, A., Lehrer, R., & Schauble, L. (2003). Design Experiments in Educational Research. *Educational Researcher, 32*(1), 9–13.

Collins, A., Joseph, D., & Bielaczyc, K. (2004). Design Research: Theoretical and Methodological Issues. Retrieved 12.08.2018 from http://treeves.coe.uga.edu/EDIT9990/Collins2004.pdf

Design-Based Research Collective. (2003). Design-Based Research - An emerging paradigm for education inquiry. *Educational Researcher, 32*(1), 5–8.

Einsiedler, W. (2010). Didaktische Entwicklungsforschung als Transferförderung. *Zeitschrift für Erziehungswissenschaft, 13*(1), 59–81. doi:10.1007/s11618-010-0106-y

Euler, D., & Sloane, P. F. E. (Eds.) (2014). *Design-Based Research* (Zeitschrift für Berufs- und Wirtschaftspädagogik Beiheft, Bd. 27). Stuttgart: Franz Steiner Verlag.

Euler, E. (2013). Unterschiedliche Forschungszugänge in der Berufsbildung: eine feindliche Koexistenz? In E. Severing & R. Weiß (Eds.), *Qualitätsentwicklung in der Berufsbildungsforschung* (Schriftenreihe des Bundesinstituts für Berufsbildung, Bonn, Bd. 12, pp. 29–46). Bielefeld: Bertelsmann.

Hoadley, C. M. (2004). Methodological Alignment. *Design-Based Research, 39*(4), 203–212.

Jahn, D. (2014). Durch das praktische Gestalten von didaktischen Designs nützliche Erkenntnisse gewinnen: Eine Einführung in die Gestaltungsforschung. *Wirtschaft & Erziehung Ausgabe, 1*, 3–15.

Kahlert, J. (2005). Zwischen den Stühlen zweier Referenzsysteme. Zum Umgang mit heterogenen Erwartungen bei der Evaluation schulnaher Disziplinen in Lehramtsstudiengängen. *Zeitschrift für Pädagogik, 51*(6), 840–855.

Klees, G., & Tillmann, A. (2015). Design-Based Research als Forschungsansatz in der Fachdidaktik Biologie - Entwicklung, Implementierung und Wirkung einer multimedialen Lernumgebung im Biologieunterricht zur Optimierung von Lernprozessen im Schülerlabor. *Journal*

für Didaktik der Biowissenschaften, 6, 91-110.

Mandl, H., & Kopp, B. (2006). *Blended Learning: Forschungsfragen und Perspektiven* (Forschungsbericht Nr. 182). München: Ludwig-Maximilians-Universität.

McKenney, S., & Reeves, T. C. (2014). Educational Design Research. In J. M. Spector, M. D. Merrill, J. Elen, & M. J. Bishop (Eds.), *Handbook of Research on Educational Communications and Technology* (4th ed., pp. 131–170). Dordrecht: Springer.

Plomp, T. (2007). Educational Design Research: an Introduction. In T. Plomp & N. Nieveen (Eds.), *An Introduction to Educational Design Research* (pp. 9 – 36). Retrieved 12.08.2018 from http://www.slo.nl/downloads/2009/Introduction_20to_20education_20design_20research.pdf/

Raatz, S. (2016). *Entwicklung von Einstellungen gegenüber verantwortungsvoller Führung. Eine Design-based Research Studie in der Executive Education* (1. Aufl.). Wiesbaden: Springer VS.

Reinmann, G. (2005). Innovation ohne Forschung? Ein Plädoyer für den Design-Based Research-Ansatz in der Lehr-Lernforschung. *Unterrichtswissenschaft: Zeitschrift für lernforschung, 33*(1), 52–69.

Reinmann, G., & Sesink, W. (2011). *Entwicklungsorientierte Bildungsforschung*, Universität Leipzig. Retrieved 10.07.2018 from http://gabi-reinmann.de/wp-content/uploads/2011/11/Sesink-Reinmann_Entwicklungsforschung_v05_20_11_2011.pdf

Stark, R. (2004). Eine integrative Forschungsstrategie zur anwendungsbezogenen Generierung relevanten wissenschaftlichen Wissens in der Lehr-Lern-Forschung. *Unterrichtswissenschaft: Zeitschrift für Lernforschung*, (3), 257–273.

Weissengruber, W. (2014). Stellungnahme (18/SN-67/ME). Retrieved 01.08.2018 from https://www.parlament.gv.at/PAKT/VHG/XXV/SNME/SNME_01950/index.shtml

THE INFLUENCES OF THE TEACHING AND LEARNING PROCESS IN THE SCHOOL INFRASTRUCTURE DESIGN

Luljeta Belegu Demjaha

Abstract
This research paper addresses the influence of the teaching and learning process in the design of school infrastructure and some of its implications for effective learning environment. The paper is guided by three main research questions: To what extent is the design process of school infrastructure inclusive in education in Kosovo?; What is the role of teaching and learning in the design of school infrastructure?; What are the appropriate solutions to involve the most important actors in the process of designing school models? A qualitative research design that primarily relies on a case study approach and on a document analysis is used. Purposeful stratified sampling is employed for the first two questions, while the third question is answered through a study of key documents pertaining to major educational reforms and the technical guide for school design.

Key words: teachers, school infrastructure design process, effective learning environment, school climate

Introduction

A newly designed competency-based curriculum in Kosovo (Ministry of Education, 2011), which implies changes in the entire education system, is demanding. It initiated a huge in-service teacher training process and required the development of new learning resources and the introduction of new equipment and technology in schools. Further, new learning assessment procedures are introduced: two external standardized exit exams (after grade 9 and grade 12), and an external diagnostic test in grade 5. The school management is thought to get modernized with introduction of decentralization. University teacher education programmes will undergo changes as well; teachers licensing procedures are re-considered; and quality assurance became a mainstream topic. New curriculum has been piloted in selected 97 schools in 30 municipalities in Kosovo, while the roll-out started during the school year 2017-18.

One important aspect that can influence the success of the newly-designed curriculum, not often considered from the perspective of the new curriculum requirements is the school building itself. Large amounts of money were spent in school infrastructure in Kosovo during the last two decades. However, school rebuilding and renovation efforts were not based on any

research pertaining to the alignment of the school building with students' learning needs. The technical guide for norms and standards for school buildings mainly refers to the physical aspects of the building. The focus of the school infrastructure was to fulfil the basic technical aspects, such as security, water supply, and furniture. In best cases, newly designed schools calculated heat losses from the physical aspect. But there is no case where a 'learning loss' was considered, which implies that there is no appropriate alignment between the school design and teaching and learning environments within curriculum reform requirements.

Researchers emphasize the necessity for a more systematic exploration of different potential influences that changes in school design might have on student learning. This research paper is part of an ongoing PhD research study focusing on the implications of the curriculum reforms in primary school design in Kosovo. The objective of the PhD study is to analyze how school infrastructure affects student learning with regard to curriculum attainment, engagement, attendance, and well-being. The following claim outlines the logic of the rationale that the PhD study follows, i.e. the connection between curriculum reforms and school design and teaching and learning opportunities and student learning outcomes is mediated by school infrastructure and 'learning loss'. In turn, the learning loss is caused by the misalignment between school design and curricular goals in a given school setting.

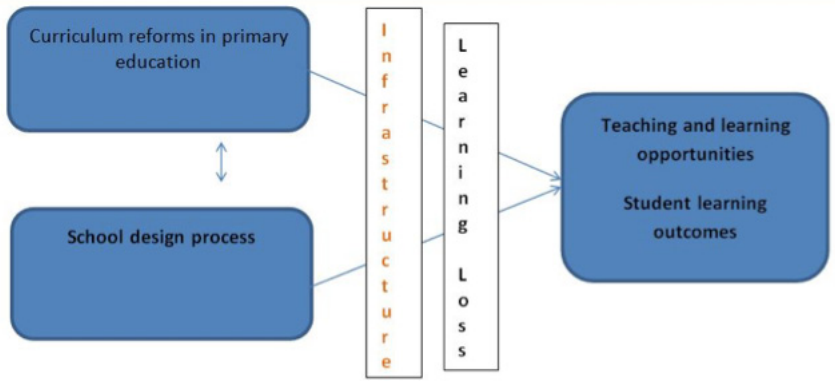


Figure 1. A diagram of logic rationale

In order to understand the aim of this paper, the next paragraph briefly describes the policy document that regulates the national educational system, the Curriculum Framework.

The actual Curriculum Framework in Kosovo introduced the competency-based approach, aiming that profiles of students graduating in pre-university education could be described as: Effective Communicator, Creative

and Critical Thinker, Successful Learner, Productive Contributor, Healthy Individual, and Responsible Citizen. The Curriculum Framework is based on principles that are expected to ensure the coherence and cohesion of the system, such as Inclusion, Development of Competencies, Integrated and Coherent Teaching and Learning, School Autonomy and Flexibility, and, Responsibility and Accountability. The structure of the system of education in Kosovo is in line with the International Standard Classification of Education: Preschool, Primary, Lower Secondary and Upper Secondary levels. Preparatory grade students (ages 5–6) are housed at primary schools and pre-school institutions. Primary education includes 1–5 grade students (ages 6–11); Lower Secondary includes 6–9 grade students (ages 11–14+). Upper Secondary includes grades 10–12 (ages 14–17). Compulsory education (considered as basic education) in Kosovo are primary and lower secondary levels. Moreover, the Curriculum Framework is structured in six Key Stages. They consist of one, two or three years/grades. Each key stage has its own defined standard requirements for measuring students' progress, organizing their learning experiences, and the approach and criteria for assessing specific competences. In this research, we will focus on the first two stages, Key Stage 1 – Basic Acquisition, (students aged 5–8), and Key Stage 2 – Reinforcement and Development (students aged 8–11). Kosovo's curriculum is structured into seven curriculum areas, which constitute the basis for organizing educational and learning processes in school. Some subjects in a curriculum area may be taught and be integrated at different curriculum key stages. Project based learning is recommended as the teaching method with students. It includes challenges, integrations and explorations. New assessment approaches are introduced as well, the internal and the external assessment. Furthermore, the internal assessment falls into three types: ongoing, final and key stage-based assessment. On the other hand, the external assessment is divided into three standardized state assessments at the end of formal levels of education: end of grade 5, end of grade 9 and end of grade 12 (State Matura Exam).

Based on the *Law on Pre-university Education in Republic of Kosovo*, Article 5, point 7.1, the Ministry of Education developed the design guidelines for school facilities, norms and standards. The document aims to be a reference for everyone involved in the process of planning, programing, designing and building new school facilities or renovating existing ones. The document defined and described educational spaces needed by the type, size, and specifications, according to the standards established by the Ministry of Education. These guidelines have been designed for all stakeholders of the educational sector, professionals such as architects and designers, municipal education authorities, school principals, school boards, and teachers. It is a very comprehensive document with explicit technical norms, but there

are also a few principles that refer to the pedagogical requirements, such as functionality and flexibility. Regarding the functionality, the document stipulates that a certain balance should be established between the quality of function and cost efficiency, meaning that: spaces should be rationally dimensioned; areas should be adapted to the school population; spaces must be designed with a maximum versatility enabling them to adapt to several subjects and changes; spaces should be grouped in blocks according to function and interrelation; the location of spaces should meet basic requirements such as sanitarian and hygiene rules, functional comfort, security regulations as well as acoustic, visual and climatic comfort. When it comes to flexibility, designers are instructed to foresee sufficient flexibility to allow the school staff to adapt the premises to various teaching methods and to future curricula and syllabi.

Theoretical background

In recent decades, there has been an increased interest in school infrastructure and its impact on student learning. Many authors focused on the different aspects of infrastructural issues in education but not so much on its impact on student achievement. In addition to the elaborate literature review in the text below, a longer list of authors was also reviewed within this study: Cash, n.d.; Eccles et al., 1993; Attar-Schwartz, 2009; Ananiadou and Claro, 2009; Marzano, 2007; Carron and Chau, 1996. Nevertheless, for the purpose of presenting this research paper, only the most important authors have been chosen.

Research is showing that there are not many studies on the relation between physical environment and the learning process. On one hand, many researchers consider teaching and learning as independent from physical environment. Yet, there is evidence that physical conditions play an important role in the learning process. The importance of many environmental factors, such as indoor air quality, lighting, noise and acoustics, occupant density and thermal comfort (Gislason, 2011), is recognized by architects and building engineers. However, empirical studies do not provide any detailed evidence of their importance for teaching and learning (Stadler-Altmann, 2015).

Appropriate building: Learning environments are made up of physical, psychosocial and service delivery elements (UNICEF & others, 2000). Physical learning environments or the places in which formal learning occurs range from relatively modern and well-equipped buildings to open-air gathering places. Over the last 10–20 years, worldwide, a wide diversity of

morphological and spatial patterns of school buildings has been conceived. An interesting research about school types identified four design types that presented innovative factors in the field of learning spaces and socializing. The basic criteria for the elaboration of these types were morphology and internal layout: the courtyard type, block type, cluster type and town-like type (Rigolon, 2010, p. 2). Design types may be in function of specific didactic and social needs. The preferred flexible open-plan classrooms, compared to the traditional cell-type plan, would need a careful consideration of spaces. In this regard, there is a growing need for areas dedicated to collaborative teamwork and breaks, meaning that communication spaces need to be rethought and enlarged in order to host learning activities. As stated by the author of this research, the decision to design school buildings based on a pedagogical type is reasonable, but prior to this, there is a need to define clear interlinkages between technical/architectural design and didactic requirements.

Design process: So far, global, isolated work has been done when exploring the future shape and design of schools, which gives the impression that school buildings exist in a vacuum. Design process of school building needs to be inclusive in a sense of involving key players such as students, teachers, parents, school principals, and others in a constructive dialogue between themselves and the researchers. School design should reflect the requirements of school curriculum, assessment and testing system, parental engagement and expectations (Heppell, Chapman, Millwood, Constable, & Furness, 2004). The design suitable for a learning atmosphere should follow a holistic, systemic way, in order to take into consideration all aspects (Guney & Al, 2012). However, when creating a physical condition for learning, designers, architects, engineers and facility planners of physical learning environments have to respond to a program of spatial requirements and educational specification (Akinsanmi, 2008). In order to create an effective learning environment, architects should follow a holistic approach that enables the creation of appropriate morphological compositions to support learning environments corresponding to diverse learning theories (Guney & Al, 2012). This is a very complex process, and architects should collaborate closely with educational experts. Most of the research in the field supposes that changes in the school buildings and classroom design have been influenced by changes in teaching and learning (Gislason, 2011).

Over the time schools are judged by three principles: the value of community recognition, the importance of good design and the importance of continuous evaluation (Woolner, 2010).

Academic performance: Some researchers base their views on physiological and sociological aspects that take place during the learning process, and

often exclude the physical circumstances around it. School buildings are often described from the perspective of pedagogical philosophy, curriculum design and social climate and there is little research on physical conditions in learning environment. A study shows that there is a correlation between the physical characteristics of the school environment and the academic performance of students in mother tongue and mathematics, and a correlation between appreciation and use of their school and their representation of it through creative drawing (Matar & Brighith, 2010). In this case, students who had been attending "new" schools interacted with their new school buildings more positively and did better in learning than their peers attending standard or "old" school buildings. There are other researches who have provided data regarding how the learning environment can improve student performance (Cash & Twiford, 2009). Some types of classroom lighting have been linked to improved student performance (Cash, 1993). The same research emphasizes that pleasant daylight in learning spaces is valuable for enhanced student performance, but is also an important consideration for energy savings. Observations show that cleanliness and conditions of the building also have an impact on students' and teachers' satisfaction. There are other concerns associated with the health and attendance of students, including air quality, heating, ventilating, and air conditioning systems.

Security and shelter are the most fundamental functions of all built environments. Feeling safe socially, emotionally, intellectually, and physically is a fundamental human need (Maslow, 1943). Psychologically, the feeling that school and classroom are a safe, good, and comfortable place to be, is an important precondition. According to researchers, feeling safe in school strongly promotes student learning and healthy development (Devine & Cohen, 2007). Findings have shown that many students do not feel physically and emotionally safe in schools, mainly because of failings in interpersonal and contextual variables that define a school's climate. To avoid experiencing violence among students, peer victimization, and punitive disciplinary actions, which are often accompanied by high levels of absenteeism and reduced academic achievement, recommendations point towards schools with supportive norms, structures, and relationships (Astor, Guerra, & Van Acker, 2010). In addition, studies have shown that students feel less safe in large schools (Lleras, 2008).

Eco-schools: Environmental issues are a relevant topic around the globe. Although research shows that environmental literacy among Eco-School students is not significantly higher than in ordinary schools, there is evidence that students integrated in the Eco-Schools have a slightly better performance in some aspects of knowledge, attitude and behaviors (Spínola, 2015).

School climate: School climate, among other variables, is directly dependent on the morphological aspect of the school building. By its definition, it reflects the students' school life experiences, school personnel, and parents at social, emotional, civic, ethic as well as academic levels (Thapa, Cohen, Guffey, & Higgins-D'Alessandro, 2013). Some researchers are claiming that the most important factors for student achievement are socioeconomic status (Ravitch, 2009), parental involvement and principal leadership (Lumpkin, 2013). Interactions between built environment and the users of that environment help to define the learning climate of schools. Conversely, the climate helps to shape the interactions that take place, fostering environmental understanding, competence and control and supporting academic learning (Uline, Tschannen-Moran, & DeVere Wolsey, 2009). As cited in Pennycuick (1998), establishing clear rules and instructions for student behavior are ways in which the goals and values of the institution are translated into daily life. School effectiveness is linked with effective use of rewards, praise, encouragement and appreciation rather than punishment.

Colors: Research is showing that the colors of school walls can also affect students' attitude and academic performance. Some findings support the preference of pastel colors to dark or white walls (Cash, 1993). Recent research has indicated that a focal point of one medium tone of blue, brown, or green with neutral surrounding walls is effective in enhancing the environment of the classroom (Engelbrecht, Oswald, Swart, & Eloff, 2003). The combination of sky-blue tinged with read does not only have a cognitive impact in the classroom, but is also conducive to thoughtful study and alertness, and a predictor of teacher satisfaction (Cash & Twiford, 2009).

Class size: As cited in Pennycuick (1998, p. 17), research carried out in Wales (Reynolds et al., 1989) found that more effective schools had smaller class sizes and more convenient students/teacher ratios.

Relationships: Many authors claimed that the process of teaching and learning is fundamentally relational (Thapa et al., 2013). Psychologists are arguing that relationships refer not only to relations with others but also to relations with ourselves. As elaborated above, a responsive school climate tends to foster a greater attachment to school and provide the optimal foundation for social, emotional, and academic learning (Blum, McNeely, & Rinehart, 2002); (Osterman, 2000).

Effective learning environments: There is a relative paucity of research on effective learning environment (Higgins, Hall, Wall, Woolner, & McCaughey, 2005). Despite rapid changes in education, we do not yet have a powerful research base for integrated and personalized learning environments.

Research aim, research questions and research method

The aim of this small-scale study is to explore the extent of the influences of the teaching and learning process in the school infrastructure design in Kosovo. In particular, the study will focus on the involvement of teachers and the school community in school design process.

This paper aims to define the process of school design, more specifically, it explores the influence of the teaching and learning process in the process of school infrastructure design and some of its implications in effective learning environment.

More specifically, this research aims to answer the following questions:

1. To what extent is the design process of school infrastructure inclusive in education in Kosovo?
2. What is the role of teaching and learning in the design of school infrastructure?
3. What are the appropriate solutions to involve the most important actors in the process of designing school models?

To address these questions, the study employs a qualitative research design that primarily relies on a case study approach and on a document analysis. To address the first and the second research question, a case study approach is employed, which includes school site visits, classroom observations, and interviews with teachers, students/parents, school managers, and relevant policy makers. To address the third question, the study examined key documents that outline the education reform in Kosovo and analyzed how the goals of those documents align with existing primary school buildings. Moreover, the inclusion of relevant actors in the process of designing the school building was explored.

Description of participants and sample

In the first step, three municipalities have been selected based on the predefined criteria: urban/rural, big/medium/small size municipality. In the second step, two schools per municipality have been selected based on the school size, number of students, old building (built between 1960–1970)/ new building (built after 2000). Most, but not all, of the selected schools have been part of the development process in support of the new curriculum implementation since 2011.

Additionally, a seventh school has been included in the sample, which is

called the "Model" school and which represents the "gold standard" for the school buildings in Kosovo. In order to avoid researcher bias, seven of selected school principals were asked to invite teachers to participate in the study. The principals were given information about the nature of the research so that they could nominate teachers with necessary background, experience and qualifications. The research was limited to the Curriculum Key Stage 2 students (aged 8–11), which includes the upper grades in primary education. Thus, one 4 or 5 grade classroom teacher has been selected per school to complete classroom observation. Lastly, a number of relevant stakeholders from each sampled municipality and school have been interviewed, including 7 students, 7 parents, 7 school directors, 3 municipal directors of education, and 2 senior policy-makers at the national Ministry of Education.

Coding of participants is performed with numbers in the following order: municipality, school, participant (principal/student/parent).

Municipality 1 is the capital of Kosovo, where three schools were selected. School 1.1 is a big school with 1,400 students, which houses the Key Stage 1–4 students (aged 5–14), including Primary School, and Lower Secondary School. Use of the building space between primary and lower secondary levels of education is regulated in two shifts. The building itself is very old, built in the mid-fifties. The building has gone through several renovation phases and two annexes have been built over the time. It is located in the city center, and has a very good reputation within parent community. School 1.2 is one of the oldest in the city, built in the early sixties and has not been substantially renovated since it was built. It has about 650 students, including Key Stage 1–4 students (aged 5–14) of primary and lower secondary level, which are regulated in two shifts. It is located in the purest part of the city and it is not very attractive for the community. School 1.3 is a new modern building, which has 5,700 square meters, houses about 700 students of Key Stage 1–4 (aged 5–14), including both primary and secondary level of education use, which work in one shift. It represents the "gold standard" for the school buildings in Kosovo, as it is very attractive for the community.

Municipality 2 is a medium size city with two selected schools. School 2.1 is larger than average schools in Kosovo, with 1,900 students in total. It operates in two buildings in the same compound, one of which houses the Key Stage 1 and 2 pupils (aged 5–11), which includes Primary School, and the other the Key Stage 3 and 4 pupils (aged 11–14) including Lower Secondary School. There is a big yard with a total of 7,800 square meters. The school is located in the city center. The Primary School is in an older building, while the Lower Secondary School was built in 2010. Both schools work in two shifts; there are modest facilities for teacher's professional development and a few science labs. School 2.2 is a smaller one with 500 students, including only Key Stage 1

and 2 at the primary level of education, and working in two shifts. It has about 1,500 square meters. Although the building is a new one, built in 2013, technical standards for school buildings have not been applied.

Municipality 3 is a smaller rural city. Two selected schools are from two villages located around the municipality. School 3.1 is a relatively new building built in 2008 with a lack of technical standards, located near a very busy road. It houses about 700 students (aged 5–14) of primary and lower secondary levels, working in one shift. School 3.2 is an older building, renovated in 2014, which houses about 650 students (aged 5–14).

Methods of data collection

Key relevant documents are analyzed in the desk review collected from official sources, namely the curriculum framework, the guide for norms and standards of school buildings, and other relevant education legislation. School and classroom observations are carried out by the researcher during classes, extra-curricular activities and breaks. Observation protocol is developed based on the *Reformed Teaching Observation Protocol (RTOP)* from Arizona State University (Piburn & Sawada, 2000). Semi-structured interview protocols were developed and modified accordingly when interviewing students, parents, school directors, municipal education directors, and policymakers.

Throughout the study all ethical aspects were fully respected, including confidentiality of the responses, voluntary participation, appropriate permissions from the parents and the institution for handling the data and using any secondary data from any source are acknowledged and referenced. All participants in the sample signed a consent form. The interviews and observations have been digitally recorded for audio and video, and subsequently transcribed.

The interview questions were designed to gain in-depth information and to focus the discussion on what participants think about suitability of existing infrastructure and their involvement in the school infrastructure design process. The main questions used to serve the study's purpose were:

- Questions for parents: *How much are you ready to be involved in consultations when the school undertakes re-design or renovations to improve the school environment?*
- Questions for students: *What would you change in your school environment if you had the possibility?*
- Questions for school principals: *Have you ever been involved in the design process of the school buildings?*

- Questions for municipal education directors: *Do you think that school buildings in your municipality reflect the new curriculum requirements? Have you ever been included in the design process of school buildings?*

For the purpose of this paper, only a number of selected interviews and classroom observations of all the participants in the research have been considered, meaning that at this stage, the researcher presented the perception of a few representatives of each category described above (one municipal education director, four school principals, two parents and three students).

Data analysis

A large pool of qualitative data in the form of field observation notes, interviews, and secondary data was gathered to address the first and the second research question. An observation protocol was used for classroom observation, while interviews were performed in a semi-structured way. The qualitative data were analyzed following a case study approach where data are initially coded into memos, followed by rich descriptions of cases (classrooms within schools within municipalities). Then, the data are coded into themes and lastly, themes are classified into main categories and trends (Creswell, 2012). The structure of data analyses is comparative, explanatory, descriptive, and theoretical and provides sufficient information from which it can be determined which explanations, descriptions or theories best fit the data.

The document and text analyses were used to address the third research question, mainly the *Design Guidelines for School Facilities Norms and Standards*, and *Law on Pre-university Education in the Republic of Kosovo*.

Findings

The interview data and observation in schools revealed a variety of views, which could then be grouped in three main themes: Participation in the design process; Teaching and learning process; and, Change to Physical settings.

From this analysis, we can summarize the following findings: the design process of school infrastructure in education in Kosovo is perceived as a job for architects and designers and not yet as educators' concern. Thus, the design process of school settings is still far from being inclusive, because teachers', students', and parents' roles in this process are practically nonexistent. However, the creation of appropriate solutions in involving the most

important actors in the process of designing school models will be an ongoing challenge that remains to be solved in the future.

To summarize, the findings are set out in Table 1, below.

Table 1. *Factors important for the influences of the teaching and learning process in the school infrastructure design*

Themes	Category I	Category II
Participation in the design process	Design of new building Re-design of old building Relevance	Stage of involvement
Teaching and learning process	New curriculum implementation	Extracurricular activities
Change to the physical setting	Reflection on existing practices	Collaborative idea for change

Participation in the design process

In the researched schools, the school principals showed awareness of the complexity of school infrastructure design. Nonetheless, they were not able to make an explicit connection between the curriculum requirements and the school design process. They felt more comfortable speaking about the need to change teaching and learning cultures.

The representative of the local authority, Municipal Education Director (MED) 1, explained that it was in their future planning to build a few new school buildings, but the design process was done solely by the donor. Although the municipality had been consulted, its role was still pretty small. Moreover, local education authorities considered that the school design is the responsibility of the infrastructure and not the education department. As stated by the MED 1, 'it should be acceptable, because architects respected norms and standards set by the technical guide for school buildings'.

Principal 1.1 explained that his school was one of the oldest in the capital city, but it was in a good shape due to several renovations done over the time. Most of the renovations were financed by donors of different channels, and they did not see much need to involve school management in the re-design phase. The school management was pleased to have that support and considered that the design of school settings is the responsibility of architects.

For Principal 1.2, who managed an old school in the urban area, involvement of the school management was necessary in all phases of renovations or re-designs. As she said, nobody would know better what the needs of the school are than someone who works in it every day.

The relevance of being involved in the design process for Principal 1.3 was very high. He was leading the so-called 'Model' school, which represented the gold standard for school buildings in Kosovo, but he was not involved in the design process of the school. As he stated, the school was new, modern and had pretty much enough space, but there were some aspects that he would change in order for the building to better meet pedagogical and curriculum requirements. In this regard, he mentioned after-school activities and the cross-curriculum aspects. Therefore, for this principal, the relevance of being involved in the school design was very high, and the stages of the involvement should be in all phases of that process.

When asked about the participation in the design process, Principal 2.1 was not very sure about what he could contribute to the new school building design, because, as stated '…this is the architect's job…'. He then explained how he was very actively involved in the re-designing of the school setting when the Primary and Lower Secondary Schools were separated in two buildings within the same compound. He also declared that the principal and the school staff were the best people to consult when designing the school buildings, but they were not used to being consulted on this issue.

Teaching and learning process

Regarding the teaching and learning process, Principal 1.2 had very clear and concrete ideas about the changes that should be done to improve the school building from the technical aspect as well from the pedagogical aspects. While very proactive thinking of Principal 2.1 was that teaching and learning process should be supported by teachers' professional development, therefore when re-designing the school, he established the center for school-based professional development in his school.

As stated before in this paper, the actual Curriculum Framework recommends new teaching techniques, which require more physical space and flexibility. The project-based learning techniques require additional space for teachers to collaborate in their planning of activities and for students to implement them. In addition, extracurricular activities and afterschool activities are promoted and encouraged, such as student clubs of different nature, which also require additional and specific spaces.

During the observation in schools and classrooms, it was visible that the classroom teacher was the most actively involved in supporting change in school. In the context of changes during the curriculum and the teaching plan implementation, it was visible that the classroom teachers tried to rearrange the furniture in the classrooms so as to facilitate collaboration

between students. Depending on the school, for some classrooms, circular tables were purchased, while in others, the teachers created L or U shapes or grouped two to three tables together. Students were expected to sit facing one another so that they could learn from each other as well as from the teachers. School principals were not very involved in these classroom arrangements, and neither were parents or students, but they appreciated the teachers' efforts in this direction. In best cases, school classrooms included some larger rooms that could somehow accommodate a big number of students in the class. Teachers in the school premises did not have their own individual rooms for preparations, except from the common space for all teachers together, without the required technology to support their work.

It was interesting to listen to students' opinions about the teaching and learning environment. Student 1.1, who attended grade 4, liked the extracurricular activities very much, but in her school, there was a lack of sufficient space for such activities. Her teacher was very creative in planning drama plays, music or language plays with students, but as there were many classes, they had to use the only space that was available for all the students in that school. The same student said that she liked a lot of her classmates and felt very good in the class atmosphere, but, '…there is sometimes very crowded and it is very hot during the sunny days, due to a big number of students in the class…'. During the classroom observation, the class 1.1 was organized in groups, because that learning activity recommended group work. Regarding this, the student expressed that she preferred group work because it was a pleasure to collaborate with classmates, but this was not the case every day because '…the teacher is obliged to arrange the seating in rows, since there is not enough space to work in groups…'.

Change to the physical setting

Reflections of participants in the interviews were interesting regarding the changes in the physical setting. Student 1.1 said that if she was responsible for changing something in school, this would be to expand the classroom space, to add space for extracurricular activities, and have the school premises cleaner. Student 2.2, attending grade 5 in a medium sized city, liked her classmates and the teacher, because '…there is an excellent atmosphere in classroom…', and in addition, she also liked the makerspace they have in school, equipped with elements to make robots. Student 3.1, attending grade 4 in a small rural area, said that she would like to have more colors in the class and a better playground in the school yard. She would also be happy if she had a personal shelf in school in order not to carry the heavy books every day.

There is an interesting approach of parents as well. Parent 1.2, would start the changes with school location. As stated, students are secured in their school, but the location was not appropriate for the school building due to several reasons: the lack of space in the school yard for students to play, the difficult access from the street, and a high density of the surrounding buildings, which did not allow enough sun and air circulation. This parent also suggested that internet in school should be controlled in the sense that certain restrictions should be made when students use the social media. Regarding parents' involvement in the school design, she expressed that her family is ready to contribute in all aspects, starting from ideas, and helping in implementing them, such as coloring, decorating etc. As far as the parents' involvement in the school design process is concerned, the parent said that it would be good if the authorities asked for parents' opinions, because '…it's about the lives of our children…but they have never asked for our opinion on such issues…'. For Parent 3.2 whose children attend school in the rural area, the most important things remained security, heating and cleanliness.

Collaborative ideas for change should come from all stakeholders. For this issue, Principal 1.2 stated that 'management of the school should act as the real host and take responsibility for the coordination of the pedagogical process, as well as for the physical aspect of the school building'.

Discussion

This study has examined the factors that influence the teaching and learning process in the school infrastructure design. Based on the findings and the literature review there is a necessity for a more systematic exploration of all potential influences that the changes in the school design might have on student learning.

As mentioned before, this paper is part of an ongoing PhD research study, which aims to analyze how school infrastructure affects student learning. The following claim outlines the logic of the rationale that the PhD study follows: the connection between curriculum reforms and school design and teaching and learning opportunities and student learning outcomes is mediated by school infrastructure and 'learning loss'.

Another educational research problem which should be addressed is the need for more research which integrates students in the research process (Stadler-Altmann, 2015). According to researchers (Woolner, 2010), students could be an important partner in the research about the school design/architecture and classroom. In addition, involving teachers in this process is also highly relevant.

According to the technical guide, when designing and building new school buildings as well as renovating the existing ones, the following factors need to be taken into consideration: pedagogical principles, aims and objectives of the education as foreseen within the curriculum framework. The designing process should therefore also consider the importance of student-centered teaching and learning, different pedagogical approaches and the use of various teaching aids, team work, learning projects, etc. Organization of the classroom should enable teachers and students to organize and develop group work and practical activities. Various teaching tools should be accessible for students inside and outside their classroom, such as corridors, library, reading rooms, etc. Schools need to provide easy access for students in classrooms and other learning environments; they need to be organized in such a way that will facilitate communication among school management, teachers and students. Students should be provided with an appropriate place for gatherings, discussions, learning and entertainment. Requisites for physical education and sports should be in good condition and in accordance with contemporary requirements. Also, schools should strive to enable students a close contact with nature through gardens, parks or greenhouses.

Indeed, this is a complex process, and architects should collaborate closely with educational experts along the way. Many aspects of school design hinder the positive developments in school, for instance, subject-specific cabinets are making cross-curricular planning more difficult and decreasing the number of opportunities for contact between subject teachers.

School principals who are initiating change need to see the changes in school space as part of an integrated pedagogical, cultural and organizational whole. Nevertheless, this is not easy to realize. They need to support and institutionalize the changes in class setting, making it clear that, for example, 'the arrangement of tables in rows is not allowed and classrooms are inspected to ensure that such rearrangement does not occur'. The reason for this is that such seating arrangement represents a teacher who does not embody the values and the vision of the school (Woolner, Thomas, & Tiplady, 2018), in which case the principal can take action to prevent such a scenario.

Conclusion

Teaching and learning in existing school infrastructures is a very complex process if spaces are not appropriately harmonized with pedagogical requirements. Thus, the research in this field must take into consideration the explicit principles when re-designing schools and classes. Success of school

design lies in users being able to articulate a distinct vision of their school, before working with architects to create integrated solutions.

It is obvious that no design solution will last forever, therefore the inclusion of users in the design process is needed to continually update and support the ongoing changes. There is a need for every school to take ownership of the design process of the school building. There are still many gaps in the research on the relationships between school architecture, classroom design and learning environment (Blackmore et al., 2011), therefore researchers should be focused on identifying and analyzing them.

References

Akinsanmi, B. (2008). *The optimal learning environment: Learning theories*. Retrieved from: http://www.designshare.com/index.php/articles/the-optimal-learning-environment-learning-theories/

Ananiadou, K., & Claro, M. (2009). *21st century skills and competences for new millennium learners in OECD countries*. Retrieved from http://www.oecd-ilibrary.org/education/21st-century-skills-and-competences-for-new-millennium-learners-in-oecd-countries_218525261154

Astor, R. A., Guerra, N., & Van Acker, R. (2010). How can we improve school safety research? *Educational Researcher*, *39*(1), 69–78.

Attar-Schwartz, S. (2009). Peer sexual harassment victimization at school: The roles of student characteristics, cultural affiliation, and school factors. *American Journal of Orthopsychiatry*, *79*(3), 407.

Blackmore, J., Bateman, D., Loughlin, J., O'Mara, J., & Aranda, G. (2011). *Research into the connection between built learning spaces and student outcomes*, Literature Review, Paper No. 22. Melbourne, Australia: Education and Policy Research Division, Department of Education and Early Childhood Development. Retrieved from https://www.deakin.edu.au/arts-ed/efi/pubs/deecd-reports blackmore-learning-spaces.pdf

Blum, R. W., McNeely, C. A., & Rinehart, P. M. (2002). *Improving the odds: The untapped power of schools to improve the health of teens.* Minneapolis: Center for Adolescent Health and Development, University of Minnesota.

Carron, G., & Chau, T. N. (1996). *The Quality of Primary Schools in Different Development Contexts.* Retrieved from http://eric.ed.gov/?id=ED445830

Cash, C. S. (2012). Building achievement: exploiting the relationship between architecture and learning. In Inter-American Development Bank (Ed.), *Learning in Twenty-First Century Schools* (pp. 91-100). Ontario, Canada: IDB Social Center.

Cash, C., & Twiford, T. (2009). Improving student achievement and school facilities in a time of limited funding. *International Journal of Educational Leadership Preparation*, *4*(2), 1–9.

Creswell, J. W. (2012). *Qualitative inquiry and research design: Choosing among five approaches*. Thousand Oaks, California: Sage.

Devine, J. F., & Cohen, J. (2007). *Making your school safe: Strategies to protect children and promote learning*. New York: Teachers College Press.

Eccles, J. S., Midgley, C., Wigfield, A., Buchanan, C. M., Reuman, D., Flanagan, C., & Mac Iver, D. (1993). Development during adolescence: The impact of stage-environment fit on young adolescents' experiences in schools and in families. *American Psychologist*, *48*(2), 90.

Engelbrecht, P., Oswald, M., Swart, E., & Eloff, I. (2003). Including learners with intellectual disabilities: Stressful for teachers? *International Journal of Disability, Development and Education*, *50*(3), 293–308.

Gislason, N. B. (2011). *Building innovation: History, cases, and perspectives on school design*.

Guney, A., & Al, S. (2012). Effective learning environments in relation to different learning theories. *Procedia-Social and Behavioral Sciences*, *46*, 2334–2338.

Heppell, S., Chapman, C., Millwood, R., Constable, M., & Furness, J. (2004). Building learning futures. *UK, Council for Architecture and the Built Environment*. Retrieved from http://pasaporte.urosario.edu.co/urosario_files/3a/3ab3bd4d-2bf4-4e5a-94c9-2b6da193db8f.pdf

Higgins, S., Hall, E., Wall, K., Woolner, P., & McCaughey, C. (2005). *The impact of school environments: A literature review*. London: Design Council.

Lleras, C. (2008). Do skills and behaviors in high school matter? The contribution of noncognitive factors in explaining differences in educational attainment and earnings. *Social Science Research*, *37*(3), 888–902.

Lumpkin, R. (2013). School Facility Condition and Academic Outcomes. *International Journal of Facility Management*, *4*(3). Retrieved from http://ijfm.net/index.php/ijfm/article/viewFile/91/88

Marzano, R. J. (2007). *The art and science of teaching: A comprehensive framework for effective instruction*. Retrieved from https://books.google.com/books?hl=en&lr=&id=Bv9QBAAAQBAJ&oi=fnd&pg=PA1&dq=Marzano+(2007)+&ots=xRGwo6MYbQ&sig=BaBMeJpSBZO4oLpKeaaNMAzvEVE

Maslow, A. H. (1943). A theory of human motivation. *Psychological Review*, *50*(4), 370.

Matar, M., & Brighith, I. (2010). *The impact of school design on academic achievement in the palestinian territories*. Retrieved from http://www.oecd-ilibrary.org/education/the-impact-of-school-design-on-academic-achievement-in-the-palestinian-territories_5kmh36dqbnjd-en

Osterman, K. F. (2000). Students' need for belonging in the school community. *Review of Educational Research*, *70*(3), 323–367.

Kosovo Ministry of Education. (2016). *Curriculum framework for pre-university education in Kosovo*. Prishtina, Kosovo: Ministry of Education.

Kosovo Ministry of Education. (2018). *Design guidelines for school facilities norms and standards.*

Pennycuick, D. (1998). *School effectiveness in developing countries: A summary of the research evidence. Education research paper. Knowledge & research.* UK: DFID Education Publications. Retrieved from http://eric.ed.gov/?id=ED461944

Piburn, M., & Sawada, D. (2000). *Reformed teaching observation protocol (RTOP) reference manual*. *Technical report*. Retrieved from http://eric.ed.gov/?id=ED447205

Ravitch, D. (2009). *Ilme to Kill'No Child Left Behind'*. Retrieved from https://nautical.uwf.edu/files/module/groupMail/nclb[1].pdf

Rigolon, A. (2010). *European design types for 21st century schools.* Retrieved from http://www.oecd-ilibrary.org/education/european-design-types-for-21st-century-schools_5kmh36gpvmbx-en

Spínola, H. (2015). Environmental literacy comparison between students taught in Eco-schools and ordinary schools in the Madeira Island region of Portugal. *Science Education International*, *26*(3), 392–413.

Stadler-Altmann, U. (2015). *Learning environment: The influence of school and classroom space on education*. In C. Rubie-Davies, J. M. Stephens, & P. Watson (Eds.), *The routledge international handbook of social psychology of the classroom* (pp. 252-262). Routledge.

Thapa, A., Cohen, J., Guffey, S., & Higgins-D'Alessandro, A. (2013). A review of school climate research. *Review of Educational Research*, *83*(3), 357–385.

Uline, C. L., Tschannen-Moran, M., & DeVere Wolsey, T. (2009). The walls still speak: the stories occupants tell. *Journal of Educational Administration*, *47*(3), 400–426. http://doi.org/10.1108/09578230910955818

UNICEF. (2000). *Defining quality in education*. Retrieved from www.unicef.org/education/files/QualityEducation.PDF

Woolner, P. (2010). *The design of learning spaces*. Retrieved from http://site.ebrary.com/id/10422384

Woolner, P., Thomas, U., & Tiplady, L. (2018). Structural change from physical foundations: The role of the environment in enacting school change. *Journal of Educational Change*, *19*(2), 223–242.

INDEX

University *of Ljubljana*
Faculty *of Education*

ISBN 978-961-253-254-3