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IMPRESSUM

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International Journal of Cognitive Research in Science, Engineering and Education

(IJCRSEE)

EDITORIAL

International Journal of Cognitive Research in Science, Engineering and Education (IJCRSEE) is an open access international peer-reviewed, open-access journal, which provides a platform for highlighting and discussing various cognitive science issues dealing with the problems of cognition (and its evolution) within some specific subject field - philosophical, psychological, linguistic, mathematical, psychogenetic, pedagogical, ergonomic. Editorial Board strives to provide a possibility for the scientists of different fields to publish the results of their research, technical and theoretical studies. IJCRSEE is multidisciplinary in approach, and will publish a great range of papers: reports of qualitative case studies, quantitative experiments and surveys, mixed method studies, action researches, meta-analyses, discussions of conceptual and methodological issues, etc. IJCRSEE publisher is The Association for the Development of Science, Engineering and Education, Vranje, Serbia. Quality control, assisting and monitoring are supported by co-publishers:

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IJCRSEE particularly welcomes articles on the results of scientific research in various fields of cognitive science (psychology, artificial intelligence, linguistics, philosophy and neuroscience) catering for international and multidisciplinary audience. Readers include those in cognitive psychology, special education, education, adult education, educational psychology, school psychology, speech and language, and public policy. IJCRSEE has regular sections: Original Research, Review Articles, Studies and articles, Book Reviews, Case Studies, and is published 3 issues per year (April, August and December). This journal provides an immediate open access to its contents, which makes research results available to the public based on the global exchange of knowledge. The journal also offers access to uncorrected and corrected proofs of articles before they are published.

The main **aim** of the Journal is to discuss global prospects and innovations concerning major issues of cognitive science, to publish new scientific results of cognitive science research, including the studies of cognitive processes, emotions, perception, memory, thinking, problem solving, planning, education and teaching, language and consciousness study, the results of studying man's cognitive development and the formation of basic cognitive skills in everyday life. The Journal seeks to stimulate the initiation of new research and ideas in cognitive science for the purpose of integration and interaction of international specialists in the development of cognitive science as interdisciplinary knowledge.

All articles are published in English and undergo a peer-review process.

The **scope** of IJCRSEE is focused on cognitive research both in topics covered as well as disciplinary perspective:

- Cognitive Research in Education
- Cognitive Pedagogics
- Cognitive Psychology
- Psycholinguistics
- Cognitive Linguistics

- Cognitive Culture Studies
- Cognitive Neurophysiology
- Cognitive Aspects: Sport Culture
- Cognitive Aspects: Methodology of Knowledge
- Text Processing and Cognitive Technologies
- Curriculum Development
- Development of Learning Environment
- Education Administration
- Educational Psychology
- Educational Technology
- Elementary Education
- Innovative Pedagogical Models
- Learning Systems Platforms
- Media Education
- Science Education
- Teaching and Learning Technologies

IJCRSEE has an international editorial board of eminent experts in their field from Russia, USA, Republic of Macedonia, Germany, Hong Kong, Greece, Serbia, Australia, United Kingdom, USA, Turkey, Nigeria, Bulgaria, Romania, Spain, Italy, Republic of Srpska, Croatia, Kingdom of Saudi Arabia (KSA), India, China, Thailand, Israel, Malaysia, Morocco, Jordan,, Iran... We are confident that IJCRSEE will attract a great number of editors, eminent scientists in the field. The selection will be based on the activities of the editors and their desire to contribute to the development of the journal.

IJCRSEE provides a platform for academics and scientists professionals to refer and discuss recent progress in the fields of their interests. Authors are encouraged to contribute articles which are not published or not under review in any other journal.

Each submitted manuscript is evaluated on the following basis: the originality of its contribution to the field of scholarly publishing, the soundness of its theory and methodology, the coherence of its analysis, its availability to readers (grammar and style). Normal turn-around time for the evaluation of manuscripts is one to two months from the date of receipt.

Submission of an original manuscript to the journal will be taken to mean that it represents original work not previously published, that is not being considered elsewhere for publication; that the author is willing to assign the copyright to the journal as per a contract that will be sent to the author just prior to the publication and, if accepted, it will be published in print and online and it will not be published elsewhere in the same form, for commercial purposes, in any language, without the consent of the publisher.

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The requirement for the submission of a paper implies that it has not been published before; that it is not under consideration for publication anywhere else; that its publication has been approved by all co-authors.

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Originality – The author should ensure that the manuscript has not been previously published nor is being considered by another journal.

Plagiarism - All articles are tested with iThenticate and Antiplagiat RU software. Content should be properly referenced. Be sure to check the paper for possible accidental plagiarism. Some plagiarism checker websites include: http://www.ithenticate.com/, www.antiplagiat.ru, www.grammarly.com, www.plagtracker.com or www.duplichecker.com

Writing – Please write in good English (American or British usage is accepted, but not a mixture of these). For non-native English speakers, and perhaps even for some native English speakers, grammar, spelling, usage, and punctuation of the texts are very important for an effective presentation. Hence, manuscripts are expected to be written in a clear, cogent, and readily understandable by an international readership.

Manuscripts must be submitted online. Electronic submission reduces the editorial processing and reviewing time. As part of the submission process, authors are required to check off

their submission compliance with all of the following items, and submissions may be returned to authors who do not adhere to the following guidelines:

The submission has not been previously published or presented to another journal for consideration (or an explanation has been provided in Comments to the Editor).

The submission file is in OpenOffice, Microsoft Word, RTF, or WordPerfect document file format.

Where available, URLs for the references have been provided.

The text is single-spaced; uses a 12-point font; employs italics, rather than underlining (except with URL addresses); and all illustrations, figures, and tables are placed within the text at the appropriate points, rather than at the end.

The text adheres to the stylistic and bibliographic requirements outlined in the Author Guidelines.

If submitting to a peer-reviewed section of the journal, the instructions in ***Ensuring a Blind Review*** have been followed.

A manuscript goes through the peer review process. Authors submit manuscripts to **Editorial office** via the online system. The acknowledgement letter should be sent to the author to confirm the receipt of the manuscript. The Chief Editor first reviews manuscripts. Chief Editor is assisted by Section Editors (could also be Co- or Associated Editors). The Editor assigns a Section Editor to see the manuscript through the complete review process and return it with a recommendation or decision. The manuscript is checked to see if it meets the scope of the Journal and its formal requirements. If it is incorrect or unsuitable, the author should be informed and the manuscript filed (or returned if requested) – direct rejection. Manuscripts that are not suitable for publication in the Journal are rejected. A Rejection letter is sent to the author stating the reason for rejection. If the manuscript conforms to the aims and scope of the Journal, and formally abides by the Instructions to Authors it is sent out for review. Depending on the type of paper, it could be accepted immediately for publication (invited Editorial, Book review etc) by the Chief Editor.

Check that the manuscript has been written and styled in accordance with the Journal style; that it carries an abstract (if applicable), keywords, correct reference system etc. and check that the correct blinding system has been used. If anything is missing ask the author to complete it before the manuscript is sent out for review.

The manuscript is sent out for review. The reviewer reads and evaluates the manuscript and eventually sends a review report to the Chief Editor. The time for review can be set to 2-6 weeks depending on the discipline (more time is usually given to papers in the humanities and social sciences). Make sure to provide the reviewer with clear instructions for the work, e.g. outlined in the form of a Review report or a number of questions to be considered.

Based on the reviewers' comments the Chief Editor makes a decision to:

- Accept the manuscript without further revision
- Accept after revision
- Ask authors to resubmit
- Reject

An acceptance letter is sent to the author and the final manuscript is forwarded to production. Sometimes, the authors are requested to revise in accordance with reviewers' comments and submit the updated version or their manuscript to the Chief Editor. The time for review can be set to 2-8 weeks depending on the discipline and type of additional data, information or argument required. The authors are requested to make substantial revisions to their manuscripts and resubmit for a new evaluation. A rejection letter is sent to the author and the manuscript is archived. Reviewers might be informed about the decision.

After review a manuscript goes to the Copy Editor who will correct the manuscript concerning the correct referencing system, confirmation with the journal style and layout. When Copy Editor finishes his/her work they send manuscripts to the Layout editor.

Layout Editor is responsible for structuring the original manuscript, including figures and tables, into an article, activating necessary links and preparing the manuscript in the various formats, in our case PDF and HTML format. When Layout Editor finishes his/her job they send manuscripts to Proof Editor.

Proof Editor confirms that the manuscript has gone through all the stages and can be published.

This issue has 7 articles (6 original research and 1 review article). Our future plan is to

increase the number of quality research papers from all fields of cognitive research in science, engineering and education. The editors seek to publish articles from a wide variety of academic disciplines and substantive fields; they are looking forward to substantial improvement of educational processes and outcomes.

Editor in Chief
Ass. prof. Dr. Lazar Stošić

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RESEARCH OF COGNITIVE EXCHANGE SPECIFICS IN TEACHERS ACADEMIC TRAINING

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ABSTRACT

The paper discusses the transformation of the educational environment issues of university pedagogical subjects. The ideas of constructivism and connectivity, of moral philosophy and social psychology, are fundamental. By defining the content parameters of the educational environment in their dichotomous condition: reproducibility – proactivity; customization – dialogue; individualization – differentiation, this research highlights the specific characteristics of the learning process, which determine the qualitative cognitive exchange in the academic training of pedagogical subjects. A compound research is conducted of the learning by registering the self-assessment and the parallel-reflecting assessment of the students in the pedagogical specialties. The analysis of the results emphasizes the urgent need to change the traditionally established patterns in the organization of the teaching process in the higher pedagogical education, the application of student-oriented practices to stimulate self-organization in learning, the development of proactive technology incorporating the characteristics of formal and nonformal education in a networked and technological environment.

1. INTRODUCTION

In recent years, the topic of modernizing higher education undoubtedly attracts attention, as it unifies the interests of society in general and rationally becomes a socially significant issue. Efforts to resolve it are addressed both at the regulatory level and through the search, research, and implementation of innovative educational approaches and strategies.

The higher education institution in Bulgaria (Article 6 of the Higher Education Act) is a legal entity with the following activities: training of specialists able to develop and apply scientific knowledge in different fields of human activity; increasing the qualification of specialists; development of science, culture, and innovation.

As such definition, the activity subject of the higher education institution is also corresponding with the increasingly necessary lifelong learning approach, popular as "learning from the cradle to the grave".

It is unsatisfactory that in parallel with well-defined educational services/activities of the higher education institution, in recent years, unsatisfactory results have been registered in all educational levels. This is a disturbing symptom of the education system as it questions the "conditions in which learners acquire knowledge and skills" (Mavrodieva, 2009). It suggests an analysis of the ratio between the objectives set, the inputs, the actions taken, the results achieved and the impacts achieved.

A significant reason of working towards improving the quality of higher education training is also the report of the European Commission "Monitoring Education and Training 2017 – Bulgaria", which insists on "further improving both the applicability of higher education to the labor market thus and its quality".

The cited recommendation focuses on objectively clarifying the reasons for a significant disparity between the development of innovative education policies, adequate to the

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needs of the globalizing world, and the willingness (degree of competence) of university lecturers to implement them.

This contradiction is particularly acute about the issues of the educational environment transformation in university pedagogical subjects - as an environment that is at the output of the educational system and is committed to the production of competent specialists - future teachers. The methods used in their training "do not yet sufficiently contribute to provoking independency, expressed in self-organization, self-realization, self-evaluation" (Vardareva, Pashova, 2012).

The term "educational environment" (Yasvin, 2001), represents "the system of influences and conditions for forming the personality by a given model, as well as the possibilities for its development, contained in the social and spatial subject environment".

Placing the "learning environment" at the center of the forming work in the higher pedagogical education requires a well-founded system of criteria and indicators to record/assess its educational potential. This focuses on the study of the specific formative interactions that structure the cognitive exchange in the learning process and influence the group dynamics in the educational environment.

It is precisely this finding that justifies the research and practical-applied value of scientific research, the aim of which is to study the specifics of cognitive exchange in academic teacher training.

The following analysis identifies resources for enhancing the quality of cognitive exchange in the learning process by including internships of university lecturers as well as using external invasive technologies stimulating proactive thinking and behavior.

Fundamental determinants for the realization of qualitative cognitive exchange in the learning process are its characteristics in terms of reproducibility - proactivity, personalization - dialogue, individualization - differentiation. It is in their manifestation that the competences of the teacher are reflected:

- to regard the form of pedagogical communication;
- to refine the choice of educational technology;
- to consider the role of the personal factor;
- to update the pedagogical reflection in view of the current role-playing scenario.

The presented study is the result of an approbation of research activities conducted in 2018 at South-west University "Neofit Rilski" – Blagoevgrad, Bulgaria.

2. MATERIALS AND METHODS

Vital to this study are the ideas of constructivism and connectivity, as well as current developments in the field of moral philosophy and social psychology.

According to constructivist theory, man is constructed in the social environment. The psychological basis of constructivism brings forward a special relationship to the human physical and social reality and emphasizes the activity of man. By combining multiple philosophical and scientific views of an interdisciplinary nature, constructivism clarifies the peculiarities of man's actions as a self-organizing system. The point of reference for the acquisition of knowledge is the social interactions between the subjects in the learning process. Thus, the static approach to learning and training, which is also embedded in the ideas of connectivity, is actually overcome.

According to Connectivism theory (Siemens, 2005), in the information age, the learning process is characterized by:

1) Sociality of learning – knowledge is a dialogue between the teacher and other members of society, and the dialogue is secured with resources, dynamic and interrelated;

2) Collaborative understanding and creation of meaning and knowledge – Many and rapidly developing educational communities that foster a strong learning development from one another are being built;

3) Diversity – the structured and planned curriculum is defined as inappropriate, outdated and "outmoded";

4) The fundamental importance of relationships – the effect of networking has been proven;

5) Learning is not linear (cause-consequence), but circular (systematic) acquisition of knowledge – the basis of the learning process is self-organization.

On a personal level self-organization is defined as a process of constructing knowledge within the institutional and network environments "until they become internal goals and efficient motivators for action and personal thought" (Milenkova, Peicheva, Marinov, 2018).

These statements support the thesis that in the present time "agents of subjective activity are the practical skills of orientation and actions in an environment saturated with in-

formation media, thus the realization of this unconditional necessity implies a specific outline of the paradigm for changing the educational process in the Bulgarian educational system" (Dermendzhieva, 2006).

Nevertheless, current research in the field of education clarifies that:

- Knowledge is rather abundant and is incomprehensible – how to choose the best;
- Knowledge is not "inside" the institution but in human and computer networks;
- Learning is a process running in an unclear surrounding environment by changing elements that are not entirely subject to human control;
- Learning is increasingly being implemented on a variety of paths – through practical social communities, personalized networks, and ongoing tasks (Ivanov, 2011).

Capitalizing knowledge in today's education system is an investment in human resources. These ideas are multifaceted with Kurt Lewin – about the active and passive-adaptive tendencies in behavior motivation (Lewin, 1980), with Viktor Frankl – about the proactiveness of searching for significance (Frankl, 2000), with Stephen Covey – realizing self-values (Covey, 2010).

These social and psychological concepts fill with content the logic and acceleration of cognitive exchange in a proactive educational environment. Moreover, it reflects the procedural essence of the development of a qualitative educational process in which cognitive exchange achieves personally significant effects on the basis of complementing traditional know-how and know-what with know-where to find the necessary knowledge.

3. RESEARCH PROGRAM

For the purposes of this research, a program has been developed that covers the following stages:

- FIRST STAGE: *Inquiring the theoretical basis on the essence and characteristics of innovative educational approaches*: This stage involves systematic follow-up of literary sources and basic theoretical representations reflecting the multi-aspect of the ideas that are objectively related to the research problem.

- SECOND STAGE: *Development of research tools of the specificity of cognitive exchange in academic teacher training*: At this stage, the research methodology, which aims to typify the cognitive structure of the learning environment in higher pedagogical education, is investigated and justified. The focus of the study is the specificity of cognitive exchange in the learning process – with its generalization, dynamism and integral integrity. The understanding that the overall organization of the learning environment is based on the principles of the activity of the interacting subjects is confirmed.

This determines that the criteria introduced should have a higher degree of diagnostic capability to reflect the imminent trends, patterns, and peculiarities.

In this connection, the content of the educational environment is determined. They identify the components that are prioritized in the idea of the new educational paradigm for the subject-subjective interaction in the learning process. The same, for the purposes of the present study, are defined by their dichotomous conditionality:

- Reproducibility – proactiveness;
- Personalizing – dialogizing;
- Individualization – differentiation.

Their objective recognition is based on certain indicators through which their presence or absence is recorded in the learning environment (Table 1.).

Table 1. Content of the educational environment and indicators, structuring the cognitive exchange

№	Components	Indicators structuring the cognitive exchange
1	REPRODUSIBILITY– PROACTIVENESS	*Problem-based learning*: learning in context, understanding ideas and concepts through direct demonstration and research in a realistic context.
		Distributed learning: discovering the links between the different subject areas and the application of the material studied in different aspects of life.
		Cooperative based learning: Reconstruction of Knowledge through Networking learning.
		Inquiry-based learning: continuous observation, asking questions, making assumptions, testing hypotheses, formulating concepts.
		Game based learning: creating conditional situations with highly relevant context and dialog activity.
		Web-based learning: is a collection of all training activities that are used in the World Wide Web (WWW) and is the main component of eLearning.
		Incidental learning: performing tasks that unexpectedly deepen specific knowledge and skills.
		Student teaching: the student is in the role of a lecturer in a regulated environment.
2	PERSONALIZATION- DIALOGISING	Techniques for creating a favorable atmosphere: organization of communication.
		Grouping and regrouping techniques.
		Face-to-face interaction techniques: group work, teamwork, working with a partner.
		Energizing techniques for activating cognitive exchange.
		Techniques for generating ideas: brainstorming, associative cloud, mental maps, visualizations.
		Feedback techniques.
		Strategies for building a positive relationship: working in an information network, expert problem solving, interpersonal experimentation.
		Strategies for presenting personal creativity: the project method, the method of concrete situations.
		Strategies for developing individual competence: modeling, design.
		Strategies for constructing opinions and preferences: analysis, synthesis, selection of information, synergy.
		Group Analysis Strategies: Sharing, Comparing, Debating.
		Strategies for Developing Critical Thinking and Defending Ideas.
		Strategies for encouraging the student's initiative in constructing knowledge: Demonstration, conducting the activity into an appropriate regulated environment.
		Individual differences and fluctuations in the learning process are considered
		It is reported that the mental processes of learners are influenced by their social and cultural identity.
		It is approached with understanding when giving feedback.
3	INDIVIDUALIZATION– DIFFERENTIATION	Practices with ongoing self-assessment and refiection are used.
		Research, experimentation, independent study is encouraged.
		Contractual learning – training in real organizations based on contracts is applied.
		Volunteering in educational institutions is encouraged.
		Internship is applied.
		The involvement of students in learning communities and groups is encouraged.
		Expert learning is applied.
		Learning through experience.
		Learning through activities.
		Differentiates tasks according to learning styles.
		Provides time for consultation in real and virtual environments.
		Promoting interpersonal communication in the learning process.

- THIRD STAGE: *Researching the specificity of cognitive exchange in the educational process of the example of higher pedagogical education at South-West University "Blagoevgrad", Neofit Rilski.* At this stage the actual research of teachers and students from the professional fields 1.2. "Pedagogy" and 1.3. "Pedagogy of Training on ..." was conducted.

The aim of the research is to typify the cognitive structure of the learning environment in the higher pedagogical education. The subject of the study is the content parameters of the educational environment in the academic education of teachers in terms of: reproducibility-proactiveness; personalizing - dialogizing; individualization-differentiation.

The subject of the study is the specific formative interactions that structure the cognitive exchange in the learning process and influence the group dynamics in the educational environment. On the basis of the formulated content parameters of the educational environment, identical matrixes were developed as follows:

– "Matrix for Teachers` Self-Assessment of the Learning Environment" - records the main aspects of teaching practices as indicators of the quality of cognitive exchange in the learning process and reflects their attitudes and ideas for the application of innovative approaches in the educational environment.

– "Matrix for Students` self-assessment of the Learning Environment" – records the actual state of the learning environment as a system of influences and highlights the specific features of cognitive exchange, ensuring the acquisition of independent competency by the subjects in the pedagogical interaction.

In the operational aspect, a compounded study of teachers' self-evaluation and the parallel-reflecting assessment of the students is conducted. Teachers and students rating markers are measured by a three-dimensional scale:

- for teachers` self-assessment: (1) "do it"; (2) "do it partially"; (3) "do not do it" - see Table 2.

- for students` self-assessment: (1) "do it"; (2) "do it partially"; (3) "do not do it" - see Table 3.

Table 2. Matrix for Teacher Self-Assessment of the Learning nvironment

№	Factors-Criteria	Statements		
1	**REPRODUCIBILITY – PROACTIVENESS**	**1**	**2**	**3**
INDICATORS	I clarify the understanding of ideas and concepts through their direct demonstration and research in a realistic context.			
	I provide the conditions for discovering the links between the different subject areas and the application of the studied material in different aspects of life.			
	I encourage cooperative learning to re-construct knowledge through networking.			
	I encourage the students' experimentation and research activity through continuous observation, questioning, making assumptions, testing hypotheses, formulating concepts.			
	I create conditional situations with a highly relevant context and provoke dialogue with students in game situations.			
	I use the resources of e-learning to enhance the digital skills of students.			
	I set up performance tasks that unexpectedly deepen specific knowledge and skills.			
	I place students in the role of lecturers and allow them to manage the pedagogical process.			
2	**PERSONALIZING – DIALOGIZING**	**1**	**2**	**3**
INDICATORS	I organize communication with students by creating a favorable atmosphere for learning activities.			
	In the process of learning I group and regroup students thus, they can get to know each other's strengths and resources.			
	I organize face-to-face interaction through group work, teamwork, partner work.			
	I use stimulating exercises to activate cognitive exchange.			
	I use methods to provoke thinking and generate ideas: brainstorming, associative cloud, mental maps, visualizations.			
	I give feedback on the work and achievements of students and insist on receiving feedback on the communication process.			
	I develop skills for positive dependence in the learning process by encouraging work in an information network for expert problem solving and interpersonal experimenting.			
	I develop the experimental and research activities of the students through the project method, a method of concrete situations.			
	I integrate the students' previous experience in introducing new areas of knowledge by solving case studies, simulations, role-plays.			
	I develop individual competence through modelling, designing research tasks.			
	I give students the opportunity to argue opinions and construct their own judgments.			
	I encourage a group analysis: sharing, comparison, debating.			
	I develop skills for critical thinking and debating.			
	I encourage the student's initiative to demonstrate knowledge in an appropriately regulated environment.			
3	**INDIVDUALIZATION – DIFFERENTIATION**	**1**	**2**	**3**
INDICATORS	I consider the individual differences and fluctuations in the learning process.			
	I recognize the impact of the social and cultural identity of students.			
	I work on building up skills for current self-assessment and reflection.			
	I encourage research, experimentation and independent studies of students.			
	I support training in real organizations based on contracts.			
	I encourage student volunteering in educational institutions.			
	Exercise is applied.			
	I encourage the inclusion of students in learning communities and groups.			
	I apply practices for expert learning.			
	I apply experiential learning techniques.			
	I apply learning techniques by doing / acting.			
	I assign tasks according to the students' learning styles.			
	Provide time for consultation in real and virtual environments.			
	I encourage interpersonal communication in the learning process.			

Table 3. Matrix for Students` self-assessment of the Learning Environment

	№	Factors - criteria	Statements		
	1	**REPRODUCIBILITY – PROACTIVENESS**	1	2	3
INDICATORS		The teacher helps to understand ideas and clarify concepts by direct demonstration and research in a realistic context.			
		The teacher provides the conditions for discovering the links between the different subject areas and the application of the studied material in different aspects of life.			
		The teacher assigns tasks for group work, teamwork and networking.			
		The teacher requires the results of continuous observation of objects and phenomena; self-constructing questions and making assumptions; evidence from hypothesis testing and formulation of concepts.			
		The teacher uses the gaming methods in the learning process.			
		The teacher applies ICT in training and stimulates the enhancement of students' digital skills.			
		The teacher puts out non-standard, atypical implementation tasks that inadvertently deepen specific knowledge and skills.			
		The lecturer reasserts his role as a student and allows them to manage the pedagogical process.			
	2	**PERSONALIZING – DIALOGIZING**	1	2	3
INDICATORS		The teacher creates a favourable atmosphere for learning activity.			
		The teacher assigns tasks to groups and always rearranges their composition.			
		The lecturer includes students in group work, teamwork, partner work.			
		The teacher uses specific exercises and diversifies the activities to keep the students' attention.			
		The teacher provokes thinking and encourages the generation of ideas using brainstorming, associative cloud, mental maps, and visualizations.			
		The teacher gives feedback on the work and achievements of students and insists on receiving their feedback on the communication process.			
		The lecturer encourages students' work in information networks to expertly solve tasks and develops skills for interpersonal experimentation.			
		The lecturer develops the experimental and research activities of students by assigning group and individual project activities.			
		The lecturer examines the available experience of the students and only then introduces them to new areas of knowledge.			
		The teacher stimulates individual competence through modelling, designing research tasks.			
		The lecturer provides an opportunity for students to give feedback and construct their own ideas.			
		The teacher provokes a group analysis by inviting students to share, compare views, and debates.			
		The teacher develops critical thinking skills and asserts his / her own ideas.			
		The teacher provokes the student's initiative to demonstrate their knowledge to the academic community.			
	3	**INDIVDUALIZATION – DIFFERENTIATION**	1	2	3
INDICATORS		The teacher works individually with students experiencing learning difficulties.			
		The teacher respects the social and cultural identity of the students.			
		The lecturer works on building up skills for ongoing self-assessment and reflection.			
		The lecturer encourages the study, experimentation and independent studies of students.			
		The teacher supports training in real organizations based on contracts.			
		The teacher encourages student volunteering in educational institutions.			
		The teacher recognizes the role of the professional-pedagogical experience in the specialty.			
		The teacher informs students about functioning learning communities and groups.			
		The teacher knows the strengths of the students and skilfully uses this expertise in assigning group tasks.			
		The teacher applies experiential learning techniques.			
		The teacher applies learning techniques by doing / acting.			
		The teacher assigns assignments according to the students' learning styles.			
		The lecturer provides consultations in a real and virtual environment.			
		The teacher encourages interpersonal communication in the learning process.			

The data obtained ensures an objective analysis as they provide data from a parallel study of both parties (trainer, trainee) in the higher education process.

- FOURTH STAGE: *Analysis of results and identification of resources for enhancing the quality of cognitive exchange in the learning process*: the results obtained are summarized and systematized in order to realize the need to transform the educational environment; rethinking past pedagogical practices in academic teacher education; responding in a timely manner to the users of educational services in a dynamically changing world.

4. RESULTS, ANALYSIS AND DISCUSSIONS

4.1. Analysis of the theoretical basis on the essence, characteristics, and effectiveness of innovative educational approaches in the academic teacher education

In the field of higher pedagogical education, the quality of educational services is proportional to the effectiveness of cognitive exchange in the learning process. This interpersonal relationship is based on the recognition that "quality" is a term of cultural values that are constantly developing and negotiating.

Thus, this dynamic characteristic of the term "quality" provides a methodological platform for professional discussions at a national and international level and it provides a basis for the methodological expertise of effective educational policies and approaches.

In the process of their selection and analytical interpretation, both the characteristics of the modern society in terms of information technology, technology, digitization, artificial intelligence are considered; globalization, alienation, multicultural diversity, etc., as well as their explanatory theoretical concepts.

Indeed, the most popular among them are the theories of constructivism with representatives of Lev Vygotsky (Vygotsky, 2004), Jean Piaget, (Piaget, 1992), John Dewey (Dewey, 1997), the concepts of the integral society of Michael Laitman and Anatoly Ulyanov (Laitman, Ulyanov 2011), the research of the movement of society and the changing knowledge base - "knowledge capacity" by Gordon Moore (Isaacson, 2014); (Siemens, 2005), Richard S. Florida's Creative Class (Florida, 2017), Charles Landry's Creative City (Landri, 2005), Creative Schools (Robinson, Aronia, 2017) etc. A unifying motif in the analysis of the stated theories is the striving to advance and embrace the innovative educational approaches necessary for the qualitative professional training of the students - future teachers.

The marked features of modern society highlight the attributes of cognitive exchange in the learning environment.

In the context of this study, the specificity of cognitive exchange (deployment method) reveals the tendencies in subjects' reaction to events in the learning process and highlights their interpretations of future behavior in the learning environment. This dialectical attachment implies that both the intrinsic (attitudes, character, disposition of the subjects) and the external (managing the actual educational situation) attribute function is crucial for the quality of cognitive exchange in the learning process.

4.2. The research results of the specificity of cognitive exchange in the academic process of the academic teachers training

The research covers 30 teachers and 140 students, a total of 170 representatives of 15 majors in the fields “Pedagogy” and “Pedagogy of training in sectors and types of sciences”.

Differentiated as Component 1, the criterion "Reproducibility - Proactiveness" (Table 4, Diagram 1) denotes the polarity of applied pedagogical approaches in the educational environment:

- the traditional one, guaranteeing a safe working basis and preferred by the teachers who "do not think it is necessary to continuously analyze and enrich their own teaching experience" (Stošić and Stošić, 2013);

- and the interactive, complementary roles in cognitive exchange, because it "allows partners in the relationship to identify themselves and others correctly, accurately embody the expected roles and play them appropriately" (Tasevska, Kaleynska, Dyankova, 2015).

As a basic feature of the learning environment, we define the dynamics of reproducibility-proactivity because we are con-

vinced that it is "the synergy of planning and management processes that is a solid basis for modeling a perspective concept in educational institutions" (Mirascieva, Koseva, 2018) focused on the quality of educational services.

Table 4. Results. Factor 1 „Reproducibility – proactiveness"

№ of indicators in the assessment Matrix	Do it	Do it partially	Do not do it
	Does it	Does it partially	Does not do it
1	78%	18%	4%
	49%	31%	10%
2	85%	13%	2%
	56%	35%	9%
3	87%	8%	5%
	38%	43%	19%
4	95%	3%	2%
	68%	30%	2%
5	68%	14%	18%
	30%	55%	15%
6	73%	19%	6%
	45%	52%	3%
7	54%	46%	0%
	19%	68%	13%
8	82%	11%	7%
	37%	53%	10%

Legend:

Teacher	Student

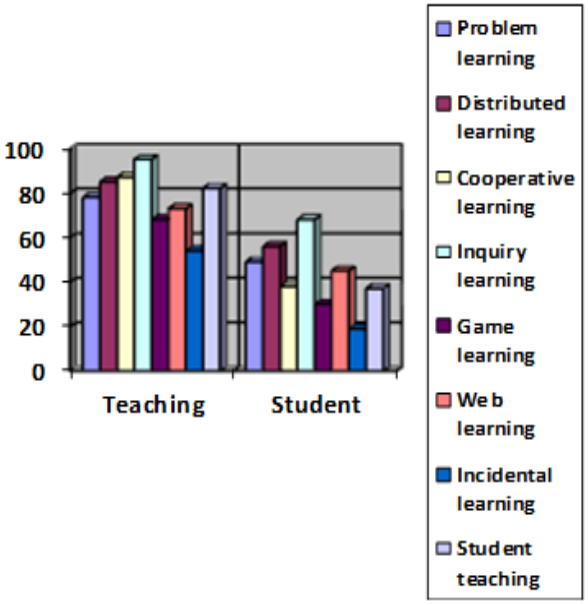

Diagram 1. „Reproducibility - Proactiveness"

The second factor-criterion in the assessment matrixes is the Personalization-Dialogization component, which aims to examine how cognitive exchange influences the search of meaning in the learning process (Table 5, Diagram 2).

The fundamental thesis is that learning is a dialogue and at the same time it is oriented towards the individual participation of the students. In the focus of the learning process are researches, problem formulation and collaboration with others. The role of the lecturer is crucial to stimulate, to facilitate the variety of learning activities in which students analyze the links between the facts and conceptualize new knowledge.

Table 5. Results. Factor 2 "Personalization-Dialogizing"

№ of indicators in the assessment Matrix	Do it	Do it partially	Do not do it
	Does it	Does it partially	Does not do it
1	82%	18%	0%
	45%	33%	22%
2	64%	28%	8%
	38%	22%	40%
3	76%	22%	2%
	35%	23%	42%
4	18%	43%	39%
	13%	24%	63%
5	67%	33%	0%
	26%	18%	56%
6	86%	14%	0%
	35%	43%	22%
7	79%	19%	2%
	31%	23%	46%
8	96%	4%	0%
	24%	49%	27%
9	100%	0%	0%
	67%	33%	0%
10	100%	0%	0%
	65%	33%	2%
11	100%	0%	0%
	68%	22%	10%
12	94%	6%	0%
	47%	38%	15%
13	95%	5%	0%
	38%	48%	14%
14	83%	13%	4%
	36%	51%	13%

Legend:

Teacher	Student

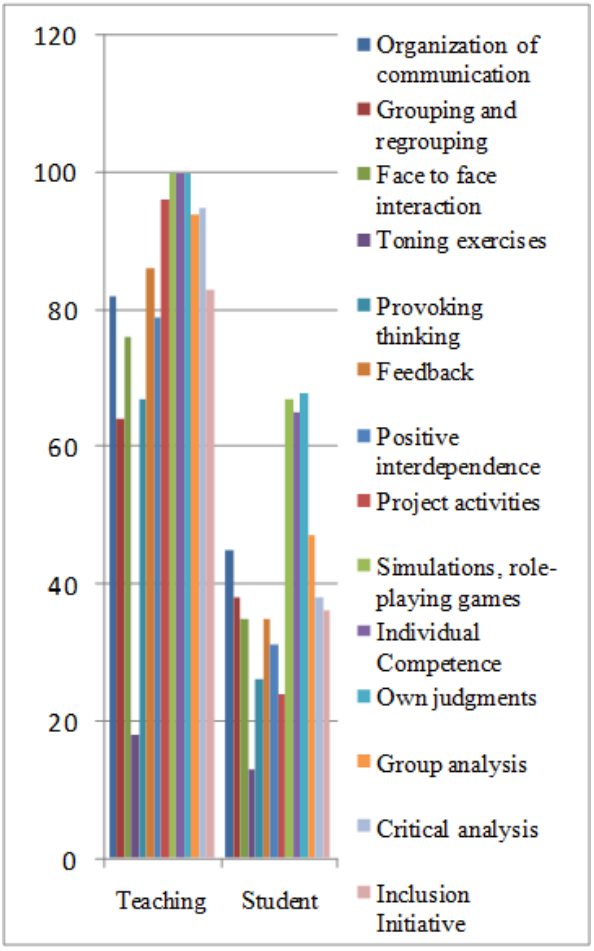

Diagram 2. Personalization-Dialogizing"

As the third component in the content parameters of the educational environment is determined the Factor-Criterion "Individualization-Differentiation" (Table 6, Diagram 3).

The focus is on the individual differences and the choice of technology to implement pedagogical interaction, given the preferred learning style (visual/verbal, consistent, global).

Resource-based teaching strategies are also explored in the context of practical activities in a real environment: volunteering, professional experience, contracts with employers, inclusion in learning communities, in personalized and technological networks.

Table 6. Results. Factor 3 "Individualization - Differentiation"

№ of indicators in the assessment Matrix	Do it	Do it partially	Do not do it
	Does it	Does it partially	Does not do it
1	78%	22%	0%
	56%	15%	29%
2	72%	28%	0%
	62%	10%	28%
3	81%	2%	17%
	69%	11%	20%
4	76%	24%	0%
	51%	18%	31%
5	67%	23%	10%
	32%	19%	49%
6	69%	15%	16%
	45%	27%	27%
7	95%	5%	0%
	61%	7%	32%
8	73%	22%	5%
	63%	17%	20%
9	84%	26%	0%
	31%	35%	34%
10	59%	37%	4%
	27%	24%	29%
11	63%	37%	0%
	35%	23%	32%
12	72%	22%	6%
	46%	27%	27%
13	100%	0%	0%
	94%	6%	0%
14	100%	0%	0%
	98%	2%	0

Legend:

Teacher	Student

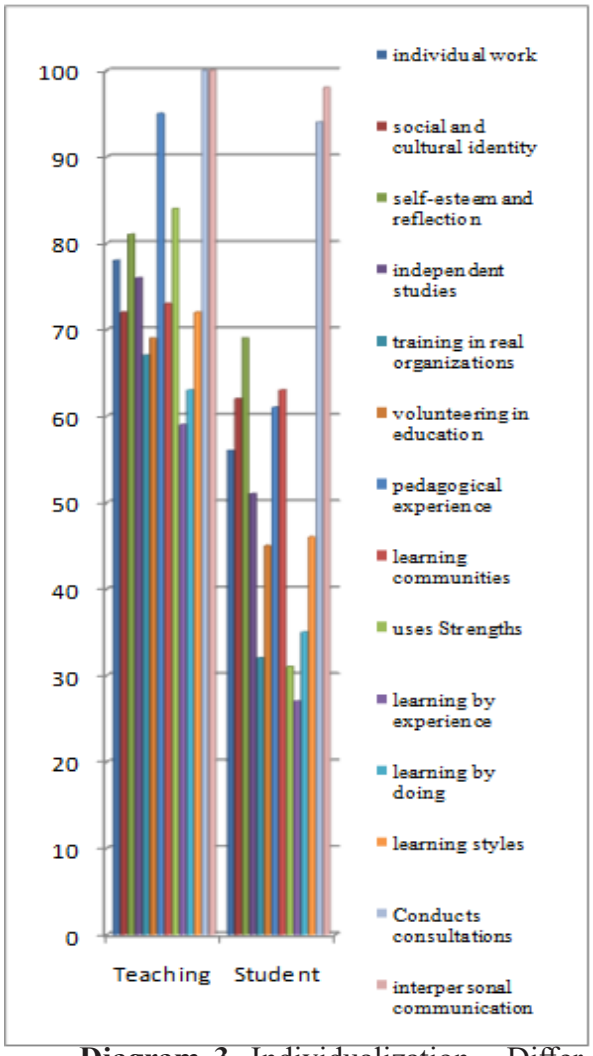

Diagram 3. Individualization - Differentiation

4.3. Analysis of results and discussion

Analysis of results and discussion of the effects of the study is based on data processing from the two main tools:

- "Matrix for Teachers` Self-Assessment of the Learning Environment"

–"Matrix for Students` self-assessment of the Learning Environment"

It is important to note that the study provided specific data on the approaches and work methods of each of the teachers included in this research, however here the summarized and analyzed information is finally commented.

The tabular and graphical results representation of the first factor-criterion "Reproducibility-Proactiveness" reveals a very colorful picture in terms of value.

The impression is that values that report the high level of active practice indicators in the learning process predominate in teacher self-assessment. Their variation in the "Do It" column ranges from 54% to 95%.

Conversely, their low level of performance ranging from 19% to 68% (reflected in the "Do It" column) is observed in the student assessment.

The analytical interpretation of the data outlines the paradoxical state of higher pedagogical education:

- *on the one hand, the teachers state that they are conducting a learning process oriented towards active practices with the students;*

- *on the other hand, findings from students' opinions reveal a reverse tendency, namely, low satisfaction with their use in the learning process.*

An explanatory approach to the observed discrepancies in the percentage ratio of the marked claims is found in the typical trends of this type:

- *the self-assessment* is a process in which the subjects unconsciously choose those statements in the reflecting scale, which rather express the DESIRED behavior;

- *the assessment* is a process where subjects predominantly focus on FACTS, reflecting difficulties in implementing the "expected" behavior.

It is the conditional observation of these two tendencies that makes it possible to objectively observe the fact that in the higher pedagogical education, *despite the insufficient categorization of the indicators that consider the active practices in the educational process, the reform for the introduction of proactive pedagogical technologies has started.*

An additional justification for this statement is the students' record in the "Does it partially" column, which reports relatively high values of Active Practice indices - ranging from 30% to 68% - against the low data values in the "Does not do it", ranging from 2% to 19%.

At a brief glance, this internal correlation in this analysis reflects the actual orientation of part of the teachers towards the active practices in the learning process.

In concrete, their implementation is examined through the results of the additional Factors-Criteria "Personalization - Dialogization" and "Individualization - Differentiation".

The indicators that structure the cognitive exchange in such researched parameters reveal two layers of analysis:

- *First, teachers' willingness to direct*

the system of influences in the learning process to the leading cognitive sphere analysis systems (visual, auditory, and kinetic).

Of key importance here are teachers and students markers confirming the application of specific techniques: organization of communication; for grouping and regrouping; for face-to-face interaction; energizing and toning; to provoke thinking and to generate ideas in the process of sharing and debating; to give feedback; for critical analysis; to formulate own through simulations, visualizations and role-plays; to discover the links between the facts on the basis of the student networking initiative. All of these determine the effective formative interactions of cognitive exchange.

The results processing again reveals high values of the 18% to 100% teachers markers in the "do it" column against the reflecting students' scores of 13% to 68% in the "Does it" column and 28% to 51% in the " Does it partially ".

Alarming is the varying student rating in the "Does not do it" column because its numerical values are ranging from 0% to 53% and reflect the questionable manifestation of the discussed effective techniques for organizing the cognitive exchange.

The objective interpretation of the registered data reveals an insufficient manifestation of the changes aimed at personalizing and dialogizing the pedagogical process.

Secondly, in the context of this research, this means that the overall organization of the educational environment is considered low level:

- in enhancing subject-subjective character in the learning process;
- in stimulating student initiative and pedagogically appropriate targeting;
- in the improvement of the ratio between the frontal, group and individual forms of organization of the pedagogical process.
- *Second: the willingness of university lecturers to structure the cognitive exchange on the dynamics of their attributive functions, activating thinking and experience as a single act of knowledge through communication, research, practical application.*

Referring here are the statements affirming that the activity of the individual and group subject of the activity "manifests not so much in the process of performing the activity as in the moments of its self-development, its progressive development when it is formed, unfolded and transformed" (Dimitrov, 2012).

In this regard, the research aims at exploring key indicators that determine the individualization and differentiation of subjects in the learning process. The quantitative dimension of their manifestation reflects their degree of importance on the effectiveness of cognitive exchange in the learning environment.

The tabular representation of the coefficients obtained in the assessment matrixes reveals an inaccuracy in the degree of indicators occurrence.

In the matrix of teachers self-assessment with a high percentage (59% to 100%) is the marker in the "Do It" column.

On the other hand, the registered low values in the student assessment matrix rebut the realism of the applied teaching skills to apply approaches and practices for individualization and differentiation in the learning process.

Excluding the values of the last three indicators, this is evidenced by the students register in the scale with the following possibilities:

- „Does it" – from 27% to 63%;
- „Does it partially" – from 2% to 65%;
- „Does not do it" – from 4% to 31%.

The discussed correlation ratios in the students' assessment of the application of approaches and practices for individualization and differentiation in the learning process reveal rather low levels of expression in the learning environment.

In its third approximation, the analysis of the results highlights the urgent need for:

- changing the traditionally established models in the organization of the teaching process in the higher pedagogical education;
- applying student-oriented practices to stimulate self-organization in learning;
- the creation of a proactive technology that combines the characteristics of formal and non-formal education in a networked and technological environment.

5. CONCLUSIONS

Summarizing the key educational environment parameters determine it as a factor mediating the processes of self-assessment, reflection, and self-organization in pedagogical interaction. The purpose of this current wording is to transform cognitive exchange into the academic training of future teachers.

The thesis that the proactive learning environment is the necessary and sufficient condition ("Sine qua non") in the process towards the achievement of cognitive efficiency in education is strongly supported.

In summary, the actual content of the proactive learning environment can be derived:

In the foreground, the procedural authenticity (connectivity) of the subjects, which is based on sharing, comparison, and debate. As natural mechanisms of cognitive exchange, these phenomena allow the subject not only to specify its own meanings but also to help others to specify their meanings.

This environment provides the conditions for maximum personalization of the learning process by transforming the traditional transmission process of educational communication into an organic and authentic dialogue.

Indeed, the acquisition of independent (autonomous) competence by the subjects in pedagogical interaction is a key determinant and indicator of the quality of the cognitive exchange in the learning process.

The inherent potential of the proactive educational environment is indisputable:

- to promote learning in the context of intensive interaction;
- to support the full use of available resources;
- overcome barriers to interpersonal communication;
- Produce skills acquisition for concentrated employment and enhanced collaboration.

These qualitative features designate the proactive educational environment as a technology platform that imposes the need for educational services in modern conditions.

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INVESTIGATING TEACHERS' PERCEPTIONS OF THEIR OWN PRACTICES TO IMPROVE STUDENTS' CRITICAL THINKING IN SECONDARY SCHOOLS IN SAUDI ARABIA

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ABSTRACT

This study aims to investigate teachers' perceptions of strategies they adopt to help their learners develop their critical thinking skills and how coherent their classroom practices are with their perceptions. The study was conducted with teachers in secondary schools in Saudi Arabia. Primary data in the form of questionnaire results, classroom observation notes and interviews was gathered to attain this goal. A total of three all-male schools participated in the study with 82 teachers completing the questionnaire, and 12 teachers (four from each school) being interviewed and observed during their classroom work. The findings suggest that positing open-ended questions to the class, focusing on performance tasks, and comparing and contrasting different perspectives were the most beneficial teaching strategies to foster students' critical thinking skills. The findings also highlight that these capabilities are affected not only by the teaching practices, but also by other factors related to the broader academic environment, such as school resources. The results of the present study may help secondary teachers to select and implement teaching strategies and consider factors that may lead to an improvement in students' critical thinking skills. While this study focuses exclusively on teachers working in the secondary schools in Saudi Arabia, some of the findings can be potentially transferable to other similar educational contexts.

1. INTRODUCTION

Critical thinking is believed to be one of the crucial skills that should be taught to students in academic settings (Hooks, 2010). This is rationalised by the fact that critical thinking not only improves the overall degree of information acquisition - and therefore students' cognitive abilities (Tsankov, 2017) - but also augments the degree to which students are able to scrutinise knowledge related to particular and diverse disciplines, such as English language, history and biology (Hooks, 2010). However, despite the importance of this concept, the existing body of knowledge regarding the most helpful teaching practices to enable the development of critical thinking skills is still comparatively limited when compared to other aspects related to teaching, such as motivation or assessment. For instance, the outlined problem was partially addressed in the works of authors such as Brookfield (2012), Smith et al. (2018) and Larsson (2017). Nonetheless, these studies lacked an in-depth examination of why and how the specific teaching methods and initiatives affected the critical thinking capabilities of the students (Brookfield, 2012). This lack of insight into teachers' classroom practices and strategies to promote critical thinking is addressed in the current study.

Teaching critical thinking presents a significant challenge in environments undergoing radical changes in their academic practices and policies. Saudi Arabia can be considered an example of a context going through such changes. Significant efforts have been made in Saudi Arabia to bring it in line with other

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countries where there have been changes in the educational approaches; an example of this is the introduction of new technologies and the use of social networks to facilitate teaching and learning. However, the governmental bodies in Saudi Arabia still hold considerable administrative control over all aspects of the national education system and this has sometimes negatively affected the quality and the development of educational practices in a variety of levels (Algarfi, 2010). The approach to education in the country is still largely characterised as 'traditional' since memorisation of textbooks remains the most common teaching and learning practice. According to Algarfi (2010), this is one of the main reasons behind the lack of self-criticism in the Saudi society. Posing 'why-questions' is still seen as form of rebellion and generally considered culturally inappropriate, negative, and prone to generate uneasiness among individuals. Al Lily (2018) argues that in the Saudi society, it is a 'norm' or even a 'value' not to acknowledge the negative aspects and the weaknesses of their society. In other words, it seems there is a widely spread belief that it is okay to make a sin, as long as you do not admit it and do not talk about it.

Alaqeel (2013) establishes that helping students think critically and develop their skills in observation and analysis is one of the main aims of secondary school education. Although there are studies conducted in Saudi Arabia that acknowledge the importance of teaching students critical thinking skills and training teachers to implement strategies to attain this goal (Alghamdi et al., 2013; Allamnakhrah, 2013; Alwadai, 2014), there are still very few studies that aimed to investigate effective and useful teaching practices that may promote the development of learners' critical thinking skills. The findings of this study may help teachers to decide on the most useful teaching practices to enable the development of critical thinking skills and positively affect students' learning.

According to Aldiab et al. (2017) and Alothman et al. (2017), there exists a substantial drive for the implementation of new teaching technologies and innovative teaching practices in the Saudi Arabian academic sector. In addition, the government of Saudi Arabia has recently initiated a large-scale educational reform project aimed at improving the school curricula and teaching competencies (Nazer, 2017). These governmental decisions and policies have very practical implications for Saudi Arabian teachers who now face a wide variety of pressures from the stakeholders involved in the educational process to deliver results in terms of student performance. This may create a conflict in terms of adhering to new curricula, implementing innovative technologies, and at the same time trying to foster critical thinking. The findings of this study may be inapplicable to other countries, limiting the generalisability of the current research; however, they are certainly significant in the Saudi context and may be equality relevant in other similar teaching environments.

The main aim of the study is to identify the most frequently adopted teaching practices for improving the critical thinking skills of Saudi students in secondary schools. Its main objectives are:

1. To identify in the literature the most common teaching practices employed to foster students' critical thinking skills.
2. To identify the most effective teaching practices employed by teachers to develop the critical thinking skills of the secondary school students in the research setting.
3. To examine the extent to which the Saudi teachers believe that their students are able to use critical thinking skills in their studies.
4. To provide Saudi teachers with recommendations on how the students' critical thinking skills could be improved in the classroom.

2. LITERATURE REVIEW

2.1. Models and Definitions of Critical Thinking

It is believed that critical thinking mainly refers to the cognitive processes related to information processing and evaluation (Salmon, 2013). Through critical thinking, an individual is able to make inferences based on the provided data and evaluate the available knowledge with respect to the dimensions of validity, reliability and generalisability (Salmon, 2013). One critical remark against this definition is that there exist a wide variety of skills, models and approaches to critical thinking, such as induction, deduction and abduction (Black, 2013). However, the overall goal of these models is to establish valuable conclusions and implications from the information available to the inquirer (Black, 2013).

Another perspective on critical thinking is that this skill serves as a tool for decision-making (Innabi, 2003). This entails that critical thinking is generally seen as an essential skills in cases in which an individual is required to make a choice based on the facts available in the macro-environment (Innabi, 2003). Overall, it can be stated that critical thinking is required both in the academic setting, in which this dimension directly affects learning and comprehension, and in everyday life due to the need to consume and synthesise large amounts of information (Hughes and Lavery, 2015). That said, the success of critical thinking is largely dependent on the cognitive skills and abilities possessed by a particular individual (Hughes and Lavery, 2015). Thus, critical thinking constitutes a mastery, which is achieved through possessing and developing mental capabilities related to understanding as well as by objectively evaluating insights from different sources (Hughes and Lavery, 2015).

Among these competencies, it is possible to distinguish specific micro-skills: having a reflective stance towards all information available on a certain topic, being capable of following a pre-determined approach to logical thinking (be it induction, deduction and abduction), and implementing the outlined processes in practice (Glaser, 1941). The importance of critical thinking skills is high in academic settings in which students are regularly required to reach their own conclusions from the evidence provided by academic sources and teachers (Ennis, 1962). On the other hand, it is admitted that while the aforementioned critical thinking capabilities could be innate, there is a great degree of emphasis on teaching the students to display a higher degree of critical thinking to raise their academic competency and improve their overall life skills (Ennis, 1962).

Critical thinking could be conceptualised through distinct frameworks and models, such as the process-based approach proposed by Nosich (2012) (Figure 1).

Figure 1. Process-Based Approach to Critical Thinking (Nosich, 2012, p.37)

Nosich (2012) reported on the elements, the procedures related to general cognition and on making inferences from the available data. While these processes form the core of critical thinking, there are also general and discipline-specific standards that serve as filters for the results of the initial critical thinking process. For example, the existing body of knowledge on the subject suggested that the standards may be related to six characteristics, namely background insight, understanding, implementation, evaluation, integration and appraisal (Jackson and Newberry, 2011). The key implication of this result was that in order to display developed critical thinking skills, students had to adhere to strict guidelines regarding the consumption of information (Jackson and Newberry, 2011). In turn, the degree, to which the inquirers were able to elicit their own understanding through the outlined dimensions could be augmented by the academic professionals by employing specific teaching practices and initiatives (Jackson and Newberry, 2011). Nonetheless, since the framework of Nosich (2012) was discipline-specific, it is implied that critical thinking strategies may go beyond the findings reported by Jackson and Newberry (2011). By relying on the discussed models, the study is limited in terms of its explanatory power concerning phenomena related to critical thinking and academic outcomes.

There also exists an alternative approach to modeling critical thinking, which advocates that all inquirers go through six stages of critical thinking mastery (Paul and Elder, 2013). More specifically, such a transformation passed through the phases of being an unreflective, challenged, beginning, practicing, advanced and master thinker (Paul and Elder, 2013). Although this conceptualisation is justified in that it covers the major steps towards critical thinking development, it is ambiguous whether the stages are applicable to all inquirers irrespective of their cognitive abilities (Moon, 2007). Moreover, the framework of Paul and Elder (2013) posited that external influence was required for students to begin developing their critical thinking capabilities. While this may be justified, this would place the motivational focus of learning critical thinking almost entirely on outside factors, such as teachers and the academic curriculum (Moon, 2007). It is unknown whether this is applicable to all possible educational cases, which is why the models of Nosich (2012), and Jackson and Newberry (2011) are adopted as central to the aims and objectives of the study.

2.2. Influence of Teaching Practices on Students' Critical Thinking Skills

Researchers and educators have advocated for some key teaching practices and strategies aimed at improving students' critical thinking. For instance, using mixed educational tactics and flipped classroom models were considered as highly beneficial methods by Smith et al. (2018). The empirical evidence gathered by the researchers suggests that integrating critical thinking strategies into the curriculum of the disciplines was a reasonable way of enhancing students' critical thinking capacities (Smith et al., 2018). A similar result was achieved by placing theoretical lectures outside of regular classroom activities and instead focusing on practical assignments which would traditionally be considered as homework (Smith et al., 2018). Additional support to the above ideas was given by Petek and Bedir (2018) who noted that integrating critical thinking teaching into the school disciplines (e.g. teaching English) was a valid tactic to improve educational outcomes related to critical thinking. Important as the works of Smith et al. (2018) and Petek and Bedir (2018) are, the issue of the applicability of the outlined practices to the setting of this study (Alamri, 2011). It remains an issue due to the cultural and educational differences between their research settings and the Saudi Arabia context.

A different approach towards fostering critical thinking in the academic setting was suggested by Larsson (2017) who focused on phenomenography as a teaching method. Phenomenography was defined as a process of comparing and contrasting different methods of understanding a particular piece of information (Larsson, 2017). Nevertheless, the caveat of the study of Larsson (2017) was that this article only focused on one task. Another unique method of improving students' critical thinking skills was posited by Cargas et al. (2017). The researchers argue that establishing difficult performance tasks across academic disciplines in which the students are faced with a pre-determined problem and are asked to develop their own solutions, works as a positive driver for critical thinking. However, the authors only provide a small sample of performance tasks.

It is also believed that frequently asking evaluative questions in class regarding the current discipline-specific assignments faced by the students could provide the learners with sufficient material and motivation to improve their critical thinking (Browne and Freeman, 2000). This could be expanded further by relying on engagement and active pedagogy. Two possible examples of the teaching practices associated with these dimensions are mentoring (one-to-one teaching) and initiating dialogues with the classroom with the aim of encouraging critical thinking (Gottesman and Hoskins, 2013). The key implication of these arguments is that in order to develop critical thinking capabilities the learners have to be put into academic environments in which individual participation and finding their own resolutions to the classroom tasks are encouraged.

Additional support to the ideas of Browne and Freeman (2000) was provided in the empirical investigation conducted by Boa et al. (2018). It was reported that a dialectic approach called Socratic Questioning was a valuable technique for augmenting students' critical thinking capabilities (Boa et al., 2018) and intellectual independence (Arsić, 2014). More specifically, this paradigm consists of establishing a dialectic environment in the classroom through encouraging student-to-student and student-to-teacher dialogue and verbal exchange of ideas (Boa et al., 2018). Consistent with the results of the above discussions, there is a substantial body of knowledge confirming that problem-based teaching is beneficial for critical thinking (Carter et al., 2016). Nevertheless, it is also stated that the impact of teaching practices on the skills displayed by the students may be inconsistent due to the influence of mediating factors related to the overall academic environment (Carter et al., 2016).

The literature on teaching practices for critical thinking highlights some practices that are frequently adopted. For example, maintaining a positive classroom atmosphere is cited by Anderson (2004) as a significant influence on the rates of student development, including critical thinking. The teachers are encouraged to foster positive relationships with the students and reformulate their feedback from explicit criticism to positive encouragement (Anderson, 2004). Similarly, Copeland (2005) also noted that students' reaction to verbal praise was highly positive. Through such dialogue between the teacher and the inquirer, the student became more receptive towards the concepts and ideas taught by a specific tutor or within a particular discipline. On the other hand, the interpersonal generalisability of the suggestions made by Anderson (2004) and Copeland (2005) is questionable. For instance, it is possible that some students may pay less attention on the perceptions of the

teachers and instead be more focused on their self-efficacy.

One critical remark that can be made against the above assertions is that implementing the discussed measures may be challenging and resource-intensive. An example of this was made by Urcola-Pardo et al. (2018) who acknowledged that although activities related to critical thinking were beneficial in the classroom, focusing on these tasks effectively inhibited the students' ability to focus on the demands posited by the regular curriculum. An analogous argument is made by Lee (2018) who reveals that complex behavioural changes were expected from students to increase their critical thinking skills, which could require time and a substantial amount of academic effort. Although the relevance of these shortcomings within the Saudi Arabian sector still remains unknown, the points made above may serve as valid explanations for the findings of this study.

2.3. Framework of the Study and Research Hypotheses

Adopting Nosich's (2012) concept of critical thinking as processbased approach, critical thinking mainly consists of elements, standards and discipline-centric factors. These are conceptualised as a sum of factors related to more specific factors: background insight, understanding, implementation, evaluation, integration and appraisal. In this study, critical thinking is also seen as influenced by the teaching practices adopted in the research setting. These methods include, but are not limited to, encouraging dialogue, establishing a positive classroom atmosphere, integrating critical thinking teaching into discipline curricula and providing the students with problem-solving tasks.

Figure 2 provides a graphical overview of the framework of the study.

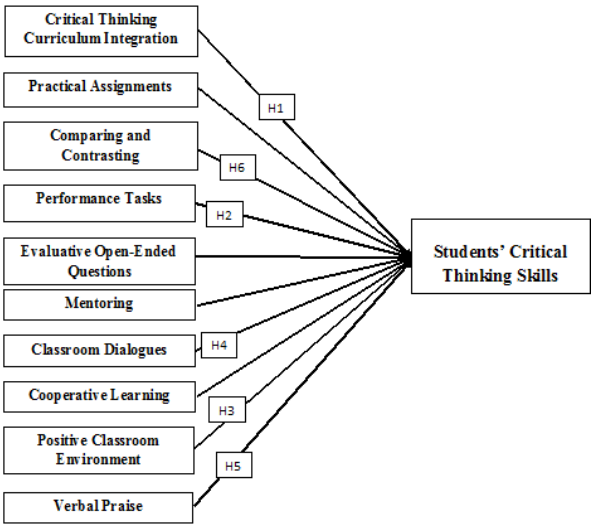

Figure 2. Framework of the Study

The following research hypotheses are formulated on the basis of the above model. Only the most interesting and relevant units of analysis are included in these assertions.

H1: Using mixed educational tactics enhances the students' critical thinking capabilities.

H2: Establishing performance-based tasks enhances the students' critical thinking capabilities.

H3: Establishing a positive classroom atmosphere enhances the students' critical thinking capabilities.

H4: Encouraging dialogue within the classroom enhances the students' critical thinking capabilities.

H5: Relying on positive verbal feedback enhances the students' critical thinking capabilities.

H6: Explicitly comparing and contrasting different points of view enhances the students' critical thinking capabilities.

3. METHODOLOGY

3.1. Data Collection and Sampling

This study adopted the mixed methods research strategy by distributing a self-administered questionnaire form to the teachers of secondary schools in the Alhafouf region of Saudi Arabia, conducting interviews with selected teachers and observing classroom activities in the secondary schools (Creswell and Creswell, 2017; Bryman and Bell, 2015). In terms of sampling, three schools participated in the project. Eighty two teachers from these schools completed the questionnaire form

while four teachers from each school out of these 82 respondents were randomly selected for the qualitative interviews and classroom observations. It is admitted that the study follows the non-probability convenience sampling strategy (Daniel, 2012), which may be considered one of the shortcomings of this investigation. Although it is not possible to generalise findings, it is important to mention that the way education is structured in Saudi Arabia has an impact on the general transferability of samples in educational research. This is due to the fact in the highly centralised Saudi educational system; all schools in the country must follow exactly the same curriculum, adopt the same teaching approaches and processes, and employ the same testing instruments and assessment criteria.

In order to increase the reliability of the data collection instruments, the questionnaire and interview questions were revised and adjusted according to the input received by another academic in the field. According to Cohen et al (2011), such steps can potentially increase the internal validity of the research tools. Similarly, a sample of the qualitative and quantitative data analysed was submitted to an experienced academic in the field of education for a reliability check. No significant discrepancy was found in the categorisation or in the analysis of the findings. External validity, on the other hand, could be considered and issue since it is very difficult to generalise the findings of the present study. Instead, I adopt here the concept of transferability (Guba and Lincoln, 2005), which refers to the extent to which the readers of a piece of research can apply its findings to understand their own contexts. As a result, although the generalisability of these findings can be considered low, the potential for transferability to other similar schools in Saudi Arabia and in countries in which cultural background and educational practices are similar may be much higher.

Low levels of reliability, validity and trustworthiness as well as the researcher's bias and lack of rigour (Yin, 2014) have been frequent used as parameters to criticise research based on case studies. However, the triangulation of different types of data (Creswell and Creswell, 2017) can help to address such criticism. In order to reduce unclear interpretations and confirm findings (Punch, 2009), a combination of different quantitative and qualitative means of collecting data (interviews, questionnaire and classroom observations) were used in this study provided the opportunity to compare and confirm the findings from different sources. Trustworthiness, reliability, and validity can also be increased by piloting (Newby, 2010) which has aided in the creation of the final versions of the data collection tools.

Ethical issues are directly connect to the integrity of a study and of the disciplines that are involved (Bryman, 2016). Ethical guidelines "are intended to help keep participants safe from harm, build trust with participants and ensure trustworthy outcomes from the research which will benefit society" (Busher and James, 2012, p. 1). In this study, ethical principles were taken into consideration regarding participants' consent, the right to refuse to participate or withdraw at any stage of the study process, and data anonymity and confidentiality.

3.2. Data Analysis and Variable Definition

Following the mixed methods research strategy, statistical, graphical and semantic analysis of the primary data were employed in the study (Creswell and Creswell, 2017). The questionnaire responses were converted into bar chart graphs to visualise the most basic trends and patterns in the answers given by the participants. Moreover, the linear regression model was employed to support these findings through statistics and establish cause-and-effect relationships between the established teaching practices and students' critical thinking skills (Montgomery et al., 2012). Only the most important units of analysis are presented from observations and interviews (Saunders et al., 2015). Although integrating different sources of data may lead to contradictory outcomes (Saunders et al., 2015), no significant discrepancy between the quantitative data collected using the questionnaire and the qualitative data from the interviews and classroom observations. On the contrary, the classroom observations showed remarkable coherence between what participants' views of their own practices and what they actually did in the classroom.

The critical thinking teaching strategies identified in the literature review are regarded as the relevant variables in this study and are compiled below in linear regression (Table 1).

Table 1. Variable Definition

Question №	Variable	Code	Variable Type
3	Open-ended questions	OEQ	Independent
4	Cooperative learning	COL	Independent
5	Mixed meth-ods learning	MML	Independent
6	Practical tasks	PRT	Independent
7	Comparing and con-trasting	CAC	Independent
8	Performance tasks	PFT	Independent
9	Classroom dialogue	CLD	Independent
10	Positive learning envi-ronment	PLE	Independent
11	Verbal praise	VBP	Independent
12	Mentoring students	MES	Independent
13	Students' crit-ical thinking	SCT	Dependent

The equation for SCT is defined as follows.

$$SCT_i = \alpha_0 + \beta_1 OEQ_i + \beta_2 COL_i + \beta_3 MML_i + \beta_4 PRT_i + \beta_5 CAC_i + \beta_6 PFT_i + \beta_7 CLD_i + \beta_8 PLE_i + \beta_9 VBP_i + \beta_{10} MES_i + \varepsilon$$

, where SCT denotes the degree, to which the critical thinking skills of the Saudi Arabian students are developed, α0 is a constant, β1, 2, 3…10 are the indicators that influence all dependent variables (i = 1, 2, 3...82), and ε marks the residuals.

4. RESULT

Statistical data collected through the questionnaires shows that only two variables, namely OEQ and PRT, passed the criterion of statistical significance of Sig. (their p-values) being less than or equal to 0.05. However, it could be stated that under normal circumstances the p-value benchmark could be expanded to 0.15, which would mean that the variable in question is statistically significant in at least 15% of all cases (Hinton et al., 2014). Considering this, it is also possible to include CAC into the list of the statistically significant units of analysis. Nonetheless, it is acknowledged that the strength of the relationship between CAC and SCT is lower than for OEQ and PRT.

The table below shows the results in statistical linear regression analysis (Table 2).

Table 2. The Influence of Teaching Practices on the Students' Critical Thinking Skills

Model	Unstandardised Coefficients		Standardised Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-0.183	0.810		-0.226	0.822
OEQ	0.297	0.125	0.279	2.376	0.020
COL	-0.088	0.124	-0.070	-0.712	0.479
MML	-0.014	0.092	-0.014	-0.155	0.878
PRT	0.308	0.113	0.269	2.723	0.008
CAC	0.244	0.129	0.219	1.895	0.062
PFT	0.007	0.113	0.006	0.065	0.948
CLD	-0.057	0.110	-0.049	-0.513	0.609
PLE	0.170	0.104	0.162	1.642	0.105
VBP	0.012	0.103	0.010	0.112	0.911
MES	0.082	0.093	0.079	0.881	0.381

The above findings are interpreted as meaning that positing more open-ended questions in the classroom can improve the critical thinking skills of the students of the secondary schools in the Alhafouf region of Saudi Arabia. Classroom observations confirmed that teachers use of open-ended questions. For example, Teacher 2 asked students in his Maths class, "Why do you think that this principle applies to questions 2 and 6 but to not apply to the other questions related to the problem?" (Teacher 2, School 4). Such findings are consistent with the outcomes mentioned by Browne and Freeman (2000). While closed-questions require one restricted alternatives with the right and wrong answers being determined by a key or the teacher's set answer; open-questions in-

stead require learners to analyse the question, evaluate how their knowledge can be relevant to the answer, consider different options and opinions, and then decide on the best possible reply. Furthermore, discussing their possible answer can lead to the reinforcement of the knowledge acquired in the process or a change in perspective with new knowledge being created.

A similar effect was achieved by relying on the dimension of phenomenography and explicitly comparing and contrasting different perspectives and pieces of evidence (Larsson, 2017). An example of this was observed in the Library and Research Module when the teacher asked one student, "What is the best way to search for information?" (Teacher 4, School 1). The student replied that the best way was to search online. The teacher then asked other students if they agreed with him. Different views were presented with some students saying that information online 'was not reliable' and it was best 'to use books'. The teacher asked students to discuss their different points of view and then open their textbook and compare and contrast their opinions with the views presented in the text.

In this process, students are asked to examine old and new information, compare diverse input material, and consider different perspectives and representations of reality. Such highly cognitive process can lead to the development of the ability to evaluate sources and points of view and then select the best option and course of action.

Finally, focusing on practical tasks can also enhance the critical thinking capabilities of the learners in the academic setting. Practical tasks typically require students to critically examine their ideas, knowledge and beliefs to achieve the task. For instance, in the English language class, the teacher gave students an exercise on relative clauses and asked them to choose the best relative pronouns to complete the sentences and explain why they have chosen one pronoun over the others. As homework, the teacher gave a similar task and asked students to bring their answer for discussion in the following lesson (Teacher 1, School 3).

However, such important variables as establishing a positive classroom environment or verbal praise were not effective within the chosen study context. One possible explanation for this result arises from the answers provided by the questionnaire respondents. For instance, Figure 2 demonstrates the opinions and perceptions held by the questionnaire sample with regards to the practice of cooperative learning.

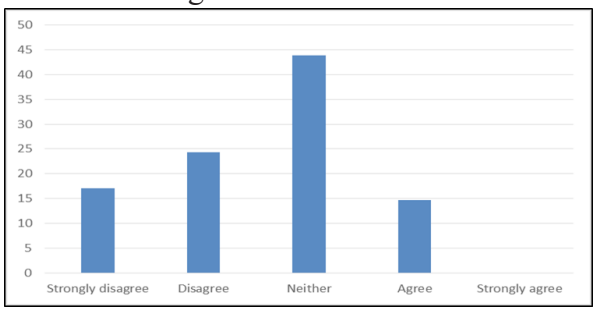

Figure 3. When in the classroom, I encourage cooperative learning (%)

It is observed that 43.9% of the respondents failed to provide a definite answer towards the implementation of cooperative learning. Only 14.6% of the participants of the study agreed with the fact that cooperative learning was encouraged in their classrooms. This could be interpreted as meaning that secondary school teachers in Saudi Arabia in general are still unaware of the benefits of cooperative learning as defined by Boa et al. (2018). On the other hand, this result could also be indicative of the fact that cooperative learning is seen as highly challenging to integrate into the regular classroom activities in the research context. Since the design of the questionnaire survey did not allow for positing additional questions, it is ambiguous, which of the above explanations is valid based purely on the quantitative data. An analogous statement could be made with regards to graphical analysis of such variables as mixed methods learning and one-to-one mentoring.

The qualitative data collected from the interviewees randomly chosen for the study suggests that there is often a dichotomy between participants' views and their classroom practices. Many of the interviewed teachers recognised the importance of critical thinking and were highly aware of the benefits of developing the critical thinking skills of the students, but also emphasised the challenges and problems when trying to embed critical thinking skills into their classroom activities. For instance, Interviewee 1 stated that "critical thinking is one of the major life skills, which is hugely important not only when studying, but also during everyday life and work". Moreover, the definitions of critical thinking provided by the interviewees were frequently aligned with the frameworks of such authors as Nosich (2012). For example, Interviewee 5 stated that "critical thinking is how well you are able to compare and contrast differ-

ent points of view…critical thinking is also required to make conclusions and inferences on the basis of what is available to students".

In spite of such awareness, the main issues faced by the secondary school academic professionals may constitute a barrier to the application of such ideas. Students' behaviour was cited as one of the key challenges for teaching practice effectiveness. Interviewee 3 argued that "in some cases, students actively refuse to go beyond the school subjects". At the same time, there were highlighted problems related to school curricula and resources. Interviewee 9 argued that "there is a conflict between new methods of teaching, which are focused on critical thinking, and the traditional paradigms of learning followed for a long period of time in Saudi Arabia" while "limited school resources" were also mentioned by Interviewee 5. These assertions were confirmed by the observations made by the researcher. The teachers frequently struggled with controlling students during classes, which hindered their ability to introduce practices related to critical thinking. In addition, the teachers were frequently forced to follow traditional curricula, thus significantly limiting the amount of time allocated to critical thinking development activities. This resulted in many teachers (a total of 65.7%) reporting that the critical thinking skills of their students were underdeveloped.

5. DISCUSSION

Overall, the findings of this study are consistent with the work of Larsson (2017) who exemplified the role of phenomenology in teaching critical thinking. In addition, the vital role played by practical tasks and open-ended questions is in line with the key arguments presented by Browne and Free-man (2000), and Cargas et al. (2017). The key implication of these outcomes is that more attention should be devoted to the outlined practices in the secondary schools of Alhafouf. However, other techniques (such as maintaining a positive classroom environment) may also be beneficial. Due to their low popularity in the Alhafouf context, the study was unable to establish whether these teaching initiatives could have a strong effect on the critical thinking skills of the students. It is inferred that secondary school teachers may improve academic outcomes by referring to the teaching strategies, which were attributed with low popularity scores in the current study.

One notable finding is that many participants reported difficulties with the classroom behaviour of their students. This expands the findings of this study beyond the previous works of other researchers such as Smith et al. (2018), and Petek and Bedir (2018). It is asserted that maintaining reasonable classroom discipline can be beneficial for the critical thinking skills of the students. Providing a stable educational environment should give the teachers more opportunities to implement the key techniques aimed at improving the critical thinking skills of their students. Nevertheless, it is difficult to provide specific suggestions regarding this aspect based on the available primary evidence.

The findings of this study also show that school resources and traditional curricula were considered as significant barriers for the implementation of the teaching practices beneficial for critical thinking. This was aligned with the core framework of Nosich (2012) who noted that critical thinking was inseparable from the overall educational environment expressed through the most relevant standards and discipline-related conditions. This finding puts the emphasis on the all stakeholders involved in the educational process to aid teachers in fostering the critical thinking skills of the students instead of positing additional challenges and problems. That said, it remains uncertain and still subject to further research which specific educational strategies or reforms could be implemented by the Saudi Arabian government to achieve such goal.

The overall consensus established in this study was similar to the discussion presented by Salmon (2013). More specifically, it was shown that critical thinking is generally perceived as a highly important cognitive skill directly related to information processing and evaluation. The broader implications of critical thinking (decision-making capacities) are also indirectly supported in the study via the interview transcripts. The participants of this study are aware of the benefits of critical thinking and consciously strive towards developing the mental abilities of their students. This outcome exemplifies the overall importance of critical thinking in the academic setting. On the other hand, this particular outcome may have been caused by the sample composition, which would limit its generalisability.

6. CONCLUSIONS AND RECOMMENDATION

6.1. Summary of the Findings

To address the first research objective, it was stated that the critical thinking skills of the students in the academic setting could be developed through particular teaching practices, such as establishing a positive learning environment, mentoring, focusing on practical tasks, positing open-ended questions, comparing and contrasting different perspectives etc. It was suggested that implementing these methods could lead directly to students improving their critical thinking capabilities. Nonetheless, only open-ended questions, comparing and contrasting, and practical tasks passed the benchmarks of statistical significance (Objective 2). This may be explained by stating that the educational process in Saudi Arabia faces significant challenges related to teacher awareness, school resources, school curricula and student discipline. As a result, the critical thinking skills of the students were only evaluated as medium by the surveyed teachers (Objective 3). The development of critical thinking skills goes thus beyond adopting certain classroom teaching practices and is also affected by broader factors related to the academic environment.

6.2. Evaluation of Hypotheses

It is necessary to identify which of the research hypotheses found support in the gathered evidence. Only hypotheses 6 and 2 were explicitly justified by the results of the statistical analysis. All other hypotheses were rejected on the basis of the cause-and-effect relationships established via linear regression. The most probable explanations for this outcome was either the lack of awareness among teachers towards the benefits of the teaching practices mentioned in the rejected hypotheses or the influence of the barriers and challenges established previously (e.g. curricula conflict). One critical remark that can be made against this discussion is that since the hypotheses only focused on what was perceived as the most relevant units of analysis, these propositions did not reflect the full picture concerning the development of critical thinking in Alhafouf.

6.3. Recommendations for the Secondary School Teachers

Addressing the fourth and final objective of the study, practical recommendations are provided for the teachers employed in the secondary schools at Alhafouf. One of the most important findings of this study was that teaching critical thinking goes beyond the considered teaching practices and is depended on such factors as classroom discipline and school curriculum. Thus, the Alhafouf secondary school teachers should be encouraged to modify their approach with respect to classroom management. For instance, strategies relying on aggressive punishment may be discarded in favour of recognition, understanding and praise, which were considered highly advantageous by Rahimi and Hosseini (2012). On the other hand, the ability of teachers to influence school curricula and resources may be limited since these factors are typically regulated by other academic stakeholders, such as the Saudi government.

Since open-ended questions, phenomenography and performance tasks were considered in the study as the most effective teaching practices, the academic personnel employed at Alhafouf should be encouraged keep relying on these methods when attempting to develop the critical thinking skills of the students. However, it is asserted that the efficiency of such techniques may be further improved by relying on innovative teaching methods and integrating the outlined tactics with these platforms. For example, e-learning can be employed by the Alhafouf teachers in order to improve educational outcomes related to critical thinking (Popovici and Mironov, 2015). That said, the implementation of such solutions may require investing on school resources. It is unknown whether all secondary schools in Alhafouf would be able to follow this recommendation.

6.4. Limitations of the Study

It must be acknowledged that the research sample constitutes the most noteworthy limitation of this study. Relying on probability sampling would have been more beneficial with regards to the validity and generalisability of the findings (Saunders et al., 2015). Moreover, this project focused exclusively on the teachers' perspectives and practices and thus lacks a studentcentric perspective with regards to data collection and analysis. While

the students may be unaware of the complexities of the educational process related to critical thinking, it may be beneficial to gather their perceptions on the teaching practices that can be employed to foster their critical thinking skills. Furthermore, In order to fill in the gap in the literature, future studies could be done in different education stages (elementary and intermediate schools) and in all-female schools to allow academics and teachers to consider possible similarities and differences among learners' thinking skills according to gender.

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Conflict of interests

The author declares no conflict of interest.

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BREAKING DOWN BARRIERS TO EFFECTIVE EFL COMMUNICATION: A LOOK AT SENSE-MAKING TECHNIQUES

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ABSTRACT

The present "new wave" investigation tackles cutting-edge perspectives of one of the most pressing problems – breaking down the barriers to effective fluent English communication. The publication reflects a broad array of studies in the area of methodology of teaching English. The investigation distills the research about sense-making techniques in the language awareness. The paper reveals obstacles and reasons for language barriers to fluent English communication. The author demonstrates an alternative way of approaching the problem of English as a foreign language acquisition. We undertake the empirical investigation of how foreign languages are learnt and taught using sense-making techniques. A foreign language should become a personal need for students allowing them to set goals, choose language improvement strategies, and exercise self-esteem and self-control. Against the backdrops of research, the experiment was carried out. Those tested were 85 students of Southern Federal University, Russia. They were split into two groups: a control group of tertiary participants who were given an instruction using traditional methods of teaching English; and a second group –experimental one implementing sense-making techniques in learning a target language.

1. INTRODUCTION

Learning a foreign language is an everlasting and complex activity. To probe deep into the matter, motivation stems from accomplishments throughout life and success. "With a keen eye for achievement, admiring eye for efforts and a tolerant eye for differences and individuality, a skillful teacher can manage to enable the majority of his students to enjoy learning" (Fengying, 2003).

We are not always conscious about the fact that there are more than language structures, grammar, and lexis that we have to impart to our students. Pupils should not merely learn to imitate and reproduce speech patterns or memorize a grammar rule but explore a new way of self-expression and acquire language awareness (Gracheva, 2015). This concept dates back to the times of Charles the Great who claimed that "to have another language is to possess a second soul".

The bedrock goal of learning English is effective communication. Language awareness and ability to communicate are different things. Even good knowledge of English can be useless once an individual doesn't exploit it. The problem lies in the psychological barrier of making mistakes. Teachers are the greatest mistake hunters and fighters (Stepichev, 2009). Teachers should not act as mentors who are good at finding mistakes of students. If the teachers always find faults with students in terms of proper grammar or pronunciation, learners can be very demotivated and become scared to speak (Alam, et al 2018). Educators should indicate the learners' errors positively and with fun (Baker and Westrup, 2003). Pedantic teaching merely restricts learners to put their opinion freely and encumbers to produce communication in the class (Alam, et al 2018). "The decisions that the teachers make about how to react to students' performance will depend on the stages of the lesson, the activities,

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the types of mistake made, and the particular student who is making that mistake. Once the teachers correct whenever there is a problem, the conversation as well as the aim of the speaking activity will be ruined" (Harmer, 1983).

With the above in place, learners are afraid of making mistakes, experimenting, expressing original ideas. The greatest mistake you can make in life is to continually fear you will make one. Every mistake is a learning experience. A teacher's job is to nurture the environment where making mistakes is accepted as an integral part of learning (Beere, 2016).

Another obstacle is listening anxiety, depicted by Baran-Lucarz (2013) who endeavors to demonstrate that listening comprehension is a heavy barrier that prevents from perceiving effective language skills, and simultaneously declines students' speech production.

Throughout the language learning process, students inevitably face imperfection in their practice. By means of sense-making techniques of learning English teachers may raise students' motivation of the target language. EFL trainees lack the opportunities to practice English language skills with native speakers or be involved in the English environment outside the classroom (Amirian and Komesh, 2018). In other words, there is no English environment in Russia to practice English with the native speakers on a regular basis. The problem arises is how to enhance motivation of EFL learners.

What is motivation? Why do some people seem to be more motivated than others? There is the saying that "unmotivated students just will not learn". Students' success in the language awareness is contingent on versatile criteria. Be that as it may, the English language should become a personal need in the meaning-centered instruction. There are two types of motivation mentioned by Gardner: extrinsic and intrinsic (Gardner and MacIntyre, 1991). Extrinsic motivation revolves around the need to achieve a practical goal, travelling, getting a better job. Intrinsic motivation is akin to the inner motives to become familiar with culture of the target language. The scholars were not monolithic in their theoretical stances.

Dörnyei and Csizer (1998) proposed a raft of recommendations to augment motivation, such as aim-mindedness. Educators should help their trainees to cultivate language skills. In this connection, Krieger (2005), Alam, et al 2018. observe, "EFL students who lack intrinsic motivation may have high-extrinsic motivation if their education system emphasizes the extrinsic rewards flowing from high scores. Even though these forms of motivation are important but maybe are not as good as intrinsic motivation, they can still inspire students to work hard."

Recent reviews point to an exciting resurgence of research on motivation of learning English by using sense-making techniques (Abakumova and Zorina, 2017). Sense-making techniques in EFL are teaching methods boosting the motivation of learning English through incremental tenets of L2 as an individual value. A foreign language should be personally significant to set goals, choose language improvement strategies, and exercise self-esteem and self-control (Stakanova, 2017). All in all, sense-making techniques in learning English are such active methods as projects, debates, role-plays, creative writings/essays, academic controversy, thought-provoking assignments and language portfolio. It seems appropriate to say that sense-making techniques have plethora of advantages:

- they allow students to combine traditional classroom tuition with the cross-curricular skills increasing students' intrinsic motivation
- develop a semantic sphere of students (Stakanova et al, 2013);
- rapport exists in the classroom activities;
- sense-making techniques improve discourse competence;
- promote motivationally oriented teaching.

Emphasizing methods of teaching EFL we compiled the classification of sense-making techniques adapted from the classification of sense-making techniques in educational sphere by Abakumova I.V. et al. (2017).

Table 1. Sense-making techniques in EFL meaning-centered instruction

№	Type of sense-making techniques	Example	Practical Use
1	Sense-making technique of academic controversy	Critical thinking, generalization, rhetorical skill, principles of making arguments	Debates, discussions
2	Sense-making technique of a dialogue	External, internal, cultural types of a dialogue	"Open-ended questions", "Find the Riddle Word"
3	Gamification	Role-playing, imitation, game-travel, theatrical plays.	Poetry Quiz, role plays with discussion, living through situations
4	Sense-making technique of self-expression	Reflection, existential choice, personalization	Reflection of mood and emotional state, rumination of activity and educational material
5	Sense-making technique of group dynamics	Building a sense of belonging, trust and acceptance in the EFL classroom. This technique enables students to experience a diversity of personalities and perspectives.	Activities "Fun facts about Our Class", "My Unforgettable Story". Book Clubs
6	Sense-making techniques of creativity	Art techniques, creative works, projects, presentations	Pictures to the topic under study, cartoons on the issues under consideration, drawing up diagrams, etc.
7	Sense-making techniques of problem-solving	Problem-solving assignments	Article for the Newspaper

2. MATERIALS AND METHODS

The current research presented the descriptive analysis of the finding. This study explored sense-making techniques of teaching and learning English as a tool of breaking down the language barriers and increasing motivation. In the empirical part of the study the main concern was finding out the reasons of difficulties of learning L2 and barriers to fluent EFL communication. Consistent to the present finding, the study supported the hypothesis that sense-making techniques can augment motivation to learn a target language.

In the light of the research conducted it's believed that sense-making techniques influence positively the academic performance and L2 acquisition. The participants of the research were 85 students of Southern Federal University, Russia: 35 tertiary level Russian students of different majors and 50 MA psychology students. The subjects had been studying English for 10-12 years as a compulsory subject. Tertiary students had Pre-Intermediate level of L2 and MA students had Intermediate/Upper-Intermediate level.

Two groups of the experiments were formed: a control group (tertiary level students) who studied English using standardized and traditional methods of instruction, and an experimental group (MA students) where we implemented sense-making techniques in the English classes.

The research involved administering questionnaire BALLI (Beliefs about Language Learning Inventory) by Horwitz (1985). The questionnaire includes 31 points to evaluate students' stance in five global domains: 1) impediments in EFL learning 2) the English language aptitude, 3) the core of language learning, 4) discourse methods, and 5) linguistic prospects.

For revelation of motivation profile, the questionnaire by Douglas Brown "Strategies of Learning English" (Brown, 2007), and the questionnaire by Michael Harris (Harris and McCann, 1994) were used. The participants were asked to estimate their motivational strategies of learning EFL. Further on, the subjects were asked to fill in the questionnaire "Sense-creative strategies in learning a foreign language" (Stakanova, 2017). The questionnaire included 3 units consisting of various statements: 1) metacognitive strategy (developing ability to manage time, self-study, and learner autonomy); 2) cognitive strategy (developing the skills of using the effective learning methods); 3) socio-affective strategy (developing social skills, a student-teacher interaction). The subjects needed to specify what actions they often do (2 points), seldom (1 point), never (0 points).

3. RESULTS

The problem is subject to conscious scrutiny and indicated the following results. The issues of motivation and breaking down language barriers have always been a thorny problem and ones that have culminated in numerous heated discussions.

By observing the two groups of trainees, we were able to point out that with the help of all above-mentioned sense-making methods, such as debates, project work, problem-solving tasks, critical thinking tasks, questionnaires it was possible to observe the students' vocational aspirations, self-assessment and learner autonomy. Project work, drama, dis-

cussions, and debates are very productive as they activate all the necessary communicative skills, all the aspects of communicative competence, thereby bringing real life into lessons. Sense-making techniques teach trainees to value one another as equals, regardless of their abilities and encourage them to be tolerant to each other. It gives every student a feeling of achievement, motivates and challenges them, and develops their communicative skills (Pavlova, 2008).

As for the criterion of meta-cognitive strategies, the same holds true to the control group of respondents, and the experimental one who showed almost equal results. We have found this familiarity to be a major benefit. However, students in the control group mainly concentrated on homework without any creative activities. Cognitive strategies of the subjects in the control group were linked with psychological concepts such as memory, thinking. They could hardly assess the personal experience with the English language, since this experience was necessary to explicate, i.e., to transfer into the verbal form. Participants in the control group were grammar conscious. The problems encountered by students in the control group in socio-affective strategy were the fear of making a mistake and misunderstanding. The subjects manifested self-control to eliminate the language barrier.

As for meta-cognitive strategies, the participants of the experimental group cast their opinion in favor of learner autonomy. They expressed their opinion with evidence about high level of self-regulation, independent fulfilling the assignments.

In cognitive strategies the subjects of the experimental group displayed the ability of honing oral communication. They indicated the interplay of affect, cognition, and language.

According to socio-affective strategy, the students of the experimental group confessed that they embarked on the study of an L2 with perseverance once the learners were not motivated by shortcomings or failure.

In the experiment to define motivation using questionnaires we found out that students had manifold motivations. For example, the most common item was integrative approach (socializing with native speakers), intrinsic (importance of being a fluent speaker in L2), and extrinsic motivation (to obtain a prestigious job). Sense-making techniques can enhance intrinsic motivation and can keep learners engaged.

The data captured during sense-making and motivational questionnaires revealed that 80% subjects of control group and 50% respondents of experimental group found the English language difficult to learn. The unwillingness of learners to develop language skills, in majority cases, failed to go unnoticed. Among all the motivational factors, using sense-making techniques had an important bearing on the EFL learning.

In language aptitude, 75% of respondents adhered to the idea that females were better at language learning than males. The central grounding factor in the language aptitude and awareness is memory. This idea is applicable to creating meaningful context for memorizing material.

Ruminating on the issue of stumbling blocks to language barriers that prevent Russian EFL learners from speaking English is firstly, lack of English language environment outside the classroom; secondly, aims should be encapsulated in the interactions between sense-making context and motivation. Learning English should be a personal need for a student. In the long run, it will be the stepping stone to success.

The analysis of academic performance indicators demonstrated a higher degree of schooling among students who attended classes based on sense-making paradigm, than did learners from the control group who studied on a traditional curriculum.

4. DISCUSSIONS

The present research was an attempt to investigate the influence of sense-making techniques on the L2 acquisition and increasing motivation, hence breaking down barriers to speaking English as a target language. The problem is subject to conscious scrutiny, so we have come to the following conclusions.

1. New emphasis on sense-making techniques in the meaning-centered instruction is encapsulated in developing the semantic sphere of students and supports motivation of learning the target language.

2. Sense-making context is a system of teaching methods aimed at meeting individual values of students in learning EFL. This paradigm is the conceptual approach to education fostering effort and resilience to failure in students.

3. Meaning-centered instruction provides the development of EFL learners, allows forming the skills of learner autonomy.

4. Sense-making context initiates sense-

creative potential of students, makes them set goals, learn the English language, improve one's knowledge, and exercise self-esteem and self-control.

5. To increase the learners' interest in speaking skill of L2, motivation plays a vital role in this regard. A learner can be motivated in different ways.

6. Results obtained in the study indicated that those L2 learners who studied in the sense-making context are more successful in such course. This is in compliance with the position of humanistic approaches to language teaching.

5. CONCLUSIONS

The outcome of the longitudinal analysis has some significant implications. In the light of information gathered it's believed that sense-making techniques take off in a big way in the teaching practice. The issue of raising motivation should be carried out in the teacher-learner interactions.

In conclusion, this study has an important bearing on a number of issues in the current theories and approaches. Aims were specific and implementation indicators were established. This ensures that the goals were taking place in practice and could be open to redefinition because of practice.

The fulfillment of these objectives enables teachers to shift from the traditional language approaches to sense-making context. Using the sense-making techniques, we change the priorities and utilize the approach, the essence of which is to put the student in the conditions when he/she feels the inner need to acquire knowledge.

Sense-making techniques have a host of advantages:

- activate the process of fulfilling comprehension exercises;
- develop self-regulation;
- take the English language as a means of self-development;
- attach students to other cultures, therefore forming a universal consciousness;
- create a favorable basis for mastering a foreign language, as well as for lifelong independent language learning at later stages;
- enhance general educational skills and learner autonomy by expanding their scope in the process of mastering a foreign language.

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Conflict of interests

The author declares no conflict of interest.

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MAKING SCIENTIFIC CONCEPTS EXPLICIT THROUGH EXPLANATIONS: SIMULATIONS OF A HIGH-LEVERAGE PRACTICE IN TEACHER EDUCATION

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ABSTRACT

There is a current research interest into high-leverage teaching practices which are geared towards making concepts explicit to learners. Explanations are a common practice in science education for sharing and constructing meaning with students. However, current studies insufficiently articulate a framework for understanding pre-service teachers' explanations; neither do they assess the practical criteria for development. This article documents various criteria for pre-service science teachers' explanations as related to the cognitive science literature and their assessment in the context of an instrument designed for teacher education. A rubric was constructed which organized structural and supportive elements into three levels. A validation process is described, and its application in teacher education programs to detect possible patterns and changes in pre-service science teachers' explanations. The results show the explanation strengths of pre-service teachers working with examples, graphs and images. However, difficulties were found in using and improving analogies, metaphors, and models, and also approaching mis-conceptions as a learning opportunity. Theoretical and practical issues are discussed from a cognitive perspective. We conclude that the signaling implications of using rubrics sensitive to progress-monitoring during teacher education for high-leverage teaching practices give opportunities to simulate and rehearse practices that are highly conducive to learning.

1. INTRODUCTION

Researchers and teacher educators seek to evaluate what educational practices are highly conducive to learning. Within which, high-leverage practices have been specifically identified (Ball and Forzani, 2011) as teaching practices with an impact on student learning, which are learned and implemented by beginner teachers (O'Flaherty and Beal, 2018). There is also increased interest in assuring teacher capacity development during teacher education (Koteva-Mojsovska and Nikodinovska, 2015; O'Flaherty and Beal, 2018). Nonetheless, current studies insufficiently articulate a cognitive framework for understanding teachers' explanations as a means of making scientific concepts explicit. Considering that explaining is crucial for children's discovery and connecting daily life phenomena with underlying principles (Legare, Gelman and Wellman, 2010), this is problematic. Teacher explanations also form a high-leverage teaching practice (Windschitl, Thompson, Braaten and Stroupe, 2012).

Explanations are communicative actions intended to make sense of a phenomenon, divulge its meaning and make it understandable or apprehensible for learners (Thagard, 1992; Norris, Guilbert, Smith, Hakimelahi, and Phillips, 2005). It can also be understood as the act of answering a 'why?' question about phenomena (Norris et al., 2005). Explanations in teaching intend to share knowledge and un-

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derstanding with other people who have the intention of learning (Treagust and Harrison, 1999).

A common point for the development of high-leverage practices such as explanations is the relevance of practical experience for enacting teaching (Koteva-Mojsovska and Nikodinovska, 2015). However, simulations of teaching provide a systematic approach to teaching actions without the cognitive and emotional load of real classroom settings. Thus, simulations of explanations for a future classroom can be beneficial in teacher education. This particular field is being explored with respect to defining what characterizes explanation for the classroom and showing it is a learnable capacity (Charalambous, Hill and Ball, 2011). However, no studies have been conducted which formatively evaluate explanations from a cognitive perspective within science teacher education.

Consequently, there is little knowledge available for student science teachers to build explanatory capacity before they start real teaching work. Sevian and Gonsalves (2008) constructed a rubric to assess how science students communicated their research findings to diverse audiences. Although this was an advance, they did not address constructing explanations for teaching and learning, which differs in context from and purpose from explanation / communication of science between professionals or scientists.

1.1. Explanations for teaching science and scientific explanation

The act of explaining has captured the attention of educators, scientists and philosophers, especially regarding what defines a scientific explanation (Geelan, 2013). Diverse meanings have been given to the term explanation (Rodrigues and Pereira, 2018). Thus, it is relevant to differentiate scientific explanations from teacher explanations.

On the one hand, scientific explanations are the main product of scientific activity (Rodrigues and Pereira, 2018), usually in the form of an evidence-driven explaining statement. The purpose of such a statement is to comprehend a phenomenon and share this understanding to the scientific communities. Hence, correct scientific vocabulary is relevant (Treagust and Harrison, 1999).

On the other hand, teacher explanations for teaching science combine axioms, concepts with metaphors and analogies connecting them to compose a coherent entity (Geelan, 2013). The purpose is to enhance understanding and lead students to construct meaning. Teacher explanations are not opposite to inquiry-based learning and other constructivist approaches, because they may not be closed and they are not limited to lecturing on a topic (Geelan, 2012).

Certainly, explanations for the classroom can be collaboratively shaped; created from parts of students' ideas and teachers' counterparts through iteration (Dawes, 2004). Consequently, explanations for teaching science differ from scientific explanations in their rigor, details and purposes (Treagust and Harrison, 1999). Furthermore, the transformation of the scientific explanation into a thoughtfully produced teaching form intended to promote learning is the main feature of a teacher explanation (Ogborn, Kress and Martins, 1996).

The synergy of learners' and teachers' ideas in generating explanations in the classroom can be achieved by teachers connecting and contrasting learners' prior ideas with the explanation. Moreover, by students questioning teachers' explanations and critically analyzing the sources of explanations, they negotiate the meaning of a shared explanation and thereby enrich them.

1.2. Styles in science teachers explanations

Explanations in teaching science have been considered as a way of explicating knowledge to a non-expert audience (Treagust and Harrison, 1999), but in teaching this is not the only function. Explanations for the classroom transform the expert knowledge into a different but connected type of knowledge, intelligible and more accessible for school learners (Ogborn et al., 1996). This is Pedagogical Content Knowledge (PCK); the amalgam of pedagogical and content knowledge oriented to teaching (Shulman, 1986) and meaning-making in the classrooms, for instance through explanations.

Depending on the teacher-student interaction, there are varying styles of explanations. First, the teacher can describe the learners' emergent ideas, connecting them with scientific models – this is known as the 'thinking together' style. Second, the teacher can turn the explanation into a tale or narrative that blends the learners' point of view with the concepts (Norris et al., 2005). Third, the

teacher can ask learners to communicate their ideas as the teacher would, which asks for re-description or re-interpretation of students' ideas in other scientific terms, progressively using more precise language (Ogborn et al., 1996). Thus, teacher explanation should not merely be an exposition by the teacher to an audience, but a dialogue that contrasts scientific ideas with student ideas. Indeed, learners can propose their ideas to the class in a form of an explanation (Dawes, 2004). From Feynman's work (1994) it is clear that expert explainers use their imaginary to make sense of non-observable, abstract or more difficult concepts. However, for novice learners, this task is not easy.

Ogborn et al. (1996) indicated that explanation for teaching in the science classroom might include four tasks; marking the point between what the learners know and what they will know through the explanation, constructing the entities -it means, the gestalt- of the explanation, transforming learners' prior knowledge and illustrating the phenomena that can be explained. Nonetheless, there is a gap in assessing the elements that teachers use to make scientific concepts explicit to novice learners and then taking this knowledge into teacher education.

Therefore, the question arises: what are the elements of pre-service teachers' construction of explanations for the classroom? From previous works in cognitive science and science education, it is plausible to interpret some criteria for the design of an assessment instrument with formative purposes. These follow in the next section.

1.3. Teacher explanations elements

The elements described below are in the rubric constructed in the present study. Our objective is to use the rubric to identify and assess the components for making explanatory concepts explicit in science teacher education. Each element is given a rationale for its inclusion. The first elements refer to the structure of the explanation, and the last are supports for representing the concepts or ideas and their connections in explanations.

1.3.1. Structure of the explanation for teaching science

Clarity of the elements of an explanation implies that the features, patterns and structure of the content are illustrative and focused (Sevian and Gonsalves, 2008). If the ideas are difficult to understand, the explainer might slow the word flow (Mohan, 2013). This facilitates using an understandable language for the learners, and concepts being presented in an appropriate vocabulary for the learners. Thus, when making a new concept explicit, it is useful first to describe the phenomenon, its characteristics and then explain the causes based on relevant scientific terminology (Wenham, 2005). Additionally, avoiding tautology in the explanation favors its clarity (Geelan, 2012).

Coherence and cohesion. Explanations do not only establish patterns or observable relationships. Explaining implies combining relationships which count as evidence for the causal reasons of a phenomenon (Windschitl, Thompson, Braaten and Stroupe, 2012). On one hand, coherence is about how the bits of the explanation are linked together to make sense (Mayer and Jackson, 2005). For instance, through cause and consequence one can make links between the parts of the explanation, exclusion or inclusion clauses, similarity, belonging, etc. On the other hand, cohesion implies connective links between the parts of the explanation that internally relates clauses and sentences (Rodrigues, 2010). Indeed, causal ties might define causality relationships between phenomena and the underlying principles (Sevian and Gonsalves, 2008).

Sequence. The organization of the elements of an explanation is crucial for effective science teaching (Mayer and Jackson, 2005). Explanations should have an organizer principle (Sevian and Gonsalves, 2008), which is usually called a sequence. Every part of the explanation should be deducible from the precursor conditions (Wu and Shah, 2004). This sequence should reduce the cognitive load for the pupils (Cook, 2006). Avoiding unneeded or disconnected details is required because an excess of information can damage qualitative understanding in explanations (Mayer and Jackson, 2005).

Accuracy. This refers to precision in the use of terms regarding current models of scientific concepts, theories or principles (Sevian and Gonsalves, 2008). Scientific accuracy is essential in making content explicit through explanations; however, simplifications are needed at times for building knowledge which is accessible to learners (Danielson, 2013).

Completeness. Sufficiency or completeness decides whether the globalization of the explanation contributes to understanding (Roth and Welzel, 2001). Are the components

of explanations sufficient or insufficient to understand what the explainer wanted to explain? Explanations for the classroom have a teaching objective, thus, the explanation should cover thoroughly the concept(s) intended to be taught (Danielson, 2013).

Connection with learners' knowledge. This refers to building up the explanations upon students' prior knowledge and concept-related experiences or ideas required to connect the explanation with the learners (Ogborn et al., 1996; Treagust and Harrison, 1999; Sevian and Gonsalves, 2008). Consequently, eliciting these before presenting new ideas is crucial (Marzano, Pickering and Pollock, 2001). In cognitive terms, when new knowledge is intentionally connected with what learners already know, information retention increases (Cook, 2006). Thus, explanations should integrate or challenge students' prior ideas about the phenomena (Smith, 2000).

1.3.2. Explanation representational supports

Analogies, metaphors, simulations and models. Analogies and metaphors help make meaning of abstract or complex content (Aubusson, Harrison and Ritchie, 2006; Danielsson, Löfgren and Pettersson, 2018). Likewise, models and simulations stimulate inferences and conceptual insights because of the establishment of relationships between variables. They also advance the conceptual understanding of scientific phenomena that are particularly abstract or complex (Podolefsky and Finkelstein, 2007). Simulations convert static concepts into dynamic visualizations (Baglama et al., 2017), bringing concepts to "life" (Danielson, 2013). All of these elements facilitate mental imagery of the concepts leading towards understanding the explanation (Geelan, 2013; Sevian and Gonsalves, 2008).

Examples, experiments, graphs or images. Relevant imagery helps students to clarify conceptual properties or characteristics which are usually difficult to imagine in phenomena or to recall from the learners' daily life experience (Buckley, 2000; Ogborn et al., 1996). Graphs are used to show variations in information (Kozma, 2003), as well as to represent dynamics and associations in processes (Cook, 2006). These representations can help students develop insights into scientific understanding and detect gaps in their comprehension (Windschitl, Thompson, and Braaten, 2008). When explaining with images, it is relevant to point out the specific aspect of the concept being illustrated (Sevian and Gonsalves, 2008). Likewise, in experiments it is valuable to call learners' attention to the reasons the experiment processes worked or not in a defined way. Regarding knowledge structure, experts connect the explanations with the underlying principles to help learners to create mental models (Snyder, 2000).

Gestures and voice inflections. Such cues serve as emphasis variation in explanations (Mohan, 2013). Body gestures help students' comprehension processes when connecting to the discourse of the explanation (Geelan, 2013). On the contrary, gestures might be useless or distractive if they are not representing an aspect of the concept (Sevian and Gonsalves, 2008). Hand and body gestures are part of non-verbal language useful to communicate conceptual properties (Roth and Welzel, 2001). Voice changes or speech pace variation might add relevance to certain parts of the explanation and help learners to discriminate between the relevant and the irrelevant in an explanation (Sevian and Gonsalves, 2008).

Promoting learning from misconceptions. Misconceptions are understood in this article as misunderstandings of specific information (Martin, Sexton and Gerlovich, 2009). Teachers need to prevent learners from constructing common misconceptions, by inquiring, exploring and contrasting. Misconceptions are considered excellent tools to start making thinking processes visible for students; thus, misconceptions are approached as learning opportunities (Carrascosa, 2006).

1.4. The current study

This study explores and assesses the above elements in pre-service teachers' explanations with a rubric constructed for formative assessment during teacher education. The rubric was developed as part of a broader research into how pre-service teachers might improve in their ability to make scientific concepts explicit for learners. The rubric embodies the assumption that there are elements of explanations, which are high-leverage; these are also more difficult to use and improve by pre-service teachers.

This paper argues that the development of a rubric, which decomposes the practice of explaining concepts into several assessable elements, informed by cognitive science and science education, is a contribution for pre-

service teachers' formative assessment, whilst also providing pre-classroom opportunities to rehearse and improve competencies for making concepts explicit for teaching science in classrooms. This should better prepare pre-service teachers to engage in high-leverage practices, which are known to promote learners' cognitive skills and engagement (Larkin, 2017).

The research questions were: 1. What are the elements of pre-service teachers' explanations in a simulated context? 2. Can the elements be grouped in general constructs? 3. How can the elements be organized and improved?

2. MATERIALS AND METHODS

2.1. Research design

The study was of a pre-post design based on quantitative measurements, but also exploratory in the sense that qualitative analyses were undertaken. Thirty-eight pre-service teachers signed a consent to participate. The participants were undergraduate student science teachers in the last year of their program from three universities; they had small prior teaching experience of only a few weeks; the average age was 25 years and they belonged to low or lower-medium socio-economic status in the country, which is very similar to the background origins of in-service teachers. Around 40% identified themselves as male and 60% as female, which was also close to the distribution of the in-service science teachers working force (38.6% and 61.4% respectively). They lived in an urban zone of the Chilean capital, Santiago.

The sampling in this study was purposive, looking for typical cases in which each university represented a unit of analysis. Additionally, the pre-service teachers invited to participate agreed to join the research project voluntarily. The process attempted to select information-rich data in accordance with Patton (2001).

The pre-service teachers joined a 10-session peer assessment workshop, which occupied between one and two hours extra work per week. This workshop was undertaken before they started their practicum. They were asked to explain a scientific concept to a simulated classroom composed of their classmates in a microteaching episode. They then were set to discuss in groups of 4-5 participants with formative peer assessment. At the end of the workshop, they performed a second microteaching episode. The micro-teaching episodes lasted from 7 to 20 minutes and were recorded for further analysis. Only 20 participants completed both episodes and at least 6 of the 10 sessions, and these constituted the final sample.

2.2. Development and application of the assessment instrument

Nineteen initial aspects of explanations were proposed, sourced from the literature in science education and cognitive science. There were specific elements for science education, but some of the others could also be applied to other subjects. Elements which were too wide were discarded to maintain the focus on explanations. Then the 17 aspects remaining were decomposed into three levels of completion. Each level contained observable features that could be addressed during teaching based on explanations. These were adjusted by science teacher experts' judgment, grouping some elements because of the role played in an explanation. For instance, the examples, graphs, images and experiments were organized together as constituents which illustrated or clarified aspects/properties of the concept being explained. Table 1 details the process.

Table 1. Criteria from literature review and process

Criterion	Process
(1) Explanation aims	Deleted
(2) Explanation context	Deleted
(3) Clarity	Maintained
(4) Coherence and cohesion	Maintained
(5) Sequence	Maintained
(6) Accuracy	Maintained
(7) Links with learners' prior ideas	Grouped
(8) Links with learners' life	
(9) Using examples	Grouped
(10) Using experiment and demonstration	
(11) Using graph and imagery	
(12) Using metaphor and analogy	Grouped
(13) Using simulation and model	
(14) Using body gestures	Grouped
(15) Inflections in voice	
(16) Approaching misconceptions as learning opportunities	Maintained
(17) Summary of the explanation	Deleted

The same process worked with criteria 7 and 8, 12 and 13, 14 and 15. The criteria 1, 2, and 17 were removed because it would not be possible to observe them in a teaching episode. The experts suggested including the criteria of completeness and sufficiency, which implied that the components of the explanation should be enough to understand the targeted concept. Thus, a ten-criterion version rubric was obtained, and we called it REC (Rubric for formative assessment of Explanations of scientific Concepts).

REC was tested in a pilot study with 17 science lessons videotaped in different real teaching contexts by beginning teachers. This led to 60 explanations in total as a lesson contained more than one explanation. The coding system was double-blinded, inter-rater reliability was calculated and Pearson's correlations were used for analysis. The internal consistency (reliability) of the rubric was $\alpha = 0.60$ (n=10), to which every element had contributed. In line with the literature review, reorganization of the elements based on their correlations was done instead of deletion. After this pilot test, REC was further validated by expert panel revision. Instrument developers at The National Teacher Assessment System for public education in Chile collaborated. They suggested some language modification and re-ordering of some performance levels. This last version (see Appendix) was applied to forty of the pre-service teachers' microteaching episodes recorded.

In order to assure reliability, 100 % of the videos were blind double-coded. Inter-rater agreement was 80.35 %. The rubric was found to be reliable for this group ($\alpha = .77$, n=10) and all the elements contributed to its internal consistency. No element, if deleted, would have substantially increased the reliability. Around half of the correlations between the elements (E) were statistically significant ($p<.05$), and all elements were statistically significantly correlated with the total (T) score (Table 2, presented in the next page). Each level of assessment was used at least once, which supports their applicability and pertinence to assess pre-service teacher explanations.

Table 2. Correlation matrix of the final rubric

	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	T
E1		.13	-.03	**.46**	.15	**.57**	**.33**	.16	**.34**	**.41**	**.65**
E2	.13		**.47**	**.55**	**.62**	**.36**	.17	.16	.30	.29	**.66**
E3	-.03	**.47**		.20	**.47**	.28	.07	.11	-.08	.10	**.41**
E4	**.46**	**.55**	.20		**.51**	**.43**	.21	**.35**	**.37**	.12	**.69**
E5	.15	**.62**	**.47**	**.51**		**.34**	.17	.23	.17	-.06	**.56**
E6	**.57**	**.36**	.28	**.43**	**.34**		.23	.13	**.34**	**.41**	**.73**
E7	**.33**	.17	.07	.21	.17	.23		.16	**.33**	.13	**.54**
E8	.16	.16	.11	**.35**	.23	.13	.16		.18	.14	**.41**
E9	**.34**	.30	-.08	**.37**	.17	**.34**	**.33**	.18		.21	**.57**
E10	**.41**	.29	.10	.12	-.06	**.41**	.13	.14	.21		**.52**

Correlation is significant at the 0.01 level (2-tailed)
Correlation is significant at the 0.05 level (2-tailed)

3. RESULTS

The participants' initial microteaching episodes showed a varied outline, featuring high and low scores in the criteria. There were a few participants with obtained high scores, however, the general pattern observed was based on medium levels of performance when marked against the rubric. Most of the elements that pre-service teachers showed - at the moment of making concepts explicit through explanations - were half achieved.

The minimum score obtained in a microteaching explanation episode was 5 out of 20, the maximum 17, and the standard deviation was 3.38.

The rubric elements that were the most developed in this group were the sequence of the explanation (SQ3) and using an example, graph or image in the explanation (SQ8). On the contrary, difficulties were found in using analogies, metaphors or models, and approaching misconceptions as learning opportunities for making concepts explicit to the learners. The other criteria were considered to be at a medium level.

After the workshop, the participants' final microteaching episodes presented a wider spectrum in the elements for making concepts explicit through explanations. The minimum score in the whole group was 6 out of 20, the maximum was 19, with a standard deviation of 3.38.

The whole groups' pre and post scores are shown in Figure 1. There were score criteria (SQ) with a marked improvement after the workshop in some (i.e. SQ1, SQ6), almost no advance in others (i.e. SQ3, SQ5) or a decrease in a criterion (SQ8).

If we compare the means of the pre and

post scores, the pre-service teachers' explanations were rated higher after the workshop than at the beginning (mean pre-test=10.1, SD =3.38; mean post-test=14.65; SD =3.38). The difference was 4.55 points. The effect size was high (d=1.34) (Cohen's delta).

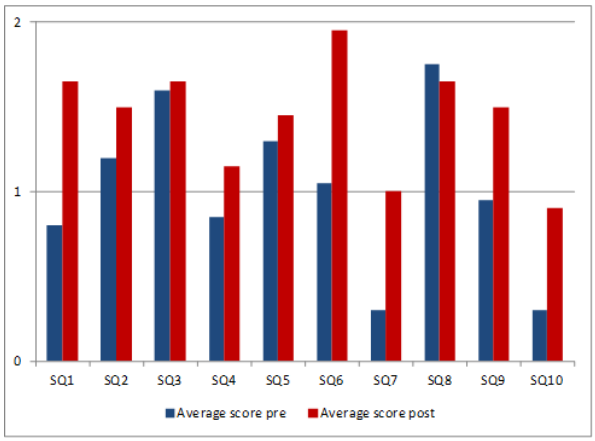

Figure 1. Comparison of scores pre and post work-shop using the rubric REC

One-way ANOVA identified significant differences between the scores obtained at the pre and post measurements (F=16.54, df=39, p<.001), as shown in Table 3. Thus, there were changes in participant teachers' ways of explaining after peer assessment based on the rubric, which suggest an advance in this crucial teaching practice.

Table 3. ANOVA one-way pre and post workshop

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	189.225	1	189.225	16.540	.000
Within Groups	434.750	38	11.441		
Total	623.975	39			

Looking at case-to-case instances, only two pre-service teachers had difficulties with improving their initial score. Otherwise, the participants with low initial scores showed the greatest improvements at the end of the workshop. This suggests that formative peer assessment based on the rubric was especially appropriate for participants with greater difficulties in making scientific concepts explicit through explanations.

Regarding the general pattern, the majority of elements had a better score after the peer assessment workshop. Nonetheless, the weakest criteria at the beginning (SQ7, SQ10) were also the lowest criteria once the workshop ended. This suggests those elements need more support to be performed in a high level by pre-service teachers. Perhaps explanation based on metaphors, analogies or models require more refined content knowledge, which was not the focus of this workshop. They might also require extra time and dedicated interventions based on the intersection of pedagogical and content knowledge to reach the level expected by the rubric.

4. DISCUSSION

The rubric presented in this paper was useful in identifying strengths and areas for further development in pre-service teachers explanations. Making scientific concepts explicit through metaphors, analogies or models is relevant for teaching from a cognitive perspective, because they require higher-order thinking skills and flexibility of thinking (Ogborn et al., 1996). Moreover, they enhance students' representation and mental model construction (Aubusson, Harrison and Ritchie, 2006; Danielsson, Löfgren and Pettersson, 2018). However, they need a focused strategy to be improved in teacher education. Teachers' content knowledge has a role in their instructional representations (Danielsson, Löfgren and Pettersson, 2018). Perhaps a well-integrated, precise and intellectually challenging understanding of science would favor cognitively oriented teaching practice through explanations. Pedagogical experience is relevant for designing student-centered teaching practices (Koteva-Mojsovska and Nikodinovska, 2015), including simulated teaching practices as in our study.

In this paper, the easiest elements of the pattern in which pre-service teachers made scientific concepts explicit through explanations were clarity (SQ1) and connection with students' prior knowledge and experience (SQ6). After the workshop the rubric detected clearer explanations, which were connected with students' prior understandings and constructed from a synergy of teachers' and students' ideas - which is a prominent principle in a constructivist approach for science education (Geelan, 2012).

Otherwise, the rubric detected one element of explanation without improvement after peer assessment; using examples, graphic representations and images. These were the strongest elements at the beginning of the workshop. However, the participants reported

that after peer discussion about the characteristics of cognitively challenging examples, a few of them were more confident to use other resources such as analogies in the final microteaching episode, which might explain the decrease.

In summary, the development and application of the rubric allowed the diagnosis and improvement of participants' explanations in terms of explanatory clarity, coherence and cohesion of parts, sequence and sufficiency regarding the pedagogical aim, connection with students' prior ideas or experiences, and use of non-verbal language for representation and emphases.

Regarding the limitations of this research, as the participant selection was not randomized but voluntary based on a workshop invitation, statistical analysis such as factor analysis of the rubric were not used. Additionally, a comparison group was not available and the participants could abandon the workshop at anytime for ethical reasons. Thus, only data from participants with a minimum of 6 out to 10 sessions attended was considered for the results, so the initial sample size was reduced. For further research, better incentives for participants to remain during the workshops will be crucial.

The numerical comparison obtained through the rubric was based solely on an element's absence, presence and a quality aspect when performed. Hence, each element could have a score of 0, 1 or 2. Thus, only for comparative purposes can we establish a general pattern designed to give feedback to pre-service teachers to enable improving the weak elements. This is a limitation of other potential uses of the rubric such as promotion of teachers or other high-stake consequences.

Otherwise, considering explaining as a central competence for science teaching (Geelan, 2012), the present study contributes evidence for developing high-leverage practice before science teachers face the multiple challenges of real school settings. The study presented here highlights the relevance of preparing new teachers with varied strategies for making concepts explicit in the classroom. The rubric constructed for formative assessment is a tool for teacher education.

Moreover, the present study opens a discussion surrounding Pedagogical Content Knowledge (PCK) development in pre-service teachers. Making scientific concepts explicit through teaching requires PCK and practical experience. Shulman's postulates (1986) have remarked that PCK, as the amalgam between content, pedagogical and context knowledge, needs teaching practice and synergy to be crafted. The present research resonates with this, but expands the argument. Pedagogical Content Knowledge for making scientific concepts explicit for teaching can be developed during initial teacher education, if targeted practices are decomposed and rehearsed in protected formative context. Teaching practice in simulated settings might be introduced as a resource in the early stages of teacher education, which opens new research questions.

The present research also contributes to help fill the gap in the literature concerning the construction of explanations by science pre-service teachers - particularly regarding the elements for making scientific concepts explicit. Although the literature review suggested some features of effective explanations, such as adequacy to the audience (Norris et al., 2005; Sevian and Gonsalves, 2008) and the giving of examples (Buckley, 2000; Ogborn et al., 1996), no prior reference was found on how to transform those elements into assessment criteria for formative purposes in teacher education.

This paper also provides an organized and conceptually valid rubric to formatively assess pre-service science teacher explanations. The rubric was designed for diagnosing and intervening in teacher education, but also as a progress monitoring instrument, which is a novel contribution to the field of research in education and the practice of teaching.

5. CONCLUSIONS

Regarding the research question about the elements of pre-service teachers' explanations in a simulated context, this study has documented some diverse criteria of science teachers' explanations present in the cognitive science literature and described their assessment within the frame of the development of a rubric for teacher education. The findings showed the explanation strengths of pre-service teachers in explaining based on examples, graphs and images. However, difficulties were found in using and improving analogies, metaphors, and models, and approaching misconceptions as learning opportunities, which have to be addressed.

The rubric REC grouped structural and supportive elements in three levels of performance, based on conceptual features and the function they have on sharing and constructing meaning in the explanation. This organi-

zation answers the second research question; Can the elements be grouped in general constructs? (see REC in Appendix).

The third question of this study referred to the extent to which the elements of explanations can be organized and improved. The instrument has detected patterns and changes in simulating a high-leverage teaching practice; making scientific concepts explicit through explanations. This sensitive detection allows monitoring of constraints and advances during teacher education. There were statistically significant changes in participant teachers' ways of explaining after peer assessment, which suggest an advance in this crucial teaching practice. A large effect size was found (notwithstanding the small sample).

Thus, from this work, we recommend that teacher educators give opportunities to simulate, rehearse and assess teaching practices conducive to learning with a formative purpose, such as explaining for the classroom.

It is important to highlight that explanations for the classroom are different from scientific explanations. It is not enough to know explanations from science to explain successfully in the classroom. One of the critical aspects of teacher education is helping pre-service teachers to develop knowledge integrated with skills for teaching. Simulating explanations for the science classroom synergizes content knowledge and pedagogical content knowledge in one practice that has a strong influence on learning. Therefore, it is necessary that teacher education provides the learning scenarios for this to happen. We have described in this work the decomposition of practice for helping pre-service teachers to build skills and confidence, through formative peer assessment facilitated by the rubric REC, which we suggest especially for their weaknesses.

We know that school contexts present several challenges - many times the complex and simultaneous demands of real classrooms are shocking for new teachers. Hence, we recommend gradually introducing pre-service teachers to real settings of practice to allow them to orchestrate the bits and pieces needed for teaching diverse groups of students with different conditions and needs.

Simulation of relevant teaching practices, as in our study with explanations, together with a climate of constructive assessment and a detailed analysis of teaching practices can not only improve the preparedness to teach, but also help to build a culture of formative peer assessment with instruments such as REC that diagnoses, facilitates and monitors changes in high-leverage teaching practices.

Besides, this study echoes with the increased relevance of student-centered teaching approaches, not only in schools but also in teacher preparation programs.

APPENDIX

Rubric for formative assessment of Explanations of scientific Concepts (REC). Adapted from Cabello, (2013)

Criteria	Level 0	Level 1	Level 2
SQ1 Clarity	The explanation does not complete the levels 1 or 2, or the explanation is confusing, vague or tautological	First the explanation describes the concept, then the name or definition comes, **or** The explanation language is understandable for the learners	First the explanation describes the concept, then the name or definition comes, **and** The explanation language is understandable for the learners
SQ2 Coherence and cohesion	The explanation does not complete the levels 1 or 2	Every part of the explanation has a relation (i.e. cause/consequence, inclusion/exclusion, differentiation/similarity) with the next part, **or** The explanation has strong unifying ties	Every part of the explanation has a relation (i.e. cause/consequence, inclusion/exclusion, differentiation/similarity) with the next part, **and** The explanation has strong unifying ties
SQ3 Sequence	The explanation does not complete the levels 1 or 2	The explanation has a progressive (logical) sequence, **or** The ideas in the explanation scaffold the construction of the concept	The explanation has a progressive (logical) sequence, **and** The ideas in the explanation scaffold the construction of the concept
SQ4 Correctness	The explanation contains **inaccuracies** that drive learners to mistakes **or** The explanation contains a conceptual error	The explanation contains **inaccuracies** which do not drive learners to mistakes, however, the concept remains vague	The explanation does not contain **inaccuracies** **or** There are some generalisations which are essential for the learning process
SQ5 Completeness	The explanation shows **mainly elements not** contributing to the construction of the concept	The explanation shows **some** elements contributing to the construction of the concept	The explanation shows **the main** elements contributing to the construction of the concept
SQ6 Connection with learners' knowledge	The explanation does not complete the levels 1 or 2	The teacher identifies students' own ideas or remarks learners' everyday life facets related to the concept **without** explicit connections (i.e. integration, confrontation, etc.) to the explanation	The teacher identifies students' own ideas or remarks learners' everyday life facets related to the concept, **and** makes explicit connections (i.e. integration, confrontation, etc.) to the explanation

Criteria/level	Not achieved (0)	Half achieved (1)	Achieved (2)
SQ7 Metaphor, analogy, simulation or model usage	The explanation does not contain a correct analogy, metaphor, simulation or model,	The explanation contains a correct analogy, metaphor, simulation or model, **but** the concept features related to the analogy, metaphor, simulation or model are not evident	The explanation contains a correct analogy, metaphor, simulation or model, **and** The concept features related to the analogy, metaphor, simulation or model are clear and evident
SQ8 Example, experiment, graph or image usage	The explanation does not complete the levels 1 or 2	The explanation includes an example, graph or image to support the explanation, **but** The concept features related to the example, graph or image are not illustrated	The explanation includes an example, graph or image to support the explanation, **and** The concept features related to the example, graph or image are illustrated
SQ9 Gestures and speech usage	The explanation does not complete the levels 1 or 2	The teacher uses gestures to support the explanation, **or** The teacher uses the voice or speech pace to highlight some elements of the explanation	The teacher uses gestures to support the explanation, **and** The teacher uses the voice or speech pace to highlight some elements of the explanation
SQ10 Misconception as a learning opportunity	The explanation does not complete the levels 1 or 2	The teacher shows a misconception or common mistake **without** encouraging students to learn from this	The teacher shows a misconception or common mistake, **and** addresses how students can learn from this

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Conflict of interests

The authors declare no conflict of interest.

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MEDIA EXPOSURE AND EDUCATION OF FIRST TO SIX GRADE CHILDREN FROM SLOVENIA - PARENT OPINIONS

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ABSTRACT

The family environment plays an important role in influencing the way that children use the media and the degree of their exposure to media, however the mediating role of parents in this process is not sufficiently understood. The present paper presents the results of a 2016 Slovenian national survey in which opinions of 2,825 parents concerning their children's exposure to media were collected and analysed using the SPSS PSAW Statistic 18 software package. Our results show that exposure to media by children from the first to the sixth grade increases with age, that children of parents who are themselves heavy media users are more likely to be heavy users and that children who are heavy media users also receive lower test scores.

1. INTRODUCTION

Contemporary information and communication technologies or devices by which we receive media messages are present on every step of our daily routines and lives. Already radio, then television and today computers, smartphones and other screen media became central nodes of activity in homes around the world, defining family environments. As generations of families inevitably accepted contemporary media as something ordinary and necessary, so concerns have increasingly been raised among parents particularly concerning the influences and effects of contemporary media on their children (Alexander 2008, 121). "*Few would deny that media play a central role in the lives of today's children and adolescents. Their homes, indeed their bedrooms, are saturated with media. Many young people carry miniaturized, portable media with them wherever they go. They comprise the primary audience for popular music; they form important niche audiences for TV, movies, video games, and print media (each of these industries produces extensive content targeted primarily at kids); they typically are among the early adopters of personal computers (indeed, of most new media) and are a primary target of much of the content of the World Wide Web.*" (Roberts, Foehr, in Rideout 2005, 1). Parent concerns that media negatively affects children is related to the exponential technological development of contemporary society in which generation live in almost unrecognizably distinct ways. Parents have less knowledge and experience with new media than their children, who are in contact with the media almost since birth and so the parents lose some of control over their children's

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lives. (Valkenburg in Taylor Piotrowski 2017, 250).

1.1. The family environment

Studies of the influence of children's exposure to media, particularly screen media, on their physical and psychical development and socialization need to take into account the mediating role of parents and the family context in which the children spend most of the time. In a review of mass communication studies A. Alexander (2008) groups the theoretical and empirical research into several schools of thought with different backgrounds and attitudes towards the into the relationship between media and the family.

Historically most influential were studies in the framework of the social learning theory, a theory of learning and social behaviour, which proposes that new behaviour, can be acquired by observing and imitating others (Bandura 1977, 1994). According to the theory, children and adolescents learn or acquire behaviour and worldviews by imitating role models, which include those seen on TV, especially if the models are appealing or similar to children. The theory was supported by empirical research on the negative influence of television on violence in children (e.g. Bandura, Ross, in Ross 1961). A. Alexander (2008) contextualizes the noted social learning theory within the contemporary social cognitive theory, which aside from the already mentioned role-model imitation also points to the fact that the media can influence children's relationship with the family members as well as apprehension of family roles and family relationships.

The author reviews other theories related to the research into media and family environment such as cultivation theory (Gerbner et al. 1994), which studies long-term effects of individual's exposure to consistent media messages, which over the time leads to the overlapping of individual's world views with those presented in the media. The theory suggests that individuals who are exposed to violence as portrayed in the media may begin to believe that crimes are more common and ever increasing than in reality. It has been shown, however that the real world effect of this hypothesis is minimal (Ferguson 2014, 14).

Children are however not isolated individuals; they are entangled in relationships with other children and adults within families, peer groups and society as a whole. While both of the above mentioned theories focus on effects of media on individuals, the theory of family systems (Baran and Davis 2006) highlights the family as the basic unit of observation and research. The family is here understood as a system of interconnected parts so that changes in one part of the system can lead to changes in other parts. This approach allows the understanding of complex interactions between family members and the family process as a whole while also providing a more nuanced view of both negative and positive effects of media. Family members' interactions form behavioural patterns, including those related to media use, which become habitual in their everyday lives.

Related is another theoretical approach reviewed by A. Alexander (2008), namely the sociocultural approach (Craig 1999; Paus-Hasebrink et al. 2013), which draws attention to the broader cultural patterns of family habits and practices in relation to media use. This approach contextualizes mass media within a symbolical process in which societal reality (re)produces, maintains, rectifies and changes. Indeed, both theoretical (e.g. Alexander 2008; Valkenburg in Taylor Piotrowski 2017) and empirical research points to the fact that family and its socioeconomic and sociocultural context in particular is the most important mediating system of adolescent media use (e.g. Scherr et al. 2018; Roberts, Foehr, in Rideout 2005). A holistic approach to mass media research, particularly the research of the influence of media exposure on the development and socialization of children thus needs to take into account the socioeconomic and cultural contexts of children's family lives.

1.2. Media exposure effects

The media have both positive and negative effects on the families and on the relationships between children and parents. Media influences are actually much more complex than entailed in the simple dichotomy between negative and positive effects (Livingstone 2007). Furthermore in the complex tripartite relationship between children, parents and the media, each of these parts may be seen to play the role of a mediator of behaviour. The interactions of family members shape behavioural patterns, which become habits in their everyday lives. In this family process, the contemporary media play a crucial intermediary role as mediators of family interactions as well as purveyors of behavioural patterns seen on the

media. Parents mediate between the media and the children by setting rules and also by the fact that their own media habits unconsciously affect that of their children. The influence of family environment on the quantity and quality of exposure of children to media has been empirically shown also by extensive research in the United States (Roberts, Foehr, in Rideout 2005). Even children may be considered as mediators of their parents' media use and media-related behaviour. In relation to media education children may change their roles with the parents for example in observed cases when they remind parents of inappropriate media-related behaviour, inappropriate use of media, such as smart phones, in the public or of the parents' refusal to deal with children when the parents are busy or constantly check or reply to electronic messages on their devices (Kalin 2004). Studies show that screen media does also have a significant influence on the children's perception and understanding of family relationships, as they perceive the depictions of families in the media s realistic. Exceptional storytelling power of some contemporary media can, given intensive exposure of individuals, create a sense of social reality, which differs significantly from the reality of the outside world. Screen media, particularly television, often represent central nodes of family environments and the context of family interactions. In the negative sense this may results less personal intimate contacts between parents and children. In the positive sense this may result, on the contrary, to more interaction and more time that parents and children spend together. " /…/ *television may serve an almost limitless range of diverse uses and functions. Family members can watch television to be together or to get away from each other; as a basis for talk or to avoid interaction; as a source of conflict, or an escape from it.*" (Alexander 2008, 133)

Noted positive influences are for example the role that some media may play in encouraging routine family interaction and communication. Co-watching of evening television shows with appropriate entertaining or, even better, educational content should not be considered problematic but in some cases perhaps even encouraged. This is of course not possible when television is present in children's rooms or when children decide to watch television alone. We should also note the educative potential of media for the children with quality educational content related to vocabulary improvement, learning of native and foreign languages, learning about natural and cultural phenomena etc. Furthermore, the media as providers of information may allow families to gain crucial information, parents to be up to date with current events, actively participate in communities and help them with the socialization and education of their children. The media can be considered contemporary social equalizers, assuming that the media providers are readily accessible and affordable to the majority of families (Alexander 2008).

The negative influences of media are much better researched due to the interests and concerns of the general public. To mention only selected, more problematic issues, one of the better-documented is the correlation between exposure of children to media, particularly screen media, and lower physical fitness, higher body weight and obesity among children (Notten, Kraaykamp, in Tolsma 2013; Arango et al. 2014; Rutherford et al. 2015; Robinson et al. 2017). The correlation between media exposure and obesity is not related only to the significant screen time or long-term exposure and consequently a more sedentary lifestyle and physical inactivity of children, but also to exposure to marketing content in media. Television commercials, such as those paid by the fast food industry, often promote an unhealthy lifestyle (Robinson et al. 2017). Particularly worrying is the effect of media exposure on socialization of children as research shows a clear correlation between greater screen time and lesser time of interaction between children (Sigman 2012). Overall, children's involvement in mediated reality does bring challenges regarding their health, eating and sleeping habits, aggressive behaviour, language development, consumerism, building of identity and relationships with others.

Any research of media influence on children and adolescents is challenged by the fact that it is difficult to establish clear cause-and-effect relationships or rather to prove undeniably that media exposure directly influences behavior. Correlation does not necessarily means causation and this is not consistently clear from the published research. When greater and longer exposure to violent content in media coincides with higher crime or delinquency rate among adolescents, the media is not the only and indeed not the most important factor or mediator, rather one cannot solely blame media without considering other factors. As argued in the previous paragraph, it is the family and its socioeconomic and sociocultural position within the broader society that needs to be considered. The influence

of media on adolescents as family members is to a large extent dependent upon cultural, social and economic dispositions of individuals, families and communities. In other words, family media environment, media availability and use is affected by parent's ethnicity, education, income, etc. as well as adolescent's sex and age (Ferguson 2014; Roberts, Foehr, in Rideout 2005).

1.3. Parent Mediation

Parents face their fears concerning the negative effects of contemporary media on their children in several ways. They may limit their children's access to violent or sexual content or limit the time of exposure. This may sometimes lead to conflicts in the family, particularly between parents and their children. Control of time and content that the children are exposed to may be both implicit and explicit which means that it either works according to unwritten rules, such as children's self-control or the rules are set clearly by the parents (Alexander 2008, 133). Setting rules and all other types of control and interventions in relation to children's media exposure is usually called parent mediation (Alexander 2008; Valkenburg in Taylor Piotrowski 2017, 250).

There are no simple and universal solutions and answers to the questions of how the parents should protect their children from potentially harmful effects of exposure to media as the families greatly differ according to a range of cultural, socio-economic, psychological and other factors. Researchers nevertheless suggest two possible mechanisms of protection from harmful effects. (Chakroff in Nathanson 2008). The first is based on the parents' mediation of children's media use by open conversation about the content of media messages as well as about the appropriate time of exposure, the setting of rules to limit the quantity and quality of exposure and with the co-use or rather usually co-watching of the media. The second is based on mediation by the school by which the school introduces media literacy courses in school curricula in order to educate the children about the appropriate use of the media and to prepare them to be critical consumers of media messages.

Researchers who deal with mediation of media exposure empirically (see for example Böcking in Böcking 2009; Schaan in Melzer 2015) separate between active and restrictive mediation. Active mediation encompases open conversation about the media and encouragement of critical relation towards media messages. Restrictive mediation is based on the setting of rules about the quantity and quality of exposure as well as the so called co-watching. Some researchers argue that the results of restrictive mediation may often be contraproductive (Chakroff and Nathanson, 2008, 555). Some critical theoretical approaches however reject such understanding of mediation and argue that mediation is merely a remedying measure for the lack of quality family relationships, particularly those between parents and children (ibid. 557). More critical researchers also warn of a theoretical possibility of a counter-effect of teaching media literacy as children which are encouraged to a more detailed and critical treatment of media messages, to which they are exposed to, might better remember, internalize and later live out the violent and other negative messages: "/…/ *In fact, intervention research is prone to boomerang effects, in which the exact opposite effect of what was intended occurs*." (ibid. 558; Valkenburg in Taylor Piotrowski 2017, 250). Such theoretical concerns don't mean however, that media literacy education is not desired or even necessary, but they draw attention to the complexity of this research field and call for further empirical research with which to test different theoretical assumptions concerning exposure of children to media.

1.4. Comparable research

Comparable extensive, though somewhat outdated and geographically distant is the study of exposure to media published by (Roberts, Foehr, in Rideout 2005). The study encompasses a broader population of children and teenagers aged 8-18 years of which the younger group aged 8-10 is comparable to our research. The average exposure to television and other screen media, except computer, in this group was as much as 4:41 hours (ibid. tab. 4-A) in which the exposure was largely dependent upon the family ethnicity so that African-American children were exposed the most and Caucasian children the least (tab. 4-B). Exposure to computer in the same age group was 0:37 hours (ibid. tab. 4-J), while exposure to video game consoles was 1:05 hours. Books, magazines, newspapers and other printed media is used by the children in this age group for 0:44 hours on average (tab. 4-E), more in families of parents with higher education (tab. 4-F), while radio and other audio media are used for 0:59 hours on average

(tab. 4-G), more by girls than boys (tab. 4-H). The exposure to all media in this age group amounts to as much as 5:52 hours (tab. 5-A) on average, thus about 6 hours which surprisingly represents a quarter of the day and roughly more than a third of the day spent not sleeping. If we compare this research to our own we find out that more than a decade ago American children were exposed to different media about two times as much as primary school children in Slovenia. It should be pointed out however that a large percentage of children multitask, meaning they use multiple media or rather media devices simultaneously. The total exposure time is thus possibly significantly lower (Roberts, Foehr, in Rideout 2005, 36). Percentages of use of individual media by children in the noted research are 55% for television and related media, 14% for radio and other audio media, 7% for desktop and tablet computers, 12% for printed media and 12% for gameplay on the video game consoles (tab. 5-C). The study also underlines the facts that children with personal devices or devices which are present in their own rooms are exposed much longer on average (tab. 6-A), that lower exposure time correlates with rule-setting by their parents (tab. 6-B) and that the overall media environment influences the children's exposure to media (tab. 6-C): "*Clearly, in homes where the TV plays a central role in defining the environment, all media exposure increases.*" (Roberts, Foehr, in Rideout 2005, 46). The authors argue that "*the amount of time young people have available to devote to media seems to have reached some kind of ceiling, but the amount of media messages to which they are exposed apparently has not. Kids seem to be engaging one, two, three, or more media simultaneously — or at least in a manner that looks simultaneous. Whether the consequences of such media behavior are good, bad, or neutral remains an open question.*" (Roberts, Foehr, in Rideout 2005, 55)

An updated study by the same authors (Rideout, Foehr, in Roberts 2010) produces roughly similar results while the screen-time or rather the time of exposure to screen media for children greatly increased. In their first study from 1999. the total daily media exposure time was 6:19 hours, in 2004 it was 6:21 while in 2009. it was already 7:38, amounting to almost half of the day not spent sleeping. These numbers account for multitasking. Despite the fact that the authors in their previous study supposed that the total daily exposure time already reached maximum levels, as cited in the previous paragraph, the exposure time continues to rise and it seems that it can potentially cover the whole children's leisure time at least for those most exposed. This does or will in the near future undoubtedly have repercussions for the quality and quantity of interactions between children and parents as well as children and their peers and on children's socialization.

From Europe the best and most up-to-date comparison to our research is the annual report of media exposure by the British government agency Ofcom („Ofcom" 2014). Last year's report for age group 8-11 years shows that 39% of children own personal mobile phones, 52% own tablet computers, 95% watches TV programs for two hours per day on average. Fifty two percent of children watches TV programs on the tablet computer. Eighty-five percent of children play computer games for an hour and a half per day on average. Ninety-five percent of children surf on the internet and are exposed to internet content for about two hours a day, among these 46% use the internet via the computer while 22% use it on their mobile phones. YouTube is the most popular internet site and is used every day by as much as 81% of children. Twenty-three percent of children aged 8-11 also has an active profile on social media (Ofcom 2016).

2. MATERIALS AND METHODS

In 2016. we conducted a national survey, collecting opinions of parents regarding first to sixth grade school children's media exposure and habits. A total of 62 school participated in the survey. Data was collected using online questionnaires, where links were sent to parents from randomly selected classes. In total 2,825 parents of first to sixth grade children (ages 6-12) were included in the survey. Subjects participated voluntarily and were not financially compensated, as their participation was anonymous, not involving a name or any identifiable information about subjects. We monitored the process using IP tracking and Google forms. Schools were located in all geographical regions with equal divide among rural and urban population.

Research sample of parents resembles according to the age (average 40 SD=5 years). 54% of children lived in 4 member households, 54 % lived in rural areas. Parents opinions were in 51% for male gender (boys). Thirteen percent of children were in shared custody. Age and geographical location of families and as so children were controlled so that the sam-

ple was not additionally adjusted (weighted). Parents who responded to the survey questions were about evenly distributed in two age groups of 1-to-3-grade children (6-9 years) and 4-to-6-grade children (10-12 years). The questionnaire consisted of 54 variables plus 14 demographic. Questions regarding opinions were gathered using 5-item Likert scale (1-never to 5-always). Media exposure was measured as total daily exposure time on each device/media. These data were than grouped in later analysis.. Internal consistency of the questionnaire was high: Cronbach alpha was 082 for media exposure subscale an 0,71 for opinions subscale. We analysed the data using SPSS PSAW Statistic 18.

Among the goals of this research, was to collect data on media exposure of the two age groups of children, presence and usage of different devices and information sharing. In addition a special focus was on parents as media limitators and educators. As such the following hypotheses were structured:

Hypothesis 1 (H1): Child's exposure to media increases with age (1-3 grade in comparison to 4-6 grade)

Hypothesis 2 (H2): Parents who are heavy media users cause that their children are more likely to be heavy users as well

Hypothesis 3 (H3): 4-6 grade children who are heavy media users have lower grades in school (1-3 grade children are not graded and were therefore not analysed)

3. RESULTS

Electronic devices in children's rooms (controlled by children) of 1-6 grade children in Slovenia are not low. Only 16,5% of children aged 6-to-12-years old have a TV set in their room. Every third child has a radio and 38% has their own PC or tablet. 43% of children have personal owned device that connects to the internet and every other child has their own mobile phone. One in six has it own game console. Although there are not large differences in owning the devices between the age groups there are substantial differences in the exposure times. These differences can be clearly seen on Table 1.

Table 1. Average media exposure times of the two age groups (in minutes daily) on different media.

	Using TV device (television, video, games and other)	Radio	Computer or tablet	Mobile phone for all activities	Printed media	Game console with screen	Sum of all media devices usage
1- to 3-grade-children	66	21	29	13	23	4	156
4- to 6-grade children	78	26	43	38	25	9	219
Both groups (1-6 grade)	71	23	35	23	24	6	182

Source: own survey.

The most commonly used media device for both age groups is still TV (due to large screen) as on average 6 to 12 year olds (both age groups) spent more than an hour daily. Total media exposure times are about 3 hours daily. We used the independent t-test to analyse H1 (differences between the mean exposure of two independent age groups). It was assumed the sampling distribution of differences between means is normally distributed in the population. For the following t-tests the assumption of homogeneity of variance has been violated, and the Equal variances not assumed t-test statistic was used for evaluating the null hypothesis of equality of means. There are significant differences in media exposure between the two age groups (1-3 grade and 3-6 grade).

• Total media exposure: t (df = 2811) = -9,385 p< .001. The mean values indicate that younger children are less exposed all media (M=156) than older (M=219).

• TV device: t (df = 2782) = -5,718, p< .001. The mean values indicate that younger children are less exposed to TV (M=66) than older (M=78).

• Radio: t (df = 2569) = -2.573, p< .01. The mean values indicate that younger children (M=21) listen to the radio less than older (M=26).

• Computer or tablet: t (df = 2710) = -8,661, p< .001. The mean values indicate younger children (M=29) are less exposed to computer or tablet then older (M=43).

• Mobile phone - t (df = 2678) = -15,008, p< .001. The mean values indicate younger children use substantially less mobile phones (M=13) then older (M=38).

• Printed media: t (df = 2627) = -1,507, p> .05. No significant differences between the two groups.

• Game console with own screen: t (df = 2576) = -4,382, p< .001. The mean values indicate younger children (M=4) use less video games console with screen then older (M=9).

To test H2 parents and children were divided into three groups similar in numbers (border framework 33 and 66 percentiles) into small medium and heavy media users. The results of the 3x3 analysis design can be seen on Table 2.

Table 2. Media exposure times of small, medium and heavy media users parents in comparison to small medium and heavy media children in minutes of daily use and the percentage of all*

	Children **small** media users	Children **medium** media users	Children **heavy** media users	Total
Parents **small** media users	63 (11%)	131 (11%)	**271 (6%)**	132
Parents **medium** media users	66 (9%)	135 (12%)	303 (16%)	189
Parents **heavy** media users	64 (9%)	133 (12%)	**331 (14%)**	195

Source: own survey.
**n>253 for each groups*

To test the hypothesis H2 we used chi-square and found significant differences between groups; chi square (4)= 120,611 at p<.000. The difference can be seen that there are only 6% of children that are heavy media users where at the same time parents are light media users. In contrast there are 14 % of heavy users children in a heavy users parents group. This confirms that when parents are heavy media users this has an effect that their children are far more likely to be in the same group.

Finally for H3 we used the analysis of variance to test if 4-6 grade children's media exposure has an effect on school grades (ANOVA). Grades in Slovenia are 1 to 5 where 5 is excellent. We found that significant differences between the grades of small, medium and heavy media users F (2, 1161) = 16,760, p<0,001. Post hoc Scheffe showed significant differences between children who are heavily exposed and other two groups. Average mark of light users was 4,67, medium was 4,66 and heavy was 4,46. The difference is small, however we have to consider very high average marks in grades 4 to 6 and that the difference of 0,21 represents a 4,7% difference. It seem that being a heavy user child already in these first years of education has an effect on school average academic performance.

4. DISCUSSION AND CONCLUSIONS

The family environment plays an important role in influencing the way that children use the media and the degree of their exposure to media, however the mediating role of parents in this process is not sufficiently understood. The present paper presents the results of a 2016 Slovenian national survey in which opinions of 2,825 parents concerning their children's exposure to media were collected and analysed using the SPSS PSAW Statistic 18 software package. Our results show that exposure to media by children from the first to the sixth grade increases with age, that children of parents who are themselves heavy media users are more likely to be heavy users and that children who are heavy media users also receive lower test scores.

The following hypotheses have been structured, from which we determine:

H1: There are significant differences in media exposure between the two age groups (1-3 grade and 3-6 grade).

H2: Confirms that when parents are heavy media users this has an effect that their children are far more likely to be in the same group.

H3: It seem that being a heavy user child already in these first years of education has an effect on school average academic performance.

From the collected results we can conclude that family has a very important impact on whether or how children use the media as part of their free time and also for the needs of the school work.

In this regard, we would like to point out that in this context the role of parents or family is not clearly defined. Children often use the media and are at the same time exposed to potential exploitation of the media for marketing purposes. Of course, parents are not aware of this directly, since they are also the users of the media themselves, but the media affects them less, since they can reasonably decide what is good for them and what is not.

We can conclude that the media are an integral part of the educational process of children in elementary school and also in further education, and despite some negative conse-

quences that the media can have on children, the media is an important element in achieving better academic achievements.

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Conflict of interests

The authors declare no conflict of interest.

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MUSIC STUDENTS' INTERCULTURAL SENSITIVITY TO DIFFERENT RELIGIOUS CONVICTIONS

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ABSTRACT

The authors' aim is to analyze the degree of openness to different religious convictions among students of Department of Music, Faculty of Arts in Niš, and also to test whether these students have an active attitude on overcoming religious prejudice. The research was initiated due to the fact that during their education, through various teaching activities (playing, singing, conducting, composition, listening to music and its analysis) students become familiar with religious, spiritual, and church music, as a constituent part of different religions. The assumption is that precisely through music as one of the most universal media of artistic communication students can establish and develop a positive attitude to religious differences. Research results show that students are aware of various religious convictions and affiliations, but they do not show enough sensitivity to respecting differences, and they do not take part in the struggle against prejudices that accompany those differences.

1. INTRODUCTION

The connection between music and religion, which can be traced back to the very beginnings of human society and civilization, provides numerous opportunities for studying various aspects of their relationship and mutual influence. The study of these interactions is obviously quite inspirational because it has contributed to the establishment of a broad research domain, as testified by a huge number of papers dedicated to this topic (Begbie 2000; Yob 2010, 145–151; Hoffman 2011, 55–59; Westermeyer 2013, 567–583; Laack 2015, 220–246; Engelhardt and Bohlman 2016; MacInnis 2017, 51–64).

Each for itself, but also fused with one another, religion and music provide some of the key reference points around which collective and individual entities are formed; they represent powerful means of communication, venues of interlinking but also of putting up cultural barriers. An unavoidable segment of various religions and religious practices, music represents their recognizable aural symbol, and indirectly also a symbol of other identities, given the interpretation that precisely religious identity represents the core of ethnic and national identities. At the same time, regardless of the ways in which music interlinks with religion, and of the level to which music is subordinate to religious practice and religious canons, music in general, and thus also various forms of religious music – religious, spiritual, church/liturgical (Perković Radak 2006, 57–70; Prodanov 2007, 21–31; Marinković 2012, 61–72) possess universal properties which are not limited solely to the religious domain, but can act as an interlinking medium in the much broader domain of culture:

> „If music is an integral part of what it is to be human, then it ought to reflect something of the image of God in

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> which we are made. If part of the imago Dei is the relationship of love that lies at the heart of the Trinity, then perhaps music can open up a way of thinking about how we relate to the world and to God in a manner where love, rather than reason, dominates. After all, music is inherently relational, both internally in the way its notes are put together and externally in the way in which it is used to communicate in everyday life" (Chua, 2011, p.160).

Current processes of globalization and accelerated movement in time and space, caused by economic and migrations originating from wars and conflicts, have resulted, on the one hand, in the articulation of demands for an integrated society governed by a dialogue of cultures and the awareness of the need to acknowledge variety and specificities, but, on the other, in resistance to such demands in the form of the reactivation and enhancement of nationalism, religious intolerance, xenophobia, and racism. The concept of intercultural education, which puts an emphasis on intercultural communication and acquisition of intercultural competences, has derived precisely from the effort to reconcile and harmonize these opposing tendencies and thus enable the joint living of ethnic, national, and religious communities in the multicultural context, which has become one of the crucial characteristics of modern society (Campbell, 2002; Vidosavljević, Vidosavljević and Krulj Drašković, 2016).

The study of music students' intercultural sensitivity to different religious convictions was initiated due to the fact that during their entire education, through both their artistic and practical process (playing, singing, conducting, composing, listening to music) and scientific and theoretical educational process (history of music, music literature) students learn about the forms of religious, spiritual, and church (liturgical) music of numerous cultures and traditions – global, European, regional, national – covering various time periods and styles. Religious and spiritual music prevails in the curricula, but one should note that a certain number of students is actively involved in extracurricular activities – they sing in church choirs and thus participate in the service by performing liturgical music.

Yet, the obvious focus on the western European musical canon still prevails, and the study of the music of other cultures is more or less marginalized. For this reason, a more detailed analysis of conditions in the academic practice suggests that in the process of music education global educational requirements pertaining to the acquisition of knowledge and raising awareness on musical and cultural heterogeneity (religious, ethnic, linguistic) – are only partly met.

This research has been conducted precisely in order to analyze the degree of openness to different religious convictions among students of Department of Music, Faculty of Arts in Niš, and also test whether these students have an active attitude in the struggle against religious prejudice. Students of the Faculty of Arts in Niš represent a part of the ethnically and religiously homogeneous urban population of the second city in Serbia by size (about 250,000 inhabitants, according to the 2011 census), which has more than 90% Serbian population, the majority of whom are Christian Orthodox (Републички завод за статистику/Statistical Office of the Republic of Serbia, 2013). Niš Faculty of Arts also has students from other parts of Serbia, in which there is more ethnic and religious heterogeneity (north Serbia, Vojvodina), but their number is much lower. The second ethnic community by size in the city are Romanies (more than 5%), while other ethnic communities do not exceed 1% each (Републички завод за статистику/Statistical Office of the Republic of Serbia, 2013).

2. MATERIALS AND METHODS

The research was conducted on a sample selected from among students of the Faculty of Arts at the University of Niš (N=101). It was carried out in May, in academic 2016/2017. Participants were undergraduate students of the Music Theory and Pedagogy and the Performing Arts programs, and also graduate students of the Music Theory and Pedagogy program. Among them, most were second year students (30 or 29.7%), third year students (24 or 23.8%), first year students (22 or 21.8%), and finally fourth year students (15 or 14.9%). The fewest students surveyed attended the master's program in Music Theory and Pedagogy (10 or 9.9%).

The research was based on the descriptive method. Surveying was used as a method to gather data. For this purpose, a previously constructed questionnaire was used (Dobrota 2016, p. 209–218). In the first part, this instrument contains questions related to participants' sociodemographic data (type of studies, year of studies, and study program), while in

the second it is based on *The Munroe Multicultural Attitude Scale Questionnaire* (Munroe and Pearson 2006) with three separate domains: knowledge/awareness, care/sensitivity, and acting/activity. Authors of this intercultural attitude questionnaire opined that proper assessment of the participant's condition in the three given domains would help establish an atmosphere that would be supportive in shaping intercultural attitudes.

The data obtained were processed in the *IBM SPSS Statistics 23.0* software package. Descriptive statistics used included frequencies, percentages, means, and standard deviation. To reach statistically valid conclusions, the analysis used the non-parametric Chi square test, One-way ANOVA, and Paired Samples T-test.

3. RESULTS

3.1. Knowledge/awareness of differences in religious convictions

By means of the first research task we wished to examine how students perceived the position that religious convictions differ from one another. Students expressed their attitude by selecting one out of five claims offered (*I do not agree at all* – 1, *I do not agree* – 2, *I neither agree nor disagree* – 3, *I agree* – 4, *I fully agree* – 5).

Based on the obtained means (M=4.74, SD=0.50) we notice that students are quite aware and express a high degree of knowledge of the fact that religious beliefs differ. In fact, almost all participants (97.0%) agree with the position that they are aware of religious differences. Of them, more than two thirds (77.2% students) fully agree with the claim, while 19.8% express agreement. Only 3% participants expressed indecision with regard to this claim (Table 1, 2).

Table 1. Students' attitude on differences in religious convictions, by study program

	I neither agree nor disagree	I agree	I fully agree	Total	
Music Theory and Pedagogy	2 3.4%	8 13.6%	49 83.1%	59 100.0%	M=4.74 SD=0.50 χ^2=3.499 df=2 p=0.174
Performing Arts	1 2.4%	12 28.6%	29 69.0%	42 100.0%	
Total	3 3.0%	20 19.8%	78 77.2%	101 100.0%	

Table 2. Students' attitude on differences in religious convictions, by year of studies

	I neither agree nor disagree	I agree	I fully agree	Total	
First	0 0.0%	4 18.2%	18 81.8%	22 100.0%	
Second	1 3.3%	6 20.0%	23 76.7%	30 100.0%	
Third	1 4.2%	7 29.2%	16 66.7%	14 100.0%	χ^2=7.337 df=8 p=0.501
Fourth	1 6.7%	0 0.0%	14 93.3%	15 100.0%	
Master	0 20.0%	3 30.0%	7 70.0%	10 100.0%	
Total	3 3.0%	20 19.8%	78 77.2%	101 100.0%	

3.2. Care for / sensitivity to the respect of different religions

The second research task was to test students' attitudes on the respect of religious differences. The students expressed their attitude to the claim I am sensitive to the respect of various religions by selecting one out of five answers offered (*I do not agree at all* – 1, *I do not agree* – 2, *I neither agree nor disagree* – 3, *I agree* – 4, *I fully agree* – 5).

The means we obtained (M=3.00, SD=1.23) suggest that students are neutral in terms of care for respecting various religious convictions. This is the attitude of 35.6% participants. Full sensitivity to and care for the respect of different religions is reported by 13.9% students, while a bit more of them – 18.8% – stated they felt a certain amount of sensitivity. Disagreement with the claim *I am sensitive to the respect of various religions* was expressed by 16.8% students circling number 2 on the Likert scale, and 14.9% students circling number 1. We can conclude that most participants are undecided on the matter of care for respecting other religions (35.6%). When one groups students' responses, one notices a similar number of those who are sensitive and express care for respecting various religious convictions (32.7%) and those who do not express such care (31.7%) (Table 3, 4).

Table 3. Students' attitude on respecting different religions, by study program

	I do not agree at all	I do not agree	I neither agree nor disagree	I agree	I fully agree	Total	
Music Theory and Pedagogy	5 8.5%	12 20.3%	22 37.3%	10 16.9%	10 33.9%	59 100.0%	M=3.00 SD=1.23 χ^2=6.267 df=4 p=0.180
Performing Arts	10 23.8%	5 11.9%	14 33.3%	9 21.4%	4 9.5%	42 100.0%	
Total	15 14.9%	17 16.8%	36 35.6%	19 18.8%	14 13.9%	101 100.0%	

Table 4. Students' attitude on respecting different religions, by year of studies

	I do not agree at all	I do not agree	I neither agree nor disagree	I agree	I fully agree	Total	
First	7 31,8%	4 18,2%	7 31,8%	2 9,1%	2 9,1%	22 100,0%	
Second	3 10.0%	1 3.3%	17 56.7%	5 16.7%	4 13.3%	30 100.0%	
Third	5 20.8%	4 16.7%	7 29.2%	6 25.0%	2 8.3%	24 100.0%	χ^2=27.272 df=16
Fourth	0 0.0%	4 26.7%	3 20.0%	4 26.7%	4 26.7%	15 100.0%	p=0.039
Master	0 0.0%	4 40.0%	2 20.0%	2 20.0%	2 20.0%	10 100.0%	
Total	15 14.9%	17 16.8%	36 35.6%	19 18.8%	14 13.9%	101 100.0%	

Table 5. Differences in attitudes to the respect of different religions, by year of studies

Claim	Year of studies	N	M	SD	F	p
I am sensitive to the respect of different religions	First	22	2.45	1.29	2.259	0.068
	Second	30	3.20	1.06		
	Third	24	2.83	1.27		
	Fourth	15	3.53	1.18		
	Master	10	3.20	1.22		

3.3. Students' activity in fighting against religious prejudice

The third research question had the goal to determine how much students become involved in the struggle against religious prejudice, i.e. whether they actively oppose religious prejudice. In the survey, students were given an opportunity to use numbers from 1 (*I do not agree at all*) to 5 (*I fully agree*) so as to assess the degree to which they agree with the given claim.

The results we have obtained (M=3.91, SD=1.05) suggest that students do not actively participate in the struggle against religious prejudice. The claim *I do not actively participate in the struggle against religious prejudice* has received 36.6% responses showing full agreement, and 29.7% responses indicating agreement.

Table 6. Students' attitude on fighting religious prejudice, by study program

	I do not agree at all	I do not agree	I neither agree nor disagree	I agree	I fully agree	Total	
Music Theory and Pedagogy	0 0.0%	4 6.8%	18 30.5%	17 28.8%	20 33.9%	59 100.0%	M=3.91 SD=1.05 χ^2=6.088
Performing Arts	2 4.8%	4 9.5%	6 14.3%	13 31.0%	17 40.5%	42 100.0%	df=4 p=0.193
Total	2 2.0%	8 7.9%	24 23.8%	30 29.7%	37 36.6%	101 100.0%	

Table 7. Students' attitude on fighting religious prejudice, by year of studies

	I do not agree at all	I do not agree	I neither agree nor disagree	I agree	I fully agree	Total	
First	1 4.5%	2 9.1%	5 22.7%	6 27.3%	8 36.4%	22 100.0%	
Second	1 3.3%	4 13.3%	7 23.3%	10 33.3%	8 26.7%	30 100.0%	
Third	0 0.0%	2 8.3%	3 12.5%	6 25.0%	13 54.2%	24 100.0%	χ^2=12.482 df=16
Fourth	0 0.0%	0 0.0%	5 33.3%	4 26.7%	6 40.0%	15 100.0%	p=0.710
Master	0 0.0%	0 0.0%	4 40.0%	4 40.0%	2 20.0%	10 100.0%	
Total	2 2.0%	8 7.9%	24 23.8%	30 29.7%	37 36.6%	101 100.0%	

4. DISCUSSION

Our research has studied students' knowledge/awareness of there being different religions, their care for/sensitivity to respecting different religions, and activity with the purpose of preventing religious prejudice.

The analysis of awareness of differences in religious beliefs (the attitude of awareness that there are different religious beliefs) by the study program (Table 1) shows that most students of the study program in Music Theory and Pedagogy (83.1%) fully agree with this claim, i.e. they express a high degree of awareness of religious differences. Unlike this group, a bit fewer students of the study program in Performing Arts fully agree with our claim (69.0%). Agreement with this attitude was expressed by 28.6% students of this study program. However, these differences between students of the two programs did not reach statistical significance (χ^2=3.499; df=2; p=0.174).

One reads from Table 2 that there are no significant differences in the awareness of religious differences among students of various years in the Faculty of Arts in Niš. We may claim that students of all years of undergraduate and graduate studies fully understand that there are differences in religious beliefs. Although the highest agreement with the claim was given by 4th year students (93.3%), differences in attitudes are minimal, as also testified by the results of the Chi-square test (χ^2=7.337, df=8, p=0.501), showing no statistically significant differences.

By analyzing student's responses based on the study program (Table 3) one notices that there are only minimal differences in attitudes on the respect of different religions. Students of both programs are mostly undecided in terms of their care for the respect of different religious convictions. Although one

may notice minimal differences in positions, results of the Chi-square test suggest that they are not statistically significant (χ^2=6.267; df =4; p=0.180).

Results of the Chi-square test (χ^2=27.272, df=16, p=0.039) show a statistically significant difference in the attitude on the respect of different religions based on the year of studies. By analyzing Table 4 we find that first year undergraduates show the least sensitivity to the respect of different religious convictions (50.0%). In the second undergraduate year, students are undecided (56.7%), while in the third year responses are evenly distributed. Responses given by fourth year undergraduates suggest that these participants express care for and sensitivity to the given claim (53.4%), while master students' responses are evenly distributed. We may say that, as they progress from lower to higher years of their studies, students become more careful of and sensitive to respect of different religions.

Measured by the ANOVA test, differences in the attitude on respecting different religions based on the year of studies remain at the borderline of statistical significance (F=2.259, p=0.068). A post-hoc test revealed a significant difference between the first (M=2.45, SD=1.29) and fourth year of studies (M=3.53, SD=1.18), regarding the attitude to the claim *I am sensitive to the respect of different religions* (Table 5).

The results of this research show that 66.3% participants are not active in the fight against religious prejudice in any way. A neutral attitude to this claim has been expressed by 23.8% students, while 7.9% of participants disagree. Full disagreement with the given claim has been expressed by merely 2.0% participants. Based on all these facts, we can claim that only 9.9% students are actively involved in the struggle against religious prejudice.

By crosstabulating responses to the question about participation in the struggle against religious prejudice with the study program (Table 6), we obtained results suggesting that attitudes of students of Music Theory and Pedagogy on the one hand and Performing Arts on the other differ only minimally. A more prominent difference has been noted with regard to the position *I neither agree nor disagree*, which was selected by 30.5% students of Music Theory and Pedagogy and 14.3% students of Performing Arts. By analyzing the responses, one may conclude that students of Music Theory and Pedagogy presented a more neutral attitude than students of Performing Arts. The minimal differences are reflected in the result of the Chi-square test (χ^2=6.088, df =4, p=0.193), which does not provide statistical significance for the differences noted.

Analysis of students' attitudes viewed against the year of their studies (Table 7) shows that all students have a similar attitude to becoming involved with the struggle against religious prejudice. The least active are third-year undergraduates, who do not act against religious prejudice in as many as 79.2% cases. Chi-square test shows no statistically significant differences among the year of studies in terms of struggle against religious prejudice (χ^2=12.482, df=16, p=0.710).

Our research has studied students' knowledge/awareness of there being different religions, their care for/sensitivity to respecting different religions, and activity with the purpose of preventing religious prejudice. Based on the t-test results (t=13.01, df=100, p=0.000) one can conclude that students are highly aware of the existence of different religious convictions (M=4.74), yet they are not sufficiently sensitive to the respect of those differences (M=3.00). Moreover, t-test results (t=7.22, df=100, p=0.000) suggest that although students are aware of religious differences (M=4.74), they do not become actively involved in the struggle against prejudice emerging from those differences (M=3.91).

5. CONCLUSION

Based on the results of the study we have conducted, we have partly corroborated that students of the Faculty of Arts are open to different religious convictions. We have found that, as they progress toward the higher years of studies, students increase their care for and sensitivity to the respect of different religions. At the same time, results show that students very rarely become involved in the struggle against prejudice that accompanies religious differences.

Having in mind the fact that in music education there is a general focus on the study of western European art music, one needs to create conditions for the affirmation and study of music from other cultures, including familiarization with their musical characteristics. The occasional attempts made in this direction so far, aiming to enrich the study programs and the music education process in general with global educational trends to continually add new musical idioms to the study programs, cannot provide the proper basis for

raising awareness on musical and cultural (religious, ethnic, linguistic) heterogeneity. In order to properly recognize, understand, and value the quality of the music of other nations, students of all study programs need to partake in various forms of the teaching process (playing, singing, conducting, composing, listening to music, music analysis) so as to become directly and actively familiar with the religious, spiritual, and church music of different religions. Such a teaching process would contribute to the emergence of an appropriate background for the acceptance of new values, and thus support the development of intercultural sensitivity, which would include the much needed interdisciplinary approach and critical reflection on the part of the students.

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Conflict of interests

The authors declare no conflict of interest.

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THE TRANSVERSAL COMPETENCE FOR PROBLEM-SOLVING IN COGNITIVE LEARNING

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ABSTRACT

The opportunities education provides to develop the student's ability to use cognitive skills to understand and solve problems whose solution is not obvious and the student's willingness to engage in problem solving as a constructive and thinking citizen are essential for the realization of the approach from transversal competences to transversal personality. The study puts an emphasis on exploring the conditions for the development of transversal competence for solving educational-and-cognitive problems that is portable through different learning contents, different activities and ages. The highlights of pupils' cognitive development have been used as a basis for turning them into subjects of problem-based training aiming at the development of transversal competence to solve problems. The here developed task system for solving integrated problems in science education allows diagnosing the level of competence of cognitive-learning problem solving as transversal. Achieving this result in school education is directly linked to the teacher's competence to design a proactive educational environment i.e. to the requirements for the training of pedagogical specialists in existing conditions.

1. INTRODUCTION

The idea that the key competences formed in the course of school education are the foundation for cultivating any special competence for full personal and professional development serves as a basis for a continuous research on the level of knowledge and skills that students have acquired at the end of the compulsory stage of their education and on the to which extend this would allow them to realize and compete in the labor market. The evaluation of mathematical, reading and science literacy of the students through PISA criteria includes tasks related to solving problems that in particular measure the ability of students to use the knowledge acquired in school to cope with the challenges of real life. However, unlike the traditional evaluation of PISA, assessment of problem-solving skills focuses on the ability of students to think and manage the solving problem process by putting them in unfamiliar situations. This type of tasks were first included in the PISA 2003. test and were the first attempt at standardized assessment and definition of problem-solving skills and their role in future development of young people and their effective and active contribution and functioning in society.

It is believed that these skills are not formed in the training of just one subject and are not limited to a specific content area. They are interdisciplinary and are the product of the overall preparation of the students. The PISA 2003. concept for problem solving skills is further developed in 2012. when the assessment of this module became a computer-based test. The new format allows computer simulations of problem situations to be used, as well as a focus on the so-called interactive problems, the solving of which is the students main prerogative. This approach was also applied in the testing in 2015, which includes assessing student skills for cooperative problem solving. Thus, the study develops further to test the ability of young people to deal with various problems in significantly more complex situations requiring cooperation and mutual

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assistance (OECD, 2014; Petrova, 2016: 3-4).

Already in 2012, Bulgarian students are lagging significantly in terms of their ability to use cognitive skills to solve **real-life problems**. As it can be seen from Table 1, the 9th graders in Bulgaria are in the last place with respect to this indicator.

The data in this category are quite controversial, as in other countries, such as Denmark and Germany, the students have quite high scores in the general education categories (mathematics, reading comprehension and science) but still show significantly worse than expected problem-solving ability. Bulgarian 9th-grade students, however, have undoubtedly very little ability to use their knowledge to solve problems compared to students from other countries with similar knowledge in mathematics, reading, and science.

Table 1. Results in solving real-life problems PISA 2012

Problem-Solving		Problem-Solving	
Korea	13,98	Taipei (China)	-9,74
Japan	10,64	Belgium	-9,90
Serbia	10,62	Denmark	-11,43
USA	10,37	Cyprus	-11,73
Italy	9,92	Germany	-12,47
England	7,98	Malaysia	-13,88
China	7,69	Turkey	-14,04
Brazil	7,09	Estonia	-15,00
Australia	6,91	The Netherlands	-15,86
France	5,19	Hong Kong	-16,31
Singapore	1,55	Ireland	-18,45
Norway	1,08	Ireland	-19,50
Chile	0,96	Croatia	-22,38
The Czech Republic	0,85	Monte Negro	-24,46
Canada	-0,2	Uruguay	-26,84
Sweden	-0,92	Israel	-27,66
Portugal	-2,96	Slovenia	-33,57
Russia	-3,80	Hungary	-33,87
Slovakia	-4,77	UAE	-43,20
Austria	-4,88	Poland	-44,11
Columbia	-6,91	Shanghai (China)	-51,46
Average OECD	-7,00	**Bulgaria**	**-54,33**
Finland	-7,98		

[1] Negative values show that the students in the respective country are doing worse in solving real-life problems than students with similar results in maths, reading comprehension and science world-wide.

In one of the first surveys - the "PISA 2012" survey, Bulgaria occupies the penul-timate 43rd place, with the 9th graders reg-istering their lowest results in terms of problem-solving compared to their achievements in mathematics, reading com-prehension and natural sciences, which are also tested by PISA - 402 points vs. 500 points on average for the OECD countries. Bulgarian students have serious difficulties in researching and understanding problems, presenting and formulating, planning, im-plementing, controlling and rationalizing certain situations. This is why they fall below the first (33.3% of the students, with an av-erage of 8.2% for OECD countries) or are in the first level of results, with only 1.6% in the fifth and sixth levels where results can be considered excellent.

In the context of cooperative problem-solving to the PISA 2015 problems, only 2% of students show a high level of cooperation, successfully overcoming disagreements in the team and **taking effective action to solve the problems**; the average result of Bulgarian students in cooperative problem solving (444 points) is lower than the average for all participants (500 points).

The search for ways to increase the effectiveness of learning, the interest and motivation for learning is a major task of modern education and an important determinant of its quality. Problem-based learning is seen as one of the possibilities to achieve this increase.

The main characteristics of the problem-based education **were** defined by Leemkuil, H., T. de Jong, S. Ootes, 2000: 38 and are based on cognitive components described by Jonassen, D. H. and Tessmer, M. (1996): knowledge (information, concepts, rules and principles); structured knowledge (building information networks, semantic maps/conceptual networks and mental models); Skills for expanding knowledge (constructing/applying arguments, applying analogy and deduction); metacognitive skills (goal defining and goal setting, cognitive resource allocation, initial knowledge assessment, progress assessment/ error checking); motivation components/components of attitude (effort, persistence, conscious engagement); self-knowledge (clarification of what I know first, clarification about what sociocultural knowledge we have, awareness of our personal strategies and awareness of our cognitive prejudices or weaknesses) (Leemkuil, H., T. de Jong, S. Ootes, 2000: 38).

The development of modern education is directly related to the pursuit of different approaches enabling the development of the personality in multiple dimensions: social, psychological, emotional, intellectual, cognitive

and cultural. Organizing an educational environment that allows for such development and improvement of learning efficiency is a key priority of secondary school education. Problem-based learning is an excellent opportunity to achieve this as it can be realized both inside and outside the classroom, its possibilities with respect to the interactions of the performing subjects as well as their personal experience makes it a possible alternative to the traditional training and classroom and directs it into the field of constructivist interpretation of modern learning. Problem-based education is at the heart of developing cognitive autonomy of students and their creative abilities (Petrov and Tsankov, 2010: 212).

2. COMPETENCE-ORIENTED EDUCATION - NATURE OF THE RELATIONSHIP COMPETENCE (AS A PERSONAL QUALITY) AND COMPETENCIES (AS NORMATIVE REQUIREMENTS)[1]

The rapid development of modern economics and the scientific-and-technological progress along with the ongoing tendencies for working democracy and humanism in society require that the educational system should change and transform from a system of long-life knowledge to a system of mastering a long-life competence. This transformation may turn into a solution to the problems of improving the quality and efficiency of modern education wherein modern education is seen as a process oriented towards real life and practices and an important economic potential, a main factor of social and cultural integration in a global world. The necessity for a new quality of educational results is obvious and therefore requires the employment of the competence-based approach on all levels of education as it meets the necessity for **educational results** in the shape of competence as an *indicator of human capital*.

The competence-based orientation of contemporary education is a world-wide tendency. The competence approach is therefore part of the paradigm of educational theory. Unfortunately, it enters educational practice as a component of the normative and administrative tools of the State Educational Requirements rather than as the main priority in a well-planned educational reform. Thus, the modernization of education and the improvement of its quality are impossible to realize at the expected rate. One of the main reasons for this lag is the inadequacies in the application of the competence-based approach in education sciences and in educational theory and practice in both high-school and higher education. Hence, it is of vital importance to provide for adequate educational environment stimulating the employment of the competence-based approach not only in modern educational theory and practice but also in the educational activity of the teacher and the university professor. All this is in line with the idea of training the future pedagogical specialists with respect to the contemporary requirements regarding the essential competences of the modern students and the possibilities for their full formation and development in the system of the school education. The requirements for this training are also related to providing a variety of methods and tools that reveal new opportunities in the learning environment. They definitely allow the educational process to be supported and thus organized in a way that takes into account the individual needs of the learners and also enable them to build up competences, in particular the competence of problem-solving. so necessary in a knowledge-based economy. The implementation of this transformation requires a thorough readiness of the future pedagogical specialists for the implementation of problem-based learning, and their personal competence to solve problems in a pedagogical context needs to constantly be developed. This requires the design of the educational environment to be efficient, effective, yet attractive and technologically enriched, to take into account the needs of the participants in the educational process and to deliberately and systematically project a type of training that is based on the solving of integrated problems from the real pedagogical practice ensuring that the future professionals are building competence to solve problems in the didactic and methodical context.

A number of studies and analyses have put the focus on literacy and competence as key concepts in modern education (Tsankov and Genkova, 2009; Toshev, 2010; Tafrova-Grigorova, 2010). When applying the competence-based approach, the educational results and achievements in learning and learning activities are not so much related to acquiring knowledge, skills and personal development,

[1] The conceptual framework presented in the paragraph has previously been published in Tsankov, N. (2012). High school students as subjects in the process of formation and development of cognitive competencies. *Romanian Journal of School Psychology, 5(10),* (47-54).

as to mastering competences necessary for the personal development and the social practices of the modern individual. Therefore, the technocratic paradigm should be replaced by a more humanistic **individual-oriented and constructivist paradigm** of education, aiming at the formation of personal and socially important characteristics of the individual such as independence, self–control mechanisms, self-reflection, and responsibility. Arguably this process occurs against the background of the formation of all the other key competences.

The characterization of the competence-based approach requires an analysis of the *concept/event* pair 'competence - competency'. It is a textbook truth that concepts occur after the objects and phenomena they generalize, while the words that denote the concepts only signify them terminologically. The phenomenon of competence therefore has been in existence long before the term that refers to it came to be.

Before presenting the major properties of the concepts *competence* and *competency*, it is necessary to define the terms concept and event. All categories (constructs) characterized as a hypothetical entity in education sciences come under the umbrella of the cover term *concept*. These entities are products of reasoning and theoretical thought. They describe or explain other, more concrete and specific entities. A variety of categories can be included here, such as consciousness, reason, intellect, goal, knowledge, skill, **competence**, ability, motivation, will, mental process, etc. (Radev, 2005: 130). This gives grounds to define the concept *competence* as both an integral personality property and an element of the environment, i.e., as a succession of events in which the individual participates with his/her competencies.

Generally, an event is a phenomenon that has short duration; it occurs as an identifiable, observable change. Defining the essence of the representation of the cause-and-effect relations between the concepts *situation* and *event*, John Lyons contends that a situation can be both static and dynamic. A static situation (state) is homo-geneous, has duration, and undergoes no change during the period of its occurrence. The dynamic situation is characterized by change, different temporal contours, and sometimes by heterogeneity. According to the British linguist, two basic situation types are formed as regards the duration of the dynamic situation: process, occurring over a long interval and event, taking place momentarily (Lyons, 1977: 483).

M. Levunlieva discusses this phenomenon from a different perspective arguing that "ontologically *events* and *actions* are the points of interaction between the surrounding world and the individual experience. They represent the dynamics of the relation between objective and subjective reality, against the background of which personal experience becomes motivated and circum-scribed by the environment. *Processes* and *states*, on the other hand, represent the resultant state of affairs which occurs in the aftermath of an *action* or *event*" (Levunlieva, 2011: 204).

From a pragmatic point of view, all these discussions amount to the one and the same issue; the problem of being able to cause an event or perform an action in a manner that is suited to the situation and brings about necessary and expected results. Far in the past there were people of enlightened spirit mastering encyclopaedic knowledge of the universe. They were adept in a skill or some other activity-art, science, technology, etc. Now we speak about competence in a more narrow sense, in association with professional activities. Competence seems to exceed our notions of being informed, experienced, educated, proficient, etc. "Competence does not mean a universal education but authority and recognition of a skilful and knowing individual, an individual with high self-awareness of his/her own abilities and talents who uses them rationally for the benefit of the society and his/her own spiritual and material welfare" (Naydenova, 2004: 63). Competence is related not only to gaining knowledge and experience but also to developing certain types of skills in the individual, to the broadening of the boundaries of his/her knowledge and refining the spirit through education and self-education. The competence required today is manifested and developed through 'the combining of strong characteristics - innate and acquired, (…) and a strong know-how' (Delor, 1997).

Professional competence was an object of an extensive debate (in the 80's and the beginning of the 90`s) regarding both the structural and functional content of the concept in the context of the evaluation of the results of professional education and in the search of an adequate definition of the level of professionalism. After J. Raven's book "Competence in modern society" was published in 1984. the interest in the concept of competence quickly rose and a distinction had to be made between *competence* and *competency*. Various interpretations on the volume and content of both

terms appeared which made their differentiation and systematization difficult, especially after 1990. when a new evolution in the development of the two notions began.

The comparative semantic analysis shows a difference in meaning between the two notions. "Competency is realized through a certain action in a practical performance on the basis of an already acquired system of knowledge, skill, experience and prerogatives of an individual in a certain field, (…) while competence is a broader term; it is much richer in both potential and effective content. Competence is related to personal characteristics and shows completeness, a result of an action or an activity" (Naydenova, 2004: 65). It is related to the ability of the individual to function adequately (performance) in a professional field where he/she demonstrates behaviour that meets certain set requirements (Burke, 1989). Although this definition is to a certain extend limited, it allows the consideration of *competence as behaviour and the evaluation* of how, when and if the specialist applies his knowledge into an activity or context through certain skills and attitudes.

Competence suggests at least minimal experience in applying a particular *competency*. Therefore the notion of competency is seen as a result of education - readiness, adaptability, and goal achievement; competence is most commonly understood as an integral quality of the individual which manifests itself through the individual's abilities and readiness to act; it is based on knowledge and experience gained in the process of education and socialization and oriented towards an independent and successful performance in an activity (Selevko, 2004: 139-140). A more pragmatic point of view on competence considers it a personal characteristic (quality) of the individual (student) that helps him/her to fulfil/achieve what is important to him/her and society.

Thus, the competence of a student or an individual can be defined as "an integral individual characteristic manifested through the specifics of the ability of the individual to organize and use different types of knowledge and skills which allow him/her to find efficient solutions and have efficient behaviour in particular situations" (Radev, 2005: 162). This mostly didactic interpretation of competence can be further completed by adding psychological accents to its interpretation and seeing it as "a possibility in the form of a skill of the individual to function efficiently in his/her environment; a characteristic of an individual having a number of behavioural patterns that help him/her to act selectively and actively; to successfully affect his/her material and social environment and change it for the purpose of his/her own intentions and goals" (Desev, 1999: 260). The above-mentioned definition of competence as a psychological phenomenon shows that competence is related to all subsystems of the individual, to the individual's entire development and to the results of this development and self-development.

As it is evident the complex phenomenon and concept of competence (used as a collective noun in the singular) comprises all the components of an individual's system connected to its formation and development as result of communication and activities in different types of environment – family, school, social life, etc. Competence is manifested differently in different individuals as it is dependent on the individual talents, intellect, abilities, interests and motives; the environment also plays a leading role in the development of these factors and characteristics.

When studying the pair competence-competency as a pair of the concept-event type, competence should be considered a concept (a construct - Pl. Radev) i.e. a product of logical thinking, needed in the cases when a connection should be established between objects or events which cannot be observed or are difficultly measured. The event of 'competency' is a case, a phenomenon, a part of reality, a thing happening in a behaviour or an environment, a thing with a beginning and an end that can be defined within the terms of the variability (Radev, 2005: 129).

The analysis offered above leads to certain conclusions concerning the concepts *competence* and *competency* as elements of a conceptevent pair. *Competence* as a construct represents an **integral personality property** and a **system of competencies** structured in a concrete manner that **integrates knowledge and skills**, as well as attitudes of the individual towards oneself and others as well as towards educational and other activities and their results in the context of the development of transversal competencies, which offer an opportunity for the individual to **function adequately in terms of individual practice and performance**.

Importantly, the concept of competence is associated pre-eminently with "untapped potential abilities" leading to the carrying out of effective activities; they relate to the "emotional aspect of the actions of the individual" and "give meaning to those actions". The concept competency on the other hand is more

pragmatically oriented; this is what makes possible the practical implementation of one's competence. It can be described by being able to tell "**how** to relate knowledge and situations" rather than being able to tell **that** knowledge and situations are related. Etymologically, both terms evoke the original meaning of the root meaning "apt, adequate, able, meaningful". Thus, summarily, competency is a subjectively represented competence. Competence is therefore a predominantly subjective and personality-oriented characteristic of human activities, while competency is preeminently subjective and social.

The vital importance of the educational issues discussed so far, their conceptualization and methodological grounding set the trail for future research in the field of education sciences on several planes of social and economic life. In terms of social development the competence-based approach contributes to a successful search of opportunities to resolve the now existing controversy between objective social demands education faces and the ways it meets them. In terms of theory of education, it gives scientific grounds to the necessity to develop students' key competencies in a transversal manner. In terms of practice, it facilitates the improvement of school practices and orients them towards the formation and development of key competencies as personality properties.

All of this draws attention to the problem of the correct operation of each of the competences so that they can be formed and developed, as well as evaluated in a specific context. Competence is an integral feature of personal expression; in particular, the competence to solve learning problems is related to the search for ways to differentiate the system of competences (as a normative requirement of the training and its expected result) and meaningful, purposeful, and systematic cognitive activity in which the subject manifests the process and its outcome.

3. PROBLEM-SOLVING COMPETENCE IN COGNITIVE-LEARNING - CONTEXT OF UNDERSTANDING

In the course of social development, the understanding of the main components of PISA research has also been changing. The reading, mathematical and natural science literacy are now complemented by new areas of research introduced in 2012. and 2015. - **problem solving and cooperative problem solving**. This change is determined by the PISA understanding not only to assess students' knowledge in the field of science, but to also assess students' abilities to implement this knowledge and apply these abilities in life situations by solving problem-based cognitive learning tasks.

The problem solving module in PISA 2012. was focused on the cognitive skills of the individual student related to the recognition of the problem situation and its understanding; defining the specific problem; planning the process of finding solutions and choosing strategies; monitoring and assessing the result achieved, etc. In the definition of the new PISA 2015. module another element has been added and the emphasis has now been placed on cooperation among pupils in solving a particular problem (OECD, 2017, Petrova, 2018: 631).

The program aims at assessing knowledge and skills of a transversal and interdisciplinary nature, through setting tasks that: (1) resemble a real life context presented through a source of information, (2) ask several thematically related questions to one source of information: a text, graphics, chart, table, animation, simulation or a combination of them, (3) are gathered in clusters and the individual student does not have to solve all the tasks, but only some of them that are generated on a rotational basis by a computer; (4) are an individual combination for a particular student containing tasks in math, reading or the cooperative solving problem component. In this context, the term "literacy", as used by PISA, is related to students' skills to find, interpret, transform and present information; to solve problems in situations close to the real ones.
In the context of Ray, B. (1996) research on **transversal competencies**, their typology and attempts to operationalize them, Y. Merdjanova points the ability **to detect and formulate problems** in the cognitive competence group for information processing (Merdjanova, 2002: 101).

The competence to solve problems in PISA 2012 evaluation process is defined as "**... the student's ability to use cognitive skills to understand and solve problems whose solution is not obvious. It also includes the student's willingness to engage in problem-solving as a constructive and thinking citizen**", while in 2015 this definition is expanded with the cooperative problem-solving ability, namely: "... **the student's ability to participate effectively in activities to solve**

problems in cooperation with one or more partners, sharing knowledge, skills, understanding, and efforts to achieve a certain outcome" (Petrova, 2018: 633).

In general, **problem solving** is seen as a process that involves individual cognitive skills to solve individual issues. The first element - individual cognitive problem solving skills - involves understanding and presenting the content of the problem, implementing problem-solving strategies, controlling the process of achieving the goal. Individual problem solving skills are summarized as: (1) research and understanding; (2) presentation and formulation; (3) planning and implementation; (4) monitoring and reflection (Petrova, 2018: 634).

Problem solving is a specific process in which students follow a certain routine: *analysis of the situation* – assessing what is known and what is not; *problem formation (task); building a hypothesis*; proving of a hypothesis and explanation (conclusion). According to Y. Merdjanova, the essence of solving a problem is *to transform the problem into a situation* (i.e. to include it into a context) and *to transform the situation into a problem* (identifying the problem in the environment), in the context of multisensory training the following milestones of problem solving technology have been defined: *exploring the problem* (its nature, its identification and additional features and components), *analyzing the problem* (through experience, comparison, adaptation of the analogy), *visualization* (general and multi-sensory "direct and indirect" information gathering), solution choice (by comparison of alternatives, coordination, trial of decisions, final solution choice) (Merdjanova, 2005: 110-111).

This also defines the structural elements of competence to solve learning-and-cognitive problems, as learning and cognitive practices are a matter of priority being the core of competence integrated with the knowledge and attitude of the person towards the activity and its results.

4. CONDITIONS FOR DEVELOPING THE COMPETENCE OF SOLVING COGNITIVE PROBLEMS AS A TRANSVERSAL ONE

The context of understanding a particular competence as transversal one and the specific characteristics of the student's transversal competencies have been clarified in previous studies (Tsankov, 2017: 130-134), therefore only some specific conditions for the developing of problems as transversal ones in sync with the idea of the search for ways to justify the basic methodologic approaches (Merdjanova, 2014: 12) as portable and relevant for all training methods as the results of their application in education, namely the transversal competencies, are decisive for the development of each person.

In order to be able to realize the cognitive functions of learning in the best possible way in the course of developing the problem-solving competence, it is necessary to determine the didactic conditions for this to happen, characterized in detail in the context of the opportunities for development of transversal competences (Tsankov, 2017: 134-141). The goals and the results determined through the education curriculum for science school disciplines (in which the survey has been carried out) in secondary education include not only the acquisition of certain knowledge, the formation of skills and relations, but also actions for their absorption and formation that are directly linked to the development of students' cognitive abilities by solving problems. This requires, in addition to observing the basic principles of education based on constructivism as its philosophy and the principles derived from the realization of the development of competence for solving cognitive problems, also taking into account the specificities of the cognitive activity. At the core of the design of problem-solving based education is the idea of constructivism that in problematic situations the basic functioning of the student's knowledge is to establish the relation between teaching and learning and that these situations give specific value to the student's knowledge that is being applied into real-life situation, empowered in the concept of competence approach and having transversal identity. It is these problematic situations that imply the use of knowledge, redirect to natural development through learning, and provide a junction point between evolving knowledge and already existing knowledge available through the application of a series of research procedures in the process of solving integrated problems.

Although in the context of problem-based training teachers change their traditional functions (Radev, 2005: 280), organizing the environment for the implementation of problem-based training, the selection of different problems and the tasks related to them, remains their main responsibility. From the

point of view of the principles of constructivism as a philosophical paradigm whose main idea is related to the active position of the subject who knows the world in and through the situations he lives in (i.e. a specific context), within the problem-based training there is a demand for cognitive learning tasks that provoke situations to enable the transition from knowledge to putting into practice. Despite the application of the ideas and principles of constructivism, according to which the student and his/her experience are at the core of the training, the role of the teacher in problem-based learning is not to be neglected.

The conditions for developing competence to solve learning and cognitive problems and the requirements of the environment should be considered synergistically as an integration between the material (those which carry information), socio-psychological (socio-psychological climate, comfort, creativity and teamwork), psychological (interests, motives, incentives, readiness for action and preparedness) and pedagogical (effectiveness, adaptability and performance) conditions in the context of the activity.

In the course of implementing the competence based approach, efforts need to be made to encourage adults to learn in order to enhance the quality of orientation systems and making the education process altogether more attractive. Such efforts may include developing new education forms and applying new techniques of teaching and learning. (Vladeva, 2013: 96). When practicing refection activities, various opportunities for the forming of some competences - experimental, exploratory, health-and-ecology related, evaluative, etc. emerge in school practice (Galcheva and Hineva, 2016).

In characterizing a reflective technology in the context of the modernizing of an intellectual reflection (reflection on one's own cognitive activity) and praxiological reflection (reflection on the application of knowledge) there are the following processes: problem defining and problem solving. Problem defining being: (1) "transformation" of a particular phenomenon in the subject of reflective analysis, (2) a process of the subject's rationalizing the contradictions causing obstacles in the course of knowledge, the process of drawing up and formulating problems and sub-problems (in psychological context); (3) a process of interpersonal interaction, in which the trainer creates the conditions discovery and formulation of problems in order to stimulate students' learning (in a pedagogical context), (4) providing conditions for a purposeful transition to more intense intellectual and creative activities to mobile and develop cognitive abilities of the student, placing him in the position of an actual subject of these activities. Problem defining requires: (1) a subjective point of view on the problem - the students' authorship in defining and formulating the problem, the acceptance of the problem as being their own, and (2) an objective point of view (externalization) of the problem – putting it into speech form and discussing of the proposed problem definition with another subject involved in the same problem situation (Vassilev and Dimova and Kolarova-Kancheva, 2005: 99). According to the authors, problem defining is related to the didactic notion of problem and the discovering of the didactic core of problem - the problematic situation (with a clearly existing contradiction between the known and the unknown, between knowledge and lack of knowledge). In their opinion, psychologically, contradiction is "born" in the subject's head in the absence of *information in the course of cognitive activity or when there is difficulty in communication with other subjects,* thus, cognitive and communicative problem situations are distinguished. In the context of a cognitive problem situation, the student (either alone or with the help of a more experienced subject) can understand and formulate a learning problem (knowledge of not knowing, turning to one's subjective experience, the beginning of a reflective act).

According to Vassilev and Dimova and Kolarova-Kancheva, 2005, problem solving includes: (1) de-problematization (transforming the problem into task), (2) conceptualization (ideal designing-forecasting, discovering the possible solutions) and (3) solving the problem itself. In the context of the opportunities for activation of intellectual and praxiological reflection in the course of turning the problem into a task, the authors distinguish between mediating and evaluative problem situations. In these analyzes, some valuable observations for the educational practice have been made:

Most teachers formulate learning problems in terms of their perception of the subjective experience of the average student and provide students with the opportunity to solve these problems in such a way, thus omit-ting the valuable opportunity for activating the student's reflection.

According to the principles of the Reflective Approach, learning problems should be formulated not by the teacher but by the

students. In order for this process to be productive, the teacher should train the students to "discover" and define problems, as well as to prepare tasks for their solution.

In the learning process of the specific school subjects, problem solving most often begins as an interpersonal interaction, in which the teacher "hints" the path of turning the formulated learning problems into tasks and encourages only the unconscious reflective acts of the students, thus missing the best opportunity for joint thinking/brainstorming effort to activate conscious reflection in all students (Vassilev and Dimova and Kolarova-Kancheva, 2005: 100-101).

The approach to integrating information from different learning disciplines when **solving an integral problem** relating to a specific subject that is actually the basis of the present study of the transversal nature of the competence to solve learning problems is of interest. The integral problem has the characteristics of the learning problem, but success in solving it cannot be ensured by the available knowledge of the student and the way this knowledge exist (its structure) and the strategy of its use in solving the problem. The specificity of problems of integral type lies in the semantic heterogeneity of the information that is used to solve them. The problem of an integrated type may arise at the boundary of two disciplines; it can, when necessary, switch to a new cognitive context or require the "entanglement" of categories from one science into the category of another (in case of abstract object integration), or it can refer to the functioning of a complex system, the elements of which are studied by two or more subjects (upon integration on a particular object). In science education, such an integral problem is defined, for example, by key concepts (reflecting certain abstract objects, defined within a particular scientific area): "cell" and "metabolism" (biology), "molecule" and "electrolyte dissociation "(chemistry)," pressure "and" heat "(physics). In the systematic study conducted by R. Peicheva among high school students with respect to the application of the knowledge from different school subjects (natural sciences - chemistry, physics and biology) the following conclusions were made regarding the solving of integral problems:

The higher the degree of integrity of a discipline, the fewer students are able to cope with the integral problem in its field;

The high achievements in tests as-sessing knowledge acquired in the learning process in the respective subjects is not a prerequisite for the application of the knowledge in practice, and that the students with lower achievements can better implement a strategy to solve an integrated problem;

Success in solving an integrated problem depends not only on the knowledge of the concepts involved in formulating it, but also on other factors - knowledge about strategy itself and the qualities of student thinking;

The lack of dependence between the knowledge of individual concepts and the ability to apply them to a non-standard cognitive situation, i.e. lack of a strategy to integrate information from different scientific fields into solving integrated problems;

Students who successfully go out of the context of the respective scientific field and can apply their knowledge in non-standard cognitive situations, can relatively easily solve integrated problems (Peicheva, 2002: 200).

All of this is in line with the specifics in the development of high-school students as subjects in the process of developing problem-solving competences in cognitive learning. Those accents have been discussed in detail by N. Tsankov in previous studies and can be summarized in the following main points:

In summary, adolescent students generally share the following characteristics:

1. Their personality has already been formed. The psychological systems of sensory perception, attention, reasoning, and imagination are stable. A higher level of the development of basic psychological functions has been reached.

2. The structure of mental processes and cognition has changed. As a result, 9th and 10th graders are more likely to focus not on the types of problems to be solved but on the means for their solution.

3. The changed social situation in the development of the 9th and 10th graders generates internal prerequisites for essential personality traits.

4. The stable psychological systems increase the efficiency of psychological processes related to the adaptation and the retentive power of memory.

5. Educational abilities belong to these stable psychological properties the way educational competencies do.

The social situation in secondary schools is specific in that it is the threshold to adulthood. This places students in a new position characterized by:

• the emergence of a necessity for professional orientation and making choices of

future life goals;

• the self-awareness of students in the 9th and 10th grade of secondary school is vital for their future and comes to form the psychological centre of the social situation of their own development;

• the psychological center thus asserted, establishes a unique position which is manifested as a specific future orientation;

• the student starts to see the present trough the future perspective and not the other way around;

• the new social situation of students changes the significance of their education, their values and their attitude to tasks, goals, the content and methods of educational activities.

These characteristics create new formations in the social and psychological development of 9th-10th graders which are related to: the formation of an outlook, self-dependence in reasoning, increased ethic requirements, development of self-esteem, aspiration to self-perfection, self-education and self-control. Regardless of the pending social and psychological change, they continue to study, but their **educational cognition** is characterized by a variety of **specific properties**:

• Study activities continue to be basic but students' attitude to different subjects changes.

• The situation structure of studying is different because of the motives related to self-awareness, the choice of profession and the preparation for a self-sustained life. Thus motives come to increase in strength, stability along with students' interest in cognition, its content and methodology, as well as the educational process in general.

Some of the other important changes in students' cognitive dynamics include:

• It is very rarely that they find it difficult to define the semantic properties of concrete an abstract concepts;

• their mental operations are facilitated;

• they employ their own methods and means of memorizing;

• the motivational structure of educational and cognitive activity has been formed;

• there is a prominent aspiration to orientation in a multitude of view points and a formation of one's own stand;

• there is and increased strife to search and establish the truth;

• an interest in the very process of analyzing situations, views and assertions occurs;

• the aspiration to the employment of new methods for arguing one's own position is rather prominent;

• the reasoning efficiency increases, which results in proposing daring suggestions, generalizations and original ideas;

• the readiness for self-education and self-perfection is improved.

All the peculiarities in **the personal development of adolescents** are related to the specifics of the learning tasks and allow the deployment of a more comprehensive technology for the development of competence for solving cognitive problems in high school students.

5. DESIGN OF THE EMPIRICAL STUDY

The empirical study consists of a several stages: a pilot study, the survey itself, a didactic experiment, and final survey; the study of the effectiveness of the applying of the developed technology for enhancing the competence to solve learning problems is presented according to the main stages (and the sequence) of their conduct:

• planning and development of a study concept;

• conducting and analyzing the results of the empirical study.

Planning as an essential element of each activity suggests a detailed presentation of the path to be taken when conducting the study.

The main components of the research methodology are directly related to its design and realization. **The object of the study** *is the problem-based science education in the high school stage of the secondary education and the competence to solve problems*.

The study of t*he transversal nature of problem-solving competence in problem-based* education has been carried out over two school years, the contingent of the study being *142 students in the first high school stage. T*he goal of the study is *to diagnose the portability of problem-solving competence across the various subjects and activities*.

In order to realize the research goal and to solve the assigned tasks, a specially developed *system of problem-based tasks* (integrated problems) and *tests for assessment* of the progress through the different stages of the research were used. The evaluation of effectiveness is made on the basis of the results of the training in natural sciences and ecology in both the control and experimental groups and is verified through a reliable test system.

For reliability check (reliability being the main feature of the accuracy of task measurement and the stability of the results of the problem solving), the same contingent was tested a month later. For the calculation of reliability ratios that quantify the reliability of the questionnaire, the Pearson correlation coefficients were used, with values ranging from 0,816 to 0,969, which is the reason for believing that the reliability factor is very good and the questionnaire can be used as a reliable tool for reporting achievement and development.

The analysis of the data on the main characteristics of the tasks shows that they allow distinguishing the excellent from the average/poor students and after the partial editing of some of the tasks, the questionnaires can be finalized and become part of the diagnostic tools of the study. Therefore, the developed tools for diagnosing the high school students' skills for solving cognitive problems can be successfully used as one of the criteria for assessing the extent of competence development for problem solving and its transversal nature.

For the current experimental study, the traditional method of distributing the students in two groups: control and experimental one was used, and the students in the control group were trained without systematic and purposeful solving of integrated learning problems, whereas the students in the experimental group were put in the conditions to solve such learning tasks at each stage of their training.

The following basic indicators were used when forming the groups:

• the average annual grade of the students for previous school year;

• the average grade from the preliminary test used to form the groups (test to assess the current student knowledge in the particular school subjects).

A statistical survey was used to check whether or not the distribution of random variables was normal or not in order to choose statistical methods to use - parametric or non-parametric. The distribution check was done through the Kolmogorov-Smirnov criterion, both for the total test results and for each of the groups individually. For the total test, the empirical value λ_{exp}=0,527 (p (sig.)=0,465>0,05 shows normal distribution), the Skewness empirical asymmetry factor is -0,124, and the Kurtosis empirical coefficient for excess is -0,256. Both parameters characterizing the distribution are within the normal distribution range of –2 to +2.

The results of the group distribution check for the experimental group are as follows: the Kolmogorov-Smirnov criterion has an empirical value λ_{exp}=0,297(p (sig.)=0,468>0,05 - normal distribution), the Skewness empirical coefficient of asymmetry is –0,307 the Kurtosis coefficient of excess is –0,279. For the control group λexp =0,472 (p(sig.)=0,699>0,05 - normal distribution), the empirical Skewness asymmetry coefficient is 0,032 and the empirical Kurtosis coefficient is – 0,043. It is obvious that the variables' distribution is normal in both experimental and control groups.

In conclusion, the verification of the empirical distribution of the results of the group formation test shows that the empirical data in both the experimental and control groups are normally distributed. Consequently, there is a requirement for further testing using parametric methods.

The verification of comparability of the results of the group formation test can be done by comparing the average values that characterize the test results with Student's t-criterion for independent samples (for both experimental and control groups) when comparing the average level of the same attribute in both groups. A zero hypothesis H0 was formed, which states that there is no significant difference between the average level of the attribute in the two groups. The alternative hypothesis H1 is that there is a significant difference between the average marker level in both groups (experimental and control).

The empirical value of Student's temp-criterion is 0,138, and the tabular value is at a significance level α=0,05 is tα=1,98. It can be seen that $\mathbf{t_{emp} < t_{\alpha}(0,138<1,98)}$, (p (sig.)=0,675>0,05 - insignificant differences). The decision is made after comparing the empirical and tabular values of the criterion, and in the event that **temp <tα**, it is assumed that there is no reason to reject the null hypothesis, i.e. there is no significant difference between the average level of the attribute in the two sets. Thus, the mean values of the experimental and control groups are statistically indistinguishable in the group forming test.

From the statistical survey done, it can be summarized that the distributions of the random variables characterizing the learning achievements of the students surveyed in the two groups do not differ and the groups thus formed can be used in the realization of the main study and in the obtaining of reliable information from the whole pedagogical experiment.

The developing didactic experiment represents the realization of the research with

respect to the previously developed concept and the project for developing the competence for problem-solving in the education of the secondary school students using a system of tasks requiring solving of integrated problems. It is related to the initial motivation of the students and the implementation of the developed technology for the improvement of competence for solving problems.

At the core of the developing didactic technology is the idea that the observation of the already discussed conditions and the purposeful solution of the subject-oriented integrated problems (from a particular scientific field) realize the development of the competence for solving of learning problems. All this is related to a specific internal structuring of the curriculum content for natural science subjects at school to solve integrated problems and to bring them into a learning context so as to ensure the necessary functionality of knowledge and its transversality. The development of the problem solving system in turn is related to the identification of integrated links at the level of the curriculum and their full design by the teachers in a methodological context with respect to the conditions for the full development of the problem-solving competence.

Based on the studies made, a number of features have been outlined in the application of the technology for the development of the competence for solving learning problems. These include:

• In the process of solving learning problems, the student is in the active position of a person working purpose-fully, consciously and systematically, i.e. is motivated and aware of what s/he is doing and why;

• students' activity is directly aimed at solving tasks and problems creating cognitive situations through which competence is developed;

• conditions are created to help establish the relation between the already existing situations and the possible future ones, i.e. awareness is developed for the possible application of knowledge and skills in new situations requiring problem-solving competence;

• the activity is ensured by providing students with cognitive problem that have various difficulty levels and topics included in them to stimulate their positive attitude towards the activity and its results;

• conditions are created to enhance self-sufficiency by sequentially complicating the tasks within cognitive levels frameworks.

6. TRANSVERSAL NATURE OF THE COMPETENCE TO SOLVE PROBLEMS (EMPIRICAL STUDY)

The results of the final study (priority skill survey) by solving integrated problems are presented by comparing the average level of the same attribute in two groups – the experimental and the control one. The comparison should also be supported by appropriate statistical reliability. When the criteria have a normal distribution and the samples are independent, Student's t-criterion for independent sampling is used to verify hypotheses. If the null hypothesis (H0) states that there is no significant difference between the average levels of the attribute in the two groups, a decision is made after comparing the empirical and tabular values of the criterion. The empirical value of Student's criterion is t_{emp}=4,29 and the tabular value at a the significance level α=0,05 is t_{α}=1,98. It was established that $t_{emp} > t_{\alpha}$ (4,29>1,98), (sig.(p)=0,01<0,05 – significant differences). Consequently, the zero hypothesis is rejected and the alternative is true, namely, that the average values of the experimental and control groups are statistically distinctive (there is a significant difference) in the final study on the development of cognitive skills through the systematic and purposeful use of integrated problems in the course of the training.

For the present study, it is of interest that the developed competence for problem solving can be transferred through different activities and subjects, i.e. that it is transversal.

As the skill is seen as an applied expression of competence, the tasks of the questionnaires for verifying the transversality of problem-solving competence are aimed at assessing the portability of the skills underlying this competence. The learning (developing) experiment was conducted within the framework of science education, and the portability of competence was verified by solving problems (integrated problems) on the curriculum in the field of social sciences.

The students' results are summarized through representing the average success rate in Table 2.

Table 2. Average success rates based on the skill criterion in the experimental and control groups

Average success rate K_x		
Control Group	Experimental Group	Difference
0,27	0,56	0,29

In order to study the relation between the results in the experimental group in the two subject areas (i.e. the relation between the developed problem solving skills and their portability in solving problems within given school subject content) correlation analysis is used - a statistical method for studying the relationship between variables to reveal the power of dependence. The indicators that provide quantitative information on the degree of dependence are called correlation coefficients. In the study, Pearson's coefficient for an ordinary linear correlation was used. In the present case, Pearson's correlation coefficient is r=0,714, which shows a significant degree of dependence between the degree of competence development for cognitive modeling and the degree of its portability. This gives grounds to believe that a competence developed in one subject area for solving learning problems is transferable in other subject areas. It has been established that the power of this relationship is significant when it comes to teaching subjects from a single area of scientific knowledge. When verifying the portability of skills within the study.

The results obtained to some extent prove the existence of competence as an intention, a point of view, an approach, a manner, a style that can be formed pedagogically and further developed as transitive, portable through ages and activities (Merdjanova, 2002: 101). Thus the subjects (the students) "carry their attitude, their style, and their approach" and give sense to their competence as transversal. Pedagogically analyzed, the results of the study suggest that the implementation of a system of integrated problems for the development of competence for solving problems in the education of the students in the upper secondary school stage also reflects the possibility of its portability (transversality), but in a more personality-related aspect (directly related to the subjects of the activity) and has a positive influence on the motivation and the overall cognitive behavior of the students.

The overall study confirms the author's conviction of the multitude of ways in which the key competences affect the individual; the open perspectives, and the need to integrate the efforts of various research paradigms and approaches to supporting young people's development - and this is done jointly with their teachers, because enhancing competences has neither age nor role limits. The perspectives in this direction are: (1) **extending the research agenda to other subjects**, (2) extending and continuing the research program towards studying students' personalities in relation to the **correlations between the main competences for solving problems as a basis for identifying personal profiles**, (3) a follow-up **factor analysis of key competencies** and their "relative weight" within the competence to decide (4) **studying the correlation** between the degree of competence development for solving cognitive problems and **the success of students in solving the problem of real prob-lems, as well as changes in their professional orientation.**

7. TEACHING TEACHERS HOW TO CREATE A PROACTIVE EDUCATIONAL ENIRONMENT AS A PREREQUISITE FOR THE DEVELOPENT OF PROBLEM-SOLVING COMPETENCE

A proactive learning environment is an investment in human resources and a capitalization of knowledge. Its purpose is the active strategies for personal development. The very concept is based on several key ideas, such as: (1) emotional intelligence of the personality; (2) multiple- intelligence; (3) social intelligence.

Human behavior is a unity of "emotions and intellect", of "rational and irrational", of "sensory and cognitive". This statement of psychology has its pre-scientific and scientific history, which is the basis of the current scientific concept of "emotional intelligence" as a scientific focus of the idea of balance between "emotion" and "intellect" as a condition for proactive human behavior. This becomes further evident from the main features of "emotional intelligence", as well as the conditions and skills/capabilities required for its realization. Among these, we can point out the relations: "emotionwill-intellect." Its operationalization implies the need for control, management, reflection every time we rely on our emotions. In this sense, it is justified to put the notion of "emotional intelli-

gence" as a condition for successful professional conduct.

At the end of the twentieth century, Howard Gardner developed the theory of "multiple intelligences." According to Gardner (1983) they are:

- Logical-mathematical intelligence;
- Linguistic intelligence;
- Spatial intelligence;
- Bodily-kinetic intelligence;
- Naturalist intelligence;
- Interpersonal (interactive) intelligence;
- Intrapersonal (for self-understanding) intelligence;
- Musical intelligence;
- Existential intelligence (Gardner, 1983).

Gardner's theory deserves attention with several of its accents:

- the globality (integrity) of the manifestation of the intellect and at the same time the differentiation of this manifestation;
- connecting the intellect with the possibility of solving problems of different cultural fields;
- the distribution of intellect as available to and outside of the human through the impact and incentives of the environment and its means;
- the role of education in the relation between intellect and with the solving of morally significant tasks.

This is all to help in the designing of a proactive educational environment which is to develop a problem-solving competence, first in teachers and then in their students. This competence is the basis of alternative educational models which put the students in the position to alter the environment as they need to and which allow the teacher to constantly adapt his/her teaching strategies (Achkovska-Leshkovska, E., and Spaseva, M. S. 2016: 65). A proactive learning environment at school provides the opportunity on one hand for the development of new values and attitudes in students and on the other, becomes a motivation factor for teachers (Cvetković, B. N., and Stanojević, D. , 2017: 55).

So far, the nature of the moral domain has not been defined on the basis of human intelligence. We can speak about "moral judgments" in the terms of psychology. Psychological methods are based on asking people how they would react in certain situations. The main component in the moral sphere is the sense of personal responsibility, and the role you take and perform. Each of these roles is associated with a certain type of intelligence, but intelligence or lack of such in person does not seem to determine a person's will and character. Thus, a person's intellect is morally defensible in any life or professional situation.

For David Wexler, social ineligibility is "normal intelligence" applied in a social situation" (Wechsler, 1955). Some psychologists are still arguing, which human abilities are social and which - emotional. Daniel Goleman consolidates the concept and defines the components of social intelligence by dividing them into two: social sense (what we "perceive" in others) and social skills (the ways we take advantage of the immediate awareness). Social sense covers a wide range of experiences, from sensing the inner state of the other person to understanding their feelings and thoughts; orientation in social situations. Social skills include cooperative abilities such as Synchronization - Self-Presentation, Influence, Active Position (Goleman, 2006).

A synergizing of "emotional", "multiple" and "social intelligence" is a precondition for proactive personality, proactive behavior and a proactive educational environment. The latter is impossible outside the person, as an investment in itself through spiritual development and creative entrepreneurship. Knowing the potential of a person and stimulating one's expression at all code levels are the most important factor for developing a proactive learning environment.

In a research perspective all of this requires: (1) to specify the boundary between the reactive and proactive educational environment necessary for the development of the students preparing for pedagogical specialists, so that they themselves can learn how to create such an environment for students in the conditions of formation and development of transversal competences; (2) to identify the main proactive qualities, skills and abilities of pedagogical specialists and the ways in which these skills and abilities are formed and developed as a basis for their proactive behavior in a real educational environment; 3) to operationalize proactive educational technologies in the training of students preparing for pedagogical specialists; (4) to develop an educational strategy for proactive thinking and behavior of students preparing for pedagogical specialists; to help form proactive values and attitudes in the future pedagogical specialists qualification so that they can become highly effective people and professionals.

All this should be based on the ideas of constructivism and pragmatism, as well

as moral philosophy, social psychology, and modern management. Their integration and synergy allows a wider methodological platform to be set up, aimed at training future pedagogical specialists in optimal mode. The motives for a **well-grounded methodology for realization are**:

1. Identification of the educational environment as a proactive one through a system of criteria and indicators;
2. Typology and technologicalization of the educational environment as proactive;
3. Educational design of the proactive environment for motivation and stimulation of the pedagogical specialists;
4. Educational design of the proactive environment for professional realization and career development of pedagogical specialists;
5. Educational design of the proactive environment for assessment and self-assessment of teachers;
6. Good practices to help the realization of a pro-active educational environment and highly effective people and professionals;
7. Emotional, social and moral intelligence of the pedagogical specialists as a personal factor for a proactive educational environment;
8. Strategies for a pro-active educational environment for sustainable development and professional growth of pedagogical specialists.

8. DISCUSSIONS AND CONCLUSION

The stage of education development and the state of educational practice draw attention to the search for a comprehensive way of solving the problems related to the unsat-isfactory educational results, the lack of in-terest and motivation of the students in the process of cognitive activity and the lack of correspondence between the requirements of the labor market and education provided. The central approach to solving this problem is the overall approach to identifying and operationalizing problem-solving competence (as a system of competencies - integrated knowledge and skills) as an expected outcome of the training and the designing of the educational environment to fully form, develop and prepared the pedagogical specialists accordingly.

This article offers an attempt at such an integrated approach to problem-solving competence development and solving cognitive problems, which are also subjects of PISA research by: (1) justifying the research interest in the context of international research and results for Bulgarian students, (2) analysis of conceptual grounds for distinguishing competence as a personal characteristic, and competences as normative requirements and expected learning outcomes in the context of the competency approach to education, (3) the clarification of the transversal nature of problem-solving competence, (4) the design of the educational environment and the basic requirements for it so as to ensure the full-value development of this competence (5) conducting an empirical study on the effectiveness of this development; and (6) drawing up guidelines for the training of pedagogical specialists so as to ensure the quality formation and development of problem-solving competence.

Conflict of interests

The author declare no conflict of interest.

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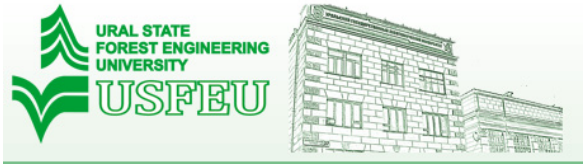

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