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Dr. Lazar Stošić

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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 and copublisher is College for Preschool Teachers, Aleksinac, Serbia.

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 twice a year. 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:

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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.

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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 14 articles (9 original research and 5 studies and article). Our future plan is to increase the number of quality research papers from all fields of 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
Dr. Lazar Stošić

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ON NATIVE SEMANTIC ROLES – COMPARATIVE STUDY BASED ON DATA FROM CHILD LANGUAGE ACQUISITION OF ENGLISH AND FRENCH

Dr. Velina Slavova, New Bulgarian University, Department of Computer Science, Bulgaria
E-mail: vslavova@nbu.bg

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concept formation,
language faculty.

ABSTRACT

This study explores statistically child language-acquisition using data extracted from large collections for acquisition in two languages – English and French. Comparison of the two collections reveals that the advancement in acquiring vocabulary displays very big differences when the children's speech is classified by the parts of speech deployed, as these are formally defined in the two languages, despite there being no reasons to suppose that the two language groups of children should show significant differences in cognitive development. The hypothesis put forward is that there exist general classes of meaning-representation and the challenge is to obtain evidence corroborating this. A specific set of classes is proposed, derived according to their different contributing roles in the mental representation of the world, considered from the perspective of an "Actor in the environment" cognitive model. The identified parts of speech from the two languages are sorted into the proposed classes. It is shown statistically that when children's speech is discriminated to these classes, the acquisition processes in the two languages are very alike. Examining the data, the use of these classes is evident from the onset of language production. Some particularities related to factors influencing the use of communicators, interjections and onomatopoeias in children's speech are discussed in addition to the study's overall findings.

1. INTRODUCTION

How the brain forms and organizes meaningful concepts and how the faculty of language permits structured expressing of their meaning are questions of fundamental theoretical importance to linguists and cognitive scientists alike. Thanks to the emergence of powerful brain-imaging technologies, neuroscientific research has made significant strides in revealing anatomically the brain's activity pertaining to the cytoarchitectural organization of concepts and their labelling with words. The neuronal networks found to be involved in this activity appear to implicate the entire brain. All of these studied phenomena can be assumed to be universal biological properties of human brains.

Considering this wide-ranging body of research permitted Slavova and Soschen (2015 a, b) to amalgamate its findings with a hierarchical information-treatment model and propose a general theory explaining how perceptual experiencing of environmental phenomena and interacting with them provides a working basis for forming concepts and subsequently associating them with particular words. The model presented in Slavova and Soschen describes the process by which humans in general progressively acquire the faculty of language during infancy. This model supposes that syntax is founded on concept semantics. It suggests that the internal creation of semantic description of the world and the mental treatment of language syntax are products of one and the same principles of information processing. The underlying mechanisms were identified as based on multimodal perception, interoception, proprioception, the mirror neuron network and default mode network — all of them ready to run in a synchronized manner

Corresponding Author
Dr. Velina Slavova, New Bulgarian University, Department of Computer Science, Bulgaria
E-mail: vslavova@nbu.bg

at birth. Following this model, the process of establishing semantic description of the world initially ensues automatically as the result of interacting with it, and in accord with some underlying principle of structuring meaning.

When children learn their first language, the meaning of the words used in spontaneous communication can suggest the structure of their mental world. At the same time, the language input that children are exposed to is of crucial importance. That is why investigating the structure of the primary semantic description of the world and its constituents necessitates analysing a wide diversity of languages. As a first effort toward such an investigation, the present paper's author undertook a large-scale study of corpora of recorded utterances collected from English and French infants over the formative period of language-acquisition. This paper presents the procedure of the study and the results of its analysis.

2. PROCEDURE AND DATA

Data from 42 corpora containing 1,515 free dialogues with child speech in English and in French, annotated with part of speech and grammar, were extracted from CHILDES (Child Language Data Exchange System) and used for the statistical analyses presented here (Appendix A).

Child speech dialogues (written, audio and video recordings) are stored with their transcripts and available on-line in the CHILDES data repository. They are collected (in separate corpora) and transcribed by researchers in language acquisition using the standard developed over the course of several decades especially for the Exchange system (see MacWhinney and Snow, 1985). The transcription is performed using CLAN (Computerized Language ANalysis), a computerized system designed specifically for the Exchange system's standardized format (Appendix B). Important for the study presented here is that the stored transcripts include for each speech utterance a separate line marked with "mor%", created by the transcribers using the computerized tools, developed for supporting the annotation in a large number of target languages. This line contains the system's standardized symbols for the parts of speech (POS), based on Hausser's MORPH system (Hausser, 1989, see MacWhinney, 2012).

For the purposes of this study the transcripts, with the entire linguistic annotation, were stored locally. Additionally, a number of tools were developed for extracting the transcripts from CLAN format and organizing them in a relational database where each dialogue and each utterance is tagged with a unique identifier (Appendix B). A more detailed description of the procedure, the tools, the data treatment and the technical aspects of the data organization and representation are provided in Slavova (2016).

The English data collection used in this study contains 620 dialogues (with 62 girls, 66 boys, and 7 children with gender not specified in the source); the French collection contains 895 dialogues (with 157 girls and 141 boys). Some children are "recorded" during several successive months and some are not. The parameters of the dialogues are as follows: the English data contains in average 520 utterances of different participants in a dialogue, where 202 child utterances; the French data contains in average 388 participants' utterances in a dialogue, where 171 are utterances of the child.

Next, a large number of queries were elaborated to select, regroup and calculate parameters of the child speech utterances. In the present study, the results for two large corpora collections — 125,873 child speech-utterances for English language production and 153,824 for French language production — were treated statistically. On average 2,400 utterances per child-month were treated, taken from different corpora, belonging to different children aged between 6 months and 62 months and originating from dialogues taking place in different circumstances and selected by different researchers over the course of the last four decades.

Examples of the children's utterances extracted from the dialogues, with their POS annotation, are given in Appendix B. The language-related parameters presented further in the statistical analysis are obtained by parsing the mor% annotation extracted from the annotated dialogues in CHILDES.

Observation of children's utterances in the two languages confirmed several known facts regarding language acquisition: The first pronounced distinguishable word- forms appear around 10-13 months in single-word expressions, and with the development of the child's overall capacities, utterances become longer, expressing increasingly complex ideas. At approximately 26 months all the analysed utterances have a phonological content comprising at least one word-form identifiable as belonging to the given language (Fig. 1). Following the collected data, after the age of 62

months, child speech starts to contain complex and subordinate sentences in a single communication utterance.

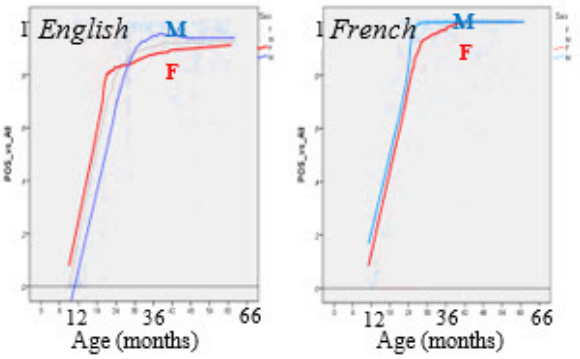

Figure 1. Utterances with phonological content recognizable as word-forms in the given language. Ratio over all utterances. (girls – red, boys – blue)

The task in this study is to judge how the global content of the speech develops in terms of mental images that underlie the meaning-expression.

3. STATISTICAL ANALYSIS OF THE POS ACQUISTION

For studying the use of POS, the statistical analysis relies on the annotation performed by the authors of the respective data-corpora in the data collections (Appendix A). In the data-annotation scheme deployed in the CHILDES source, the word-forms produced by children are classified by POS as they are distinct in the corresponding languages. This annotation uses 33 POS for the English collection and 30 for the French.

In order to obtain a measure for the contribution-weight of a given POS within a speech-utterance, the following formula for calculating the Ratio per Utterance (RU) of the given POS within a dialogue was applied:

$$RU(POS_{ij}) = \frac{NPos_{ij}}{N_j} \qquad (1)$$

where :

POSi is one of the POS annotated in the corpora,

j is the dialogue,

Nj is the number of utterances with recognizable POS in the dialogue j.

NPosij is the number of the POSi in the dialogue j.

By applying the formula (1) a RU was obtained for all the POS for each of the 620 dialogues in English and 865 dialogues in French. The RU show the extent of use of the given POS for expressing the child's notions within an exemplary utterance "averaged" for the dialogue. They can be seen as weights of the use of given POS for expressing the meaning communicated by the child within the dialogue. The RUs were used in the further analyses of the similarities.

The statistical result displayed in Fig. 2 is consistent with specialized studies in language acquisition. For example, it has been shown (Bassano, 2000) that in French acquisition, between the ages of 14 and 30 months, nouns clearly predominate over verbs, but that verbs are however produced in the early stages. The statistical result shown on plot of POS-acquisition does not contradict either the time-scale of acquisition of different POS reported in the specialized studies for English.

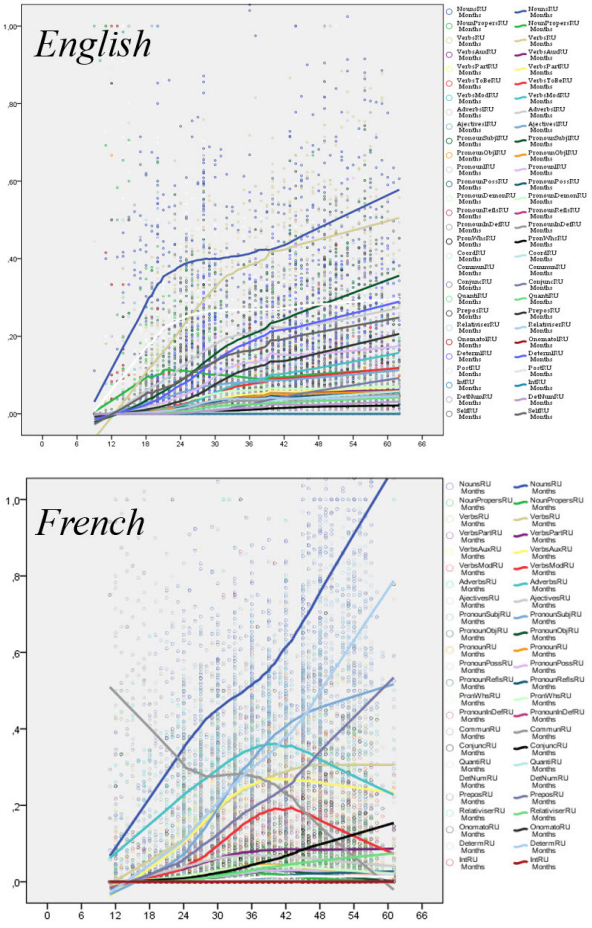

Figure 2. Development with children's age of the RU of the POS in the English and French data

As shown in Fig. 2, the developmental paths for the use of different POS in the utterances produced by English-acquiring and French-acquiring children are quite different. This difference can be attributed to language-

specific features, as obviously the grammatical particularities of English and French are different

Table 1 gives the correlations of the use of identical POS in the two languages (between-languages correlation). This correlation is small, taking into account that the use word-forms in the considered period is described by an increasing function.

The between-languages correlation presented in Table 1 is for the 25 identically labeled POS in the two language-corpora (in descending order following the correlation values), for the 50 months (from 11 to 61) which have data collected for both languages. The p – values which suggest statistically unreliable result are given in italic. The between-languages correlations are obtained based on month-to-month correspondences. That is, each POS RU of all the dialogues belonging to equally aged (in months) children are averaged within the same month, for each of the languages, and after that compared.

The average between-languages correlation for the use of identical POS is only 0.46. At the same time, for the period investigated, the Sums of the POS RU (roughly - the length of the utterances) develop in a very similar way, correlated at 0.88, i.e. higher than the maximal POS-to-POS correlation.

Table 1. Between-languages correlations for the development over the time of language acquisition of POS RU

POS:	Correlation	p – value
Preposition RU	0,840	0
Determiner RU	0,830	0
Pronoun Subjective RU	0,825	0
Verb RU	0,818	0
Conjunctions RU	0,812	0
Verb Auxiliary RU	0,795	0
Adverb RU	0,721	0
Noun – common RU	0,697	0
Verb Modal RU	0,660	0
Relativizer RU	0,553	0
Pronoun Demonstr. RU	0,541	0
Determiner Numeric RU	0,517	0
Pronoun RU	0,483	0
Pronoun Objective RU	0,471	0
Vbs. Participles RU	0,430	0
Quantifiers RU	0,376	0
Onomatopoeia RU	0,352	0,01
Pronoun Interrogat. RU	0,349	0,01
Pronoun Indefinite RU	0,331	0,01
Pronoun Reflective RU	0,327	0,02
Adjective RU	0,304	0,02
Pronoun Possessive RU	0,299	0,03
Interjection RU	-0,084	0,04
Noun - proper RU	*-0,197*	*0,56*
Communicators RU	*-0,415*	*0,17*
Average POS-to-POS	**0,465**	

There are no reasons to suspect that the two languages are very different at the level of POS-structure as they are close representatives of one and the same family and are of the same morphological type. As seen in the correlation table, the POS which are used in the most comparable way are the prepositions and the determiners.

There are also no reasons to suspect that, in terms of conveyed meaning, the 1-. 2-, 3- years old English-acquiring and French-acquiring children have very different ideas to communicate.

Specialized studies discover interactions between semantic and grammatical development. For example, Bassano (2000) found that between 14 and 30 months, verb- and noun-grammati-calization in French is related to the production of concrete action verbs and to concrete object nouns. Bassano proposes that "These findings, discussed in a cross-linguistic perspective, suggest that both conceptual and grammatical packaging are important and interacting factors in noun and verb development". This idea is strongly supported by all the contemporary research presented in the book edited by Hirsh-Pasek and Golinkoff (2006), "Action meets word: How children learn verbs."

Table 2. Example - expression of meaning and desires in a dialogue of a 15 months old child. (CHI – child, MOT – mother, FAT – father, SIS – sister)

Data extracted from the dialogue taz15.bw
*CHI: Mommy Mommy Mommy.
*CHI: tee [: tree] tee [: tree].
*CHI: Mommy tee [: tree].
*CHI: Dada.
*CHI: Mommy.
*MOT: what?
*CHI: out.
*CHI: baby.
*CHI: hi.
*FAT: hi, Laura.
*CHI: hi.
*SIS: hi, Laura.
*CHI: Mommy!
*MOT: what Laura.
*CHI: ah Dada.
*MOT: what's the matter?
*CHI: dee@b dee@b.
*MOT: oh my.
*CHI: out Dee baba [= bottle].
*MOT: what?
*CHI: hi, Dada hi, Dada Mommy.
*CHI: car car car car.
*CHI: car.
*CHI: key key key.

The core meaning-related question to be clarified concerns the very different paths of acquisition of the POS-constituents in the two languages (Fig. 2). The children's utterances in the corpora are most often incomplete and grammatically incorrect sentences, but they express the meant quite well (an example is provided in Table 2). In fact, the used measure – the POS RU reflects statistically the profile of the words produced within a dialogue and does not reflect the sentence level.

The next section presents the approach proposed here in order to find a common semantic organization which can explain the language acquisition processes as similar. Such a structure is supposed to equilibrate the difference displayed in the acquisition process measured at the POS level.

4. COGNITIVE MODEL

It is largely agreed in cognitive science that learning to assign meaning to sensory stimuli lies at the foundation of human cognition (e.g., Glezer et al. 2015). Unaided by language, infants from birth are able to begin forming meaningful conceptual knowledge about entities they perceive on a basis of interacting purposively with them, and to apply this to their interactions in increasingly structured ways and diverse contexts. Several contemporary findings suggest, as proposed herein, that the brain can execute internal meaning-related processing independently of language - that is to say, on a basis of processing of intact perceptual representations (here termed information-units) prior to, or in default of, their corresponding conceptual representations' lexicalization. A study by Moran and Tommerdahl (2011) of an 8-year-old child raised in a social environment, but without contact with spoken or signed language, found that the child exhibited no clear evidence of cognitive deficits. The celebrated case of Helen Keller provides similar testimony. In addition, several studies (e.g., Frishberg, 1987, Torigoe and Takei, 2002) have investigated cases of home-signing, that is, the inventing of sign-languages by groups of two or more hearing-impaired individuals who have not been taught a conventional sign-language. The phenomenon of home-signing suggests that humans are predisposed to elaborate systems exhibiting a language-structure in order to share their internally created concepts, and use them for communicating. The main question addressed here concerns the existence of some primary structure behind these internally created concepts.

The present study's approach focuses upon the progressively elaborated content of children's spoken utterances. The creation of meaningful representation is portrayed in the proposed model as a process in which inborn information-treatment mechanisms organize information-flows obtained in interaction with the world so as to establish distinct units of meaning. In the model presented by Slavova and Soschen (2015a., b.) this process was termed "meaning-encapsulation". It is supposed here that the meaning-encapsulation process is ready to run at birth. The early period of language-acquisition is assumed to be underpinned by the processes of meaning-encapsulation

Two separate regimes within the language-learning process are considered in the basic scheme of the proposed model — the analytic regime, related to language comprehension, and the generative regime, related to speech production or sign-language production (Fig. 3).

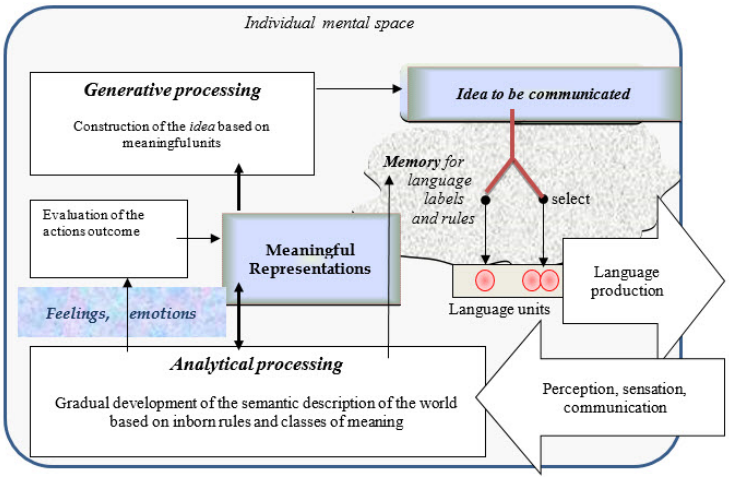

Figure 3. General scheme underlying the proposed model

The analytical processing in language acquisition is concerned with the assigning of meaning to words (or expressions). The acquisition of language-labels and rules and their use is seen as mapping between a child's own meaning-related representations and the labels and rules used in the language-environment (Fig. 3). This process can be presented as blending of the internally "encapsulated" units with the language ingredients. Its outcome is the creation of a lexicalized concept – a capsule with a "name". These names are further involved as words in the generative processing.

It should be taken into account also that children often invent their own labels for the concepts they have formed. These labels (perhaps arbitrary, à la Saussure (1916), perhaps sound-symbolic or to some extent phonetically matching the words used in the language environment) are used by children in communicating, and with persistence (an example is given in Table 2).

Additionally, the term idea is used herein to signify a consciously represented thought, generated by neuronal operations on meaningful units. The process of idea-generation involves creating the assembly of distinguishable meaningful units that express the thought. Recent medical studies suggest that some brain-impairments can harm the regulating of the mechanism of idea-generation. For example, Robinson and colleagues (Robinson et al., 2015) suggest that "When a "brake" to stop message generation mechanism is damaged at the level of conceptual preparation, the speaker will have difficulty stopping new thoughts from being created, generated, and expressed as overt speech.".

Language production commences after the analytic regime has created memory-paths necessary for the retrieval of the labels and rules used in the language. Recent research has shown that children know the meaning of many nouns at the age of 6 months (Bergelson et al., 2012), while the first pronounced words start at 10-13 months. In the speech-generative regime, the child aspires to communicate to others a certain idea, which presupposes its existence already in the child's mental space. One main question addressed here concerns the idea-ingredients, given that the meaningful units are compiled by the analytical processing-regime, the settings for which are assumed to be biologically determined.

When the idea is to be communicated, it has to be converted into expressible language-items, represented in memory. The question to be further addressed concerns what types of conceptualized items are added to children's expressions during the acquisition with regard of their role in the mental representation of the world. As children expressions become more and more reach, the next question is in what proportion and how the growth happens happens as regards of the type of meaningful units.

The analysis that follows relies on the use, during the initial stage of language acquisition, of different parts of speech (POS). POS are seen as offering the building blocks of the language's content, which (by the present hypothesis) has to be bonded to meaningful representations (Fig. 3).

The next section proposes a set of roles that can be distinguished in the mental representation of the world, suggested as basic classes of concepts.

5. MENTAL REPRESENTATION OF THE WORLD – THE MEANING CLASSES HYPOTHESIS

The overall approach in this study looks at meaning as constituting the bedrock of the faculty of language. This is opposite to some linguistic views, which suppose that meaning exists because of language. Obviously, if meaning is a consequence of language, it needs to be explained from where and how language has arisen in order to introduce the meaning that it carries; a scientifically plausible explanation has yet to be put forward, however.

The reasoning in this section relies on the widely accepted psychological model proposed by Lawrence Barsalou (Barsalou 2003), according to which the conceptualizing and in general the mental representing of the world are the undertakings of an Actor, acting in the environment. The hypothesis developed here - termed the "Self-centered model of language faculty" (see Slavova and Soschen 2015 a, b) and derived from Barsalou's model - accords to the concept of Self a central role in developing language faculty. Its authors reasoned that meaningful units of information are created by a substrate of inborn mechanisms that have the task of ensuring the survival of the biological system (the Self) as an "Actor in the environment". The Actor's mental representing of the world can be thought as a system of such meaningful units.

Categorization of meaningful information as distinctive classes is possible if the purpose (i.e., usage) of the information has been determined. The hypothesis put forward here is that the mechanisms that have arisen during evolutionary development have played the role of internal generators of information necessary for the survival of the biological species in the environment. Thus the mental mechanisms responsible for the generation of meaningful units are presumed to build units of importance for the species' survival that are assignable to such classes of information. Each class would have a specific role for representing the environment (the "world") as internal meaning.

To determine the classes, the first step was to deduce the general information-types that the newborn (an autonomous system) should have in order to act adequately with regard to his Self as Actor. Based on this, the environmentally presented "realities" that have to be organized as information units in order to further operate on them are supposed to be related to: 1. Physically negotiable objects in the environment, of significance for its functioning and existence (e.g. energy supply, obstacles, dangers etc.), 2. Their behavior (e.g. actions, states, intents etc.), namely, that which is comparable with the actions and states of the system and of importance for the system's behavior, 3. The manner in which the environment is "organized" and changes (e.g. the spatial and temporal particulars of the significant objects, relative to the system's own functioning in space and time), 4. The qualitative features of the environment (e.g. the same color or form in separate objects) that are of importance for the system's survival in the environment and 5. The quantitative parameters of the environment (e.g. evaluation of proportions between the objects or between groups of objects).

It should be noted that the reasoning followed takes into account social concepts, science-related concepts etc. as these are presumed of importance for the survival of humans as a species, or, at least, for the survival of humans as they have evolved up until now.

Together with the analysis of the speech data from the corpora, this led to the following classes (Table 3):

- *Entitles,*
- *Relationships,*
- *Circumstances,*
- *Quality and Attribution,*
- *Quantity and Precision and*
- *Others.*

Table 3. Proposed meaning-classes in the model "Actor in the environment". Spread of the POS with examples of annotation.

Meaning-Classes	Examples of annotation, English	Meaning-Classes	Examples of annotation, French
1. Entities		**1. Entities**	
Self	I, my Name, me, my, myself, mine, Baby	Self	je, moi, mon Nom, bébé, mon, ma, mes, mien
Common Noun	n|man, n|work	Comm. Noun	n|cheval, n|pied, n|crasse, n|lapin
Proper Noun	n|Dada, n:prop|Uncle, n:prop|Joe	Proper Noun	n:prop|Papa, n:prop|Raphaël
Pronoun Subj.	pro:sub|he, pro:sub|they	Pronoun Subj.	pro:subj|il, pro:subj|on
Pron. Object.	pro:obj|me, pro:obj|them	Pron. Object.	pro:obj|me, pro:obj|le
Pronouns	pro|it, pro|you	Pronouns	pro|moi, pro|toi, pro|eux
Pron. Reflect.	pro:refl|myself, pro:refl|yourself	Pron. Reflect.	pro:refl|se (+v|garer), pro:refl|se$v|appeler
Pron. Interrog.	pro:wh|what, pro:wh|who	Pron. Interrog.	pro:int|qui, pro:int|quoi
2. Relationships		**2. Relationships**	
Verb - Action	v|go, v|find, v|sit, v|finish	Verb Action	v|marcher, v|connaître, v|dire,
Verb - Modal	mod|can, mod|will, mod|do	Verb - Modal	v:mdl|faire, v:mdl|vouloir, v:mdl|aller
Verb - Auxiliary	aux|be, aux|have, aux|get	Verb - Auxil	v:aux|avoir, v:aux|être
Verb To Be	cop|be		v:aux|être
Participles	part|mix, part|go, part|use	Participles	part|casser; part|boire, part|tomber,

3. Circumstances		**3 Circumstances**	
Adverbs	adv|out, adv|there, adv|almost, adv|down	Adverbs	adv:place|dehors, adv|d'abord, adv|très, adv|aussi
Prepositions	prep|at, prep|on, prep|with	Prepositions	prep|à, prep|avec, prep|dans, prep|moins
Pron. Demonstr.	pro:dem|that, pro:dem|there	Pron. Dem.	pro:dem|ce, pro:dem|ça,
Conjunctions	conj|but, conj|when, conj|because	Conjunct.	conj|parce pro:rel|que, conj|si
Coordoners	coord|and		conj|et,
Relativisers	rel|what, rel|where	Relativ.	pro:rel|quoi, pro:rel|où; pro:rel|que
4. Quality and Attribution		**5 Quality and Attribution**	
Adjectives	adj|brown, adj|big, adj|good	Adjectives	adj|blanc, adj|petit, adj|beau,
Pron.Possesive	pro:poss:det|my, pro:poss:det|his	Pron. Possess.	det:poss|mon, det:poss|sa
5. Quantity and Precision		**Quantity and Precision**	
Numerals	det:num|four, det:num|million	Numerals	det:num|un; det:num|trois
Quantifiers	qn|more, qn|many, qn|some	Quantifiers	qn|plus, qn|un_peu, qn|plusieurs.
Pron. Indefinite	pro:indef|one, pro:indef|more	Pron. Indef.	det:gen|quelques, det:gen|chaque
Determiners	det|a, det|the, det|this	Determiners	det|le det|un
Post	post|both, post|all; post|else,		
Other		**Other**	
Onomatopoeia	on|beeu, on|bawk, on|ding	Onomatopoeia	on|pin on|pon, on|ham on|ham; on|kof
Interjection	int|da, int|ba, int|da, int|wow !	Interjection	int|wah int|berk int|berk
Communicator	co|please, co|yes, co|no, co|thank_you	Communicat.	co|oui, co|non, co|merci, co|oh, co|héh, co|miam

6. STATISTICAL ANALYSIS OF THE MEANING CLASSES

POS appearing in the data-collections were sorted into the aforenamed meaning-classes, as shown in Table 3. The separation of POS is accomplished by imagining which POS are used in the speech-samples to express each of the classes. The distribution cannot be perfect — a word-form can belong to more than one meaning-class depending on the context. As an example - tout in French is at time an adjective (translated as any, every, entire), an adverb (translated as all, very, in all, all up) a noun (all, whole) and a pronoun (all, any, anything). Here the study relies on the annotation-method applied by the linguists and on their correctness.

The use of the same POS-labels in the two languages can also be a source of errors, but when looking for universals one has to apply common sense in order to find correspondences. For example, the numerals in the French corpus are annotated as nouns as it is following the rules of the French grammar adopted in CHILDES. That has required a retrieval of the numbers in the French corpus and changing the annotation. Some particularities have not been homogenized. For example, in the French corpus mien in “le mien” (the mine, m.) is a noun and in “la mienne” (the mine, f.) is an adjective.

The child speech data were statistically treated in respect of these classes. The RUs for each of the meaning-classes were calculated by summing the RUs of their POS-constituents.

As shown in Fig. 4, the paths of use of the meaning-classes during acquisition are very similar in the two languages. (The Sum of RU of the meaning-classes is strictly equal to the SUM of POS RU). The average between-languages correlation for similar meaning-classes is considerably higher than the average POS-to-POS correlations (Table 4).

A strange behavior is displayed by the class of “Others”, in that its use in the two languages is negatively correlated. It is not clear from the data why the use of this class displays so different a statistical picture in the two languages. However, some reasoning is proposed in the next section.

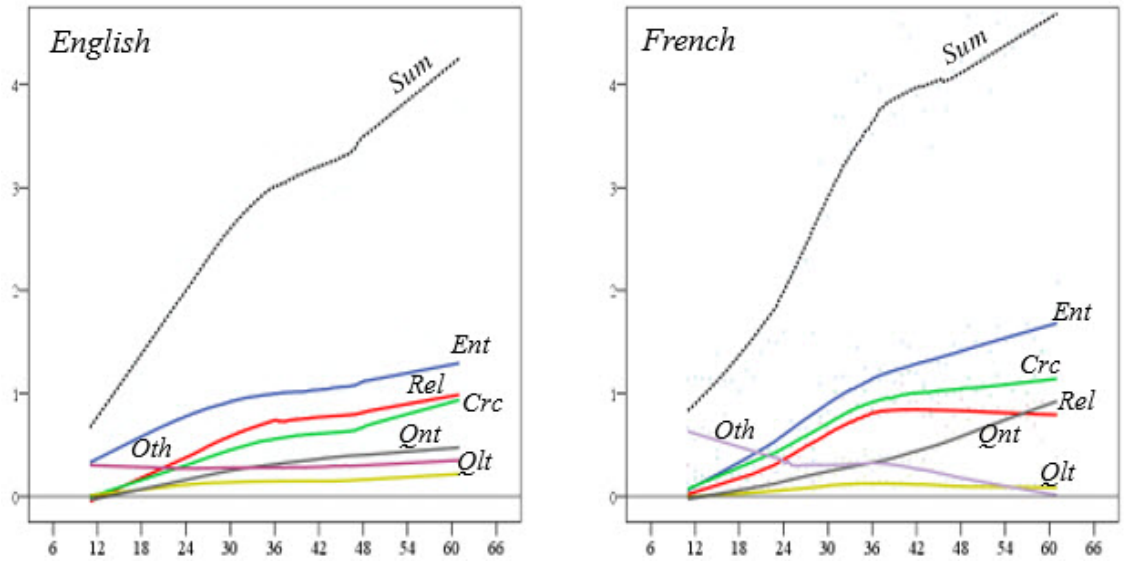

Figure 4. Meaning classes' use with advancing age : Ent – Entities, Rel – Relationships, Crc – Circumstances, Qlt – Quality, Qnt – Quantity, Oth – Others, Sum of all classes (Sum of POS RU).

Table 4. Correlations of the use of classes between English and French

Meaning class	Correlation
Entities	,830
Relationships	,857
Circumstances	,886
Quality and Attribution	,460
Quantity and Precision	,842
Others (expressive and communication)	-,121

The conclusion at this point is: when children's expressions are classified to the proposed classes of meaning, the statistical pictures that describe the two acquisition processes are very similar, as seen from the plot in Fig. 4 and from the correlations.

7. DATA OBSERVATION

The proposed meaning-classes are viewed here as language replications of the semantic roles that humans mentally construct from their interaction with the environment. If the classes have this function, they would be detectable in children's speech from the first stage of language production. Observation of the data-collections confirmed their use from its outset, i.e., at 10-14 months; examples of the first use of each class in the two languages are given in Appendix C.

A commonly accepted fact in the field of child language-acquisition is that the ability to learn arbitrary associations between words and objects develops until about 14 months of age (e.g. Werker et al., 1998). Brain studies (e.g. Friedrich and Friederici, 2005) also suggest that the processes underlying semantic integration are already developed at the age 14 months. The analysis of the data shows that at the age of 14 months all the classes of the proposed set are used by the two language groups taken as a whole.

The investigation of the English data collection confirmed statistically that there is difference in the acquisition process reflecting children's individual abilities (Atanasov at al., 2016). In the data examined here, for the age-group of 10-13 months there are dialogues of 21 children, 14 acquiring English and 7 French. The dialogues of the 13-months old English-acquiring children (9 different children) contain all the classes except Quantity and Precision and of the French-acquiring group of children (4 children) contain all the classes. The dialogues of 14-months-old English-acquiring (15 children) contain already all the classes. At 16 months the use of all classes is already intensive for the two language-samples (fig. 4). At 16 months, 2 (of the 4 recorded) English and 2 (of the 4 recorded) French acquiring children used all the classes within the confines of single dialogues. Two of the "classes-incomplete" dialogues belong to children who are recorded at younger age, which allowed seeing that these children have used the "missing" classes in their dialogues at 14 and 15 months of age.

The conclusion that can be derived is that the two language-collections' samples support the primary character of the proposed meaning classes.

There are questions concerning the behavior of the classes, however, which have to be clarified. As discussed in the previous section, the classes' acquisition displays a very similar, smoothly growing development, except for the class of Others. The class comprises Onomatopoeias, Interjections and Communicators and its use in both languages is initially high and tends to decrees over the time (Fig 4). The detailed plot of the development over the time of its components is given in Fig. 5.

Analyzing results obtained in specialized domains offers some reasons concerning the behavior and the differences accounted statistically for the use of the class of Others. A body of research supports Imai and Kita's sound symbolism bootstrapping hypothesis (Imai and Kita 2014) stating that sound iconicity facilitates language learning in general (e.g. Assano et al., 2015). For example, studies of adults' and children's language-learning have shown that non-Japanese speakers learn easer sound symbolic Japanese adjectives (Lockwood et al., 2016) and verbs (Imai et al., 2008). The results obtained by Fenson and colleagues (Fenson et al., 1994) regarding English and Spanish children's language-acquisition showed that the earliest-acquired words were those judged as being most iconic, where Onomatopoeias and Interjections were rated as being highest in iconicity.

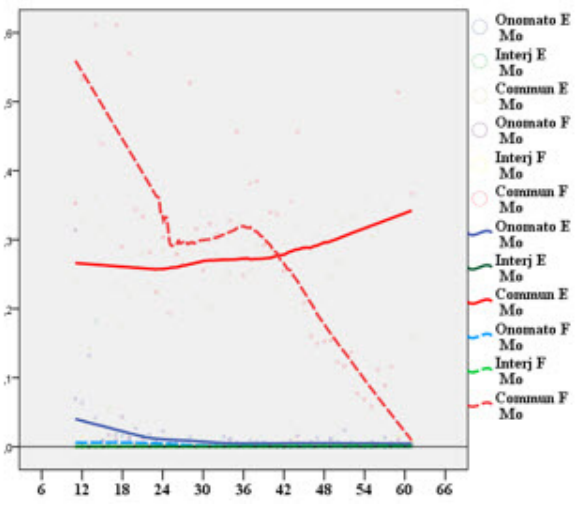

Figure 5. The class of Others.

Correlations : Communicators: -0,415 Onomatopoeias: 0,352, Interjections: -0,084,.

Laing, C. E. (2017) used an approach based on picture-mapping task and reported an advantage for onomatopoeia in the mapping word-to-semantic-item in broader perceptual sense. The extended analysis of the results related to these phenomena, proposed by Laing, states that Onomatopoeia probably constitutes the most obvious and common form of iconicity, but ideophones (e.g., glisten, jingle) and mimetics (found in Japanese) also contribute to iconicity. The author states that the extent of this contribution varies across languages.

Concerning the statistical picture obtained in the present study, in the light of these cited results it is hypothesized here that Onomatopoeias, known to be dominant in infants' early lexicons, are initially used to name Entities, Relationships etc., which explains the decrease of their use over the course of time, in both languages. It can be supposed that the use of onomatopoeias is language and culture dependent, which may explain the observed differences of the two languages.

As may be seen from the plot in Fig. 5, the negative between-languages correlation observed for the Others class is due mainly to the dissimilar use of Communicators (yes, no, thank you, hi!, oui, merci, salut! etc.) and Interjections (see Table 3). It should be noted that the p-value for the correlation of Communicators is 0.17, so, formally, the correlation represents an unreliable result. In fact, observation of the data shows that the intensity of use of Communicators displays a big dispersion over the dialogues. Unsurprisingly, the use of Communicators is dialogue-dependent. This dependency reflects the influence of the context occasioning the dialogue on its content. It is plausible, too, that children's individual habits have an impact on their use of Communicators. In all cases, in the English dialogues the level of use of Communicators is approximately constant, whereas the French data contain dialogues in which the use of Communicators drops drastically over the course of time.

The plots in Fig. 6 show the distances found after multidimensional scaling for the set of POS RU in the two languages (for the entire period of language acquisition investigated). The plots suggest that use of POS advances en bloc (with the exception of Nouns and Verbs) in both languages. Only the use of Communicators displays a markedly distant point, suggesting their separate role in language expression.

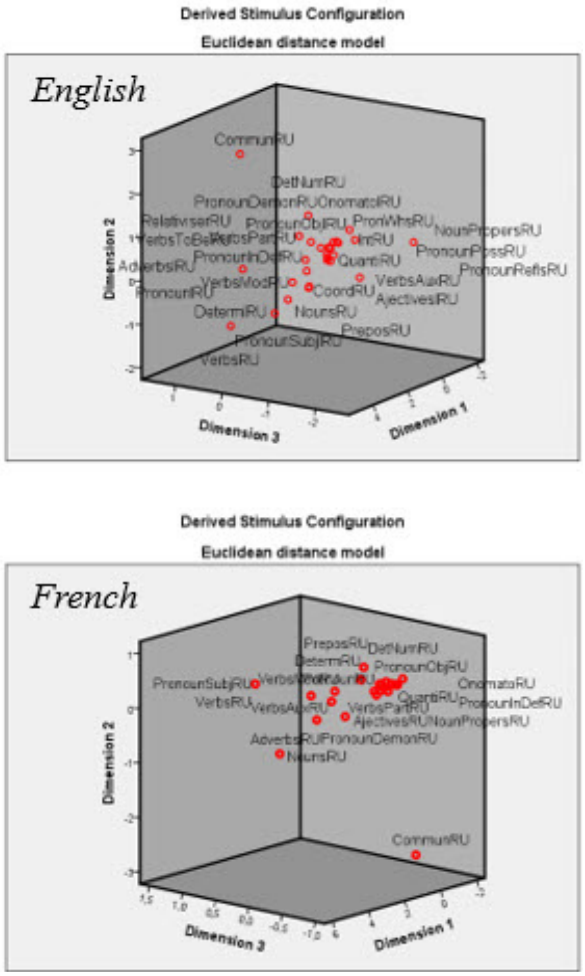

Figure 6. Euclidian distance model after multidimensional scaling of the POS RU

In French, the use of the Others class decreases as language-acquisition progresses (Fig. 4). One may suppose that the decrease is offset by the use of alternative POS (as is found regarding Onomatopoeias), or perhaps by other means of communicating.

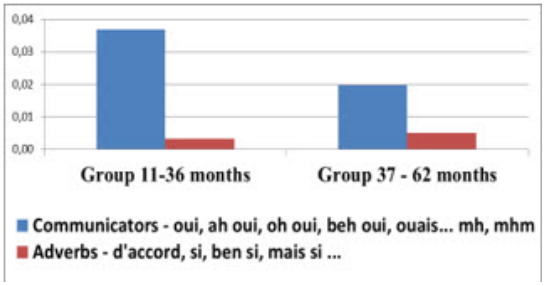

Figure 7. Example - use of some affirmative communicators and adverbs in French

Fig 7, for example, depicts the analyzed samples regarding use of affirmative communicators in French, together with other means often used by French-speakers for expressing them (where "si" is a quite specific manner of expressing a double negation - i.e., expressing approval in contradiction to a negative statement just made by the other speaker in the exchange).

Speech communication in free dialogues is an act. The internal dispositions, intents, and emotional states implied by the speaker are not transferred in a uniformly faithful manner by the pronounced words alone. Even when taking into account that the prosody of the announcement conveys a lot of information, the accompanying signs and reactions such as gestures and gaze make part of the communication. This behavioral aspect of language communication is culture dependent. As an example, the communication within a group of speakers of Italian looks different to that within a group of speakers of Dutch. It seems reasonable to propose that the difference observed in the statistical result is due to the influence of the adult's language and communication practices in the two cultures.

Re-addressing the questions of concept formation and language production after undertaking her huge analysis, Laing (2017) discusses the role of iconicity in early language development as follows: "...These 2 words [dog and ball, found to be among the first 10 most frequently used by small children] are among the 3 least iconic of the 10 words overall, and dog is both the least iconic and least systematic of the 2 words. In these two cases, therefore, the motivation behind their early acquisition cannot be driven by iconicity. "

Perhaps the reason for children's frequent production of such words could reside in the inborn necessity to mentally represent the related semantic types.

8. DISCUSSION

The idea underlying this study is not novel in linguistics. The overall approach can be seen as a statistical investigation towards the "semantic bootstrapping hypothesis" proposed by Steven Pinker (Pinker, 1987). Pinker supposes the existence of a "semantic inductive basis" that helps children in the acquisition of language rules by means of "syntax-semantic pairing". The content of the inductive basis proposed by Pinker comprises categories such as "name of person or thing", "action or change of state", "attribute" and "spatial relation, path or direction". Further, Pinker's work shows how these categories can lead to the acquisition of syntactic rules.

The set of classes proposed here, inferred from the Actor in the environment mod-

el, came to be quite similar to the categories proposed by Pinker. The results of the present study support the hypothesis that syntactic rules are based on semantic determinants and suggests, too, that this basis is common for all humans.

This implies that during the course of evolution, over a large time-span, the development of languages has been dictated by the development of the mechanism for mental representing of the world.

Let us present language development (and acquisition) as depending on two complementary factors: the one being how necessary it is to encode some item of information in order to communicate it (in terms of its importance for the continued communal existence of humankind), and the other being how feasible it is to do so. One may suppose that, in evolutionary terms, the necessity to communicate in order to survive has influenced the development of the mental capacities required.

Communicating information by means of spoken language necessitates first conceptualizing it and then according to it a phonetic content (label). This raises the question as to abilities necessary for conceptualization and those regarding the phonological encoding.

In the languages examined, Communicators and Interjections are mostly expressed with short syllables comprising simple phonetic content, easily memorized and pronounced. These lexemes are expressing internally generated, affective reactions to information that has been processed (immediately or in the past), and express products generated by limbic system processes. They can be seen as speech-expressions of internal information flows that encode intrinsic characteristics of the Actor. This explains their intensive use in the initial period of language production (see Fig. 5).

From the standpoint of conveyed meaning, Ccommunicators are the most complex representatives of the speech as they serve to communicate agreement or disagreement, intents, internal dispositions, etc., evaluating the overall conceptualized situation. Indeed, Communicators serve to summarize and convey, in a single word, both the Actor's overall conception of a situation and his or her immediate stance or inclinations in reaction to it. As stated in the Wikipedia article on "Yes and No", "They are sometimes classified as a part of speech in their own right: sentence words or word sentences."

Onomatopoeias, most likely, are used intensively at first because their sound-symbolic nature facilitates the word-to-concept mapping. From the standpoint of mental representing of concepts, their use is equivalent to the use of Entities, Relationships, Circumstances, Quality and Quantity.

The problematic is related to mechanisms ensuring the concept-creation and their dependence on brain resources. It has been argued by Fennell and Werker (Fennell and Werker, 2003) that 14 month old children's failure in associative word-learning situations is due to a processing overload (which, however, does not incapacitate their discriminating of the words' phonetic detail).

Children's speech demands the use of so-far extant concepts, so their volume in the speech reflects the processing charge which the mental system has allowed at that given age. The plot of the use of classes (Fig. 4) shows that the line of the Sum of classes develops in a very similar way for the two language groups of children (correlation 0.87). This suggests that some resource underlying the conceptualization abilities is used quite similarly by the two language groups.

The statistical picture displayed entails several questions. One is why the classes participate with different weights within the meaning construction. The reason for this should be related to the processing charge that they demand.

A second question is related to the proportions of meaning-classes – in English the intensity of use develops in the order Entities – Relationships – Circumstances (Fig. 4) and in French the order of intensity is Entities – Circumstances – Relationships. These classes serve to mentally re-describe an Event. The mental image of an Event consists (in general) of Entities, Relationships and Circumstances. The proportion of their use to express an Event can be language dependent. The Sums of the RU of discussed three classes develop in very similar way (correlation till 36 months - 0.905). That suggests that the mental process treats the two schemes with an equal effort.

All these questions necessitate establishing a model depicting the complexity of the mental processing associated with different meaning-classes that can explain the reported statistical observation.

9. CONCLUSION

Theories and studies in the field of child language-acquisition have increasingly concentrated on the relation between language

units and semantic representations. Despite the huge amount of brain studies investigating the reactions to semantic stimuli, semantic confusion, word-to-concept mapping and other aspects of semantics, there is still no explanation from where the semantic representations come and what primary role do they have. In other words, why do they exist?

The present study proposes a model which, as first step, portrays the general biological foundation for the existence of semantic representations as information substance. The model posits that children are born equipped for the role of Self-actor in the environment and supposes that inborn information-treatment mechanisms organize information into general meaning-related classes that have the role of ensuring the Actor's survival in the environment.

The classes-hypothesis is tested by analyzing data from child language-acquisition of two languages. When children's speech is considered in terms of use of these classes, the similarity between the two language acquisition processes is important. An essential statistical observation is that children use representatives of all these classes from the onset of language production - an indication that the proposed classes reflect inborn mechanisms for mental representing of the world.

The presented result and reasoning, as it often happens in science, give rise to several novel questions. The most important of them is related to the processing load which, following the data is different for the different classes.

Conflict of interests

Author declares no conflict of interest.

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Appendix A

List of the corpora in CHILDES data repository used in this study.

Corpus in CHILDES:	Number of Dialogues included in this study
English Belfast Corpus	10
English Bernstein-Ratner Corpus	5
English Bliss Corpus	2
English Bloom73 Corpus	6
English Braunwald Corpus	111
English Brent Corpus	24
English Brown Corpus	31
English Clark Corpus	1
English Cornell Corpus	11
English Demetras1 Corpus	25
English Feldman Corpus	19
English Fletcher Corpus	10
English Gleason Corpus	48
English Hall Corpus	2
English Higginson Corpus	4
English HSLLD Corpus	86
English MacWhinney Corpus	22
English NewEngland Corpus	19
English Peters Corpus	8
English Post Corpus	20
English Rollins Corpus	24
English Sachs Corpus	4
English Snow Corpus	4
English Suppes Corpus	1
English VanHouten Corpus	15
English Warren Corpus	4
English Weist Corpus	10
English-USA Bates Corpus	99
Eng-USA Soderstrom Corpus	1
French Champaud Corpus	32
French Geneva Corpus	15
French Hammelrath Corpus	224
French Hunkeler Corpus	22
French Leveille Corpus	34
French Lyon Corpus	207
French MTLN Corpus	299
French Paris Corpus	52
French York Corpus	23
Phonbank English Providence Corpus	1

Appendix B: Presentation of the Data. Example: English — the beginning of a dialogue.

a) As presented in CHILDES, the data source. Window of the CLAN interface.

```
@Begin
@Languages:    eng
@Participants:  CHI Ross Target_Child , MAR Mark Brother , MOT Mary Mother , FAT Brian Father
@ID:    eng|MacWhinney|CHI|4;1.17|male|typical||Target_Child|||
@ID:    eng|MacWhinney|MAR|2;2.23||||Brother|||
@ID:    eng|MacWhinney|MOT|||||Mother|||
@ID:    eng|MacW
@Media: 48a1, a
@Date:  11-FEB-
@Situation:     R
*FAT:   you can e
%mor:   pro|you
%gra:   1|3|SUBJ
*CHI:   no . •
%mor:   co|no .
%gra:   1|0|INCR
*FAT:   okay . •
%mor:   co|okay
%gra:   1|0|INCR
*FAT:   I'll eat it t
%mor:   pro:sub|I
%gra:   1|3|SUBJ
*CHI:   no . •
%mor:   co|no .
%gra:   1|0|INCR
%com:   he misu
*CHI:   I'm saving
%mor:   pro:sub|I
        prep|for adv:
%gra:   1|3|SUBJ
```

b) Tagged and additionally annotated records of the same dialogue, as stored locally in the constructed database

M	ModuleN	Text Marked I	TypeOfRecor	Data	Paeri
49	rrs49.mc	rrs49.mcw0002	0 @Languages:	eng	
49	rrs49.mc	rrs49.mcw0003	0 @Participants:	CHI Ross Target_Child , MAR Mark Brother , MOT Mary Mother	
49	rrs49.mc	rrs49.mcw0004	0 @ID:	eng|MacWhinney|CHI|4;1.17|male|typical||Target_Child|||	
49	rrs49.mc	rrs49.mcw0005	0 @ID:	eng|MacWhinney|MAR|2;2.23||||Brother|||	
49	rrs49.mc	rrs49.mcw0006	0 @ID:	eng|MacWhinney|MOT|||||Mother|||	
49	rrs49.mc	rrs49.mcw0007	0 @ID:	eng|MacWhinney|FAT|||||Father|||	
49	rrs49.mc	rrs49.mcw0008	0 @Media:	48a1, audio	
49	rrs49.mc	rrs49.mcw0009	0 @Date:	11-FEB-1982	
49	rrs49.mc	rrs49.mcw0010	0 @Situation:	Ross was being real nice to Brian and saving candy for him .	
49	rrs49.mc	rrs49.mcw0011	1 *FAT:	you can eat it now .	FAT:
49	rrs49.mc	rrs49.mcw0012	1 %mor:	pro|you mod|can v|eat pro|it adv|now .	
49	rrs49.mc	rrs49.mcw0013	1 %gra:	1|3|SUBJ 2|3|AUX 3|0|ROOT 4|3|OBJ 5|3|JCT 6|3|PUNCT	
49	rrs49.mc	rrs49.mcw0014	2 *CHI:	no .	CHI:
49	rrs49.mc	rrs49.mcw0015	2 %mor:	co|no .	
49	rrs49.mc	rrs49.mcw0016	2 %gra:	1|0|INCROOT 2|1|PUNCT	
49	rrs49.mc	rrs49.mcw0017	3 *FAT:	okay .	FAT:
49	rrs49.mc	rrs49.mcw0018	3 %mor:	co|okay .	
49	rrs49.mc	rrs49.mcw0019	3 %gra:	1|0|INCROOT 2|1|PUNCT	
49	rrs49.mc	rrs49.mcw0020	4 *FAT:	I'll eat it tomorrow .	FAT:
49	rrs49.mc	rrs49.mcw0021	4 %mor:	pro:sub|I~mod|will v|eat pro|it adv:tem|tomorrow .	
49	rrs49.mc	rrs49.mcw0022	4 %gra:	1|3|SUBJ 2|3|AUX 3|0|ROOT 4|3|OBJ 5|3|JCT 6|3|PUNCT	
49	rrs49.mc	rrs49.mcw0023	5 *CHI:	no .	CHI:
49	rrs49.mc	rrs49.mcw0024	5 %mor:	co|no .	
49	rrs49.mc	rrs49.mcw0025	5 %gra:	1|0|INCROOT 2|1|PUNCT	
49	rrs49.mc	rrs49.mcw0026	5 %com:	he misunderstood who was the subject of that sentence .	
49	rrs49.mc	rrs49.mcw0027	6 *CHI:	I'm saving it for you for tomorrow .	CHI:
49	rrs49.mc	rrs49.mcw0028	6 %mor:	pro:sub|I~aux|be&1S part|save-PRESP pro|it prep|for pro|you	
49	rrs49.mc	rrs49.mcw0029	6	prep|for adv:tem|tomorrow .	
49	rrs49.mc	rrs49.mcw0030	6 %gra:	1|3|SUBJ 2|3|AUX 3|0|ROOT 4|3|OBJ 5|3|JCT 6|5|POBJ 7|3|JCT 8	
49	rrs49.mc	rrs49.mcw0031	6	9|3|PUNCT	

c) Child speech, after extraction from the same of dialogue, stored in the local database table "Children speech" (in 3th Normal form).

49	rrs49.mc	rrs49.mcw0023	no .	co|no .	1|0|INCROOT 2|1|PUNCT	5
49	rrs49.mc	rrs49.mcw0027	I'm saving it for you for tomorrow .	pro:sub|I aux|be&1S part|save-PRESP pro|it prep|for pro|you prep|for adv:tem|tomorrow .	1|3|SUBJ 2|3|AUX 3|0|ROOT 4|3|OBJ 5|3|JCT 6|5|POBJ 7|3|JCT 8|7|POBJ 9|3|PUNCT	6

Record: 3 of 164 No Filter Search

Appendix C. First use of the proposed meaning classes

Examples for the period 09-19 months in English and 11-20 months in French.
There are no occurrences of use of the classes observed in the corpora before the earliest month, shown in the listed 10 examples for each class.

Months	Dialogue	Speech English	POS
		Entities	
09	ale09.br	Mama .	n:prop|Mama .
09	mor09.br	Dada .	n:prop|Dada .
09	mor09.br	egg .	n|egg .
10	mir10.br	Ma &=noise .	n:prop|Ma .
11	may11.hg	shoes .	n|shoe-PL .
11	may11.hg	baby .	n|baby .
11	may11.hg	(ba)nana .	n|banana .
11	dil11.br	no , Dillon &=noise .	co|no cm|cm n:prop|Dillon . (Self)
12	rol12.ro	ca(r) .	n|car .
12	rol12.ro	me me .	pro:obj|me pro:obj|me .
		Relationships	
11	mog11.br	go &=noise !	v|go !
12	rat12.ro	<what's> [/] what's that ?	pro:wh|what~cop|be&3S pro:dem|that ?
12	chg12.ro	pulls on hat .	v|pull-3S prep|on n|hat .
13	mrg13.br	done .	part|do&PASTP .
14	lin14.ne	draw .	v|draw .
15	ali15.br	&dæ sit .	v|sit .
16	wil16.pr	‹tired [?]› .	part|tire-PASTP .
16	ali16.bl	climb .	v|climb .
16	ali16.bl	gone .	part|go&PASTP .
17	lah17.bw	eating .	part|eat-PRESP .
		Circumstances	
12	rat12.ro	<what's> [/] what's that ?	pro:wh|what~cop|be&3S pro:dem|that ?
13	bry13.ne	yyy up .	adv|up .
14	mir14.br	out .	adv|out .
14	nao14.sa	dere [: there] .	adv|there .
15	taz15.bw	out Dee baba [= bottle] .	prep|out n:prop|Dee n|baby .
15	taz15.bw	Mommy out .	n:prop|Mommy adv|out .
16	ali16.bl	away .	adv|away .
16	ali16.bl	there Mama .	adv|there n:prop|Mama .
17	lae17.bw	outside [= actually says side] .	adv|outside .
17	lae17.bw	down .	adv|down .
		Circumstances	
12	rat12.ro	<what's> [/] what's that ?	pro:wh|what~cop|be&3S pro:dem|that ?
13	bry13.ne	yyy up .	adv|up .
14	mir14.br	out .	adv|out .
14	nao14.sa	dere [: there] .	adv|there .
15	taz15.bw	out Dee baba [= bottle] .	prep|out n:prop|Dee n|baby .
15	taz15.bw	Mommy out .	n:prop|Mommy adv|out .
16	ali16.bl	away .	adv|away .
16	ali16.bl	there Mama .	adv|there n:prop|Mama .
17	lae17.bw	outside [= actually says side] .	adv|outside .
17	lae17.bw	down .	adv|down .
		Quality and Attribution	
10	mir10.br	yummy [?] &=noise .	adj|yum&dn-Y .
13	mrg13.br	hot .	adj|hot .
14	nor14.ne	orange .	adj|orange .
14	mir14.br	big .	adj|big .
15	taz15.bw	my me Dada .	pro:poss:det|my pro:obj|me n:prop|Dada .
16	stf16.pe	gross .	adj|gross .
16	ali16.bl	dirty .	adj|dirt&dn-Y .
17	lae17.bw	I want my bottle .	pro:sub|I v|want pro:poss:det|my n|bottle .
17	lag17.bw	a@z:sc <my bike> [?] .	unk|a pro:poss:det|my n|bike .
18	ger18.cl	he sleepy .	pro:sub|he adj|sleep&dn-Y .
		Quantity and Precision	
14	nor14.ne	the woof .	det|the on|woof .
14	nor14.ne	that duck .	det|that n|duck .
15	ali15.br	a mommy .	det|a n|mommy .
16	ali16.bl	more .	pro:indef|more .
17	lah17.bw	xxx have that one . [+ PI]	v|have det|that pro:indef|one .
18	lae18.bw	<eat all> [?] .	v|eat pro:indef|all .
18	ger18.cl	two , I .	det:num|two cm|cm pro:sub|I .
19	lah19.bw	xxx this one [?] [>] . [+ PI]	det|this pro:indef|one .
19	laf19.bw	<six [?] egg [* 0s]> [<] .	det:num|six n|egg .

Months	Dialogue	Speech French	POS
		Entities	
11	jli11.Pa	yyy maman .	n|maman&f .
11	jli11.Pa	papa .	n|papa&m .
12	mrc12.Ly	bébé !	n|bébé&m !
12	mra12.Ly	des ‹cubes [= ! gémit]› .	prep|de&les n|cube&m-PL .
12	tmc12.Ly	chat .	n|chat&m .
12	mra12.Ly	‹(...) oh› les pingouins .	co|oh det|les&pl n|pingouin&m-PL .
12	mra12.Ly	un ‹vélo [= ! gémit]› .	det|un&m&sg n|vélo&m .
13	ans13.Ly	c'est bien Ana .	pro:dem|ce$v:aux|être&PRES&3s n|bien&m n:prop|Ana . (N.B. Self)
13	tmd13.Ly	‹gâteau [/]› gâteau .	n|gâteau&m .
13	ani13.Ly	ramasse un lego .	v|ramasser-PRES&SUB&13s det|un&m&sg n|lego&m=toy .
		Relationships	
11	tmb11.Ly	+< caché .	part|cacher-PP&m .
12	mra12.Ly	tu lis !	pro:subj|tu v|lire-PASS&PRES&12s !
12	nad12.Ly	+< ‹a [= ! rit]› .	v:aux|avoir&PRES&3s .
12	mra12.Ly	+< veux dormir là .	v:mdl|vouloir&PRES&12s v|dormir-INF adv:place|là .
14	mrb14.Ly	çà tourne .	adv|çà v|tourner-PRES&SUB&13s .
14	ana14.Ly	eh regardes .	co|eh v|regarder-PRES&SUB&2s .
14	mrb14.Ly	me ‹voir [?]› .	pro:obj|me v|voir&INF .
15	tmb15.Ly	est là .	v:aux|être&PRES&3s adv:place|là .
16	tmd16.Ly	0il est où> [?] doudou .	pro:subj|il v:aux|être&PRES&3s pro:rel|où n|doudou&m=blankie .
16	tmd16.Ly	a pas .	v:aux|avoir&PRES&3s adv:neg|pas .
		Circumstances	
11	jli11.Pa	ça ?	pro:dem|ça ?
12	tmc12.Ly	encore ah .	adv|encore co|ah .
12	mra12.Ly	+< ‹non ,› tout_de_suite .	co|non=no cm|cm adv|tout_de_suite .
13	tmc13.Ly	et c(el)ui-là ?	conj|et pro:dem|celui-là ?
14	mrb14.Ly	‹ça [//]› ça tourne yyy .	pro:dem|ça v|tourner-PRES&SUB&13s .
15	anz15.Ly	et là .	conj|et adv:place|là .
15	ans15.Ly	et ‹voilà [?]› .	conj|et adv:place|voilà .
16	tmc16.Ly	<à côté> [?] .	prep|à n|côté&m .
17	mra17.Ly	ah ‹dedans [?]› .	co|ah adv:place|dedans .
17	ana17.Ly	à moi .	prep|à pro|moi&sg .
		Quality and Attribution	
12	nah12.Ly	+< ‹ma [?]› maman .	det:poss|ma&sg n|maman&f .
12	tmd12.Ly	grand .	adj|grand&m .
15	ann15.Ly	bleu [?] .	adj|bleu&m !
16	tma16.Ly	fermé [?] .	adj|fermé&m .
16	tmc16.Ly	xxx rigolo .	adj|rigolo&m .
17	tmb17.Ly	sa tête .	det:poss|sa&f&sg n|tête&f .
17	ane17.Ly	pas gentille [?] .	adv:neg|pas adj|gentille&f .
18	tmg18.Ly	rouge [?] .	adj|rouge .
18	tme18.Ly	est lourd[?] .	v:aux|être&PRES&3s adj|lourd&m .
19	mrd19.Ly	yyy mon sac sac .	det:poss|mon&m&sg n|sac&m n|sac&m
		Quantity and Precision	
12	mra12.Ly	et les deux .	conj|et det|les&pl num|deux .
12	mra12.Ly	parce que ‹il [/]› ‹il [/]› ‹il [/]› il a lit un petit peu .	conj|parce pro:rel|que pro:subj|il v:aux|avoir&PRES&3s n|lit&m det|un&m&sg adj|petit&m n|peu&m .
13	mra13.Ly	‹(.) la la la [?]› .	det|la&f&sg det|la&f&sg det|la&f&sg .
14	mrc14.Ly	le chat .	det|le&m&sg n|chat&m .
15	jli15.Pa	elle va aller dans le yyy .	pro:subj|elle v:mdl|aller&PRES&3s v:mdl|aller&INF prep|dans det|le&m&sg .
16	tmb16.Ly	une abeille .	det|une&f&sg n|abeille&f=bee .
17	ana17.Ly	c'est le feutre .	pro:dem|ce$v:aux|être&PRES&3s det|le&m&sg n|feutre&m .
18	tme18.Ly	<deux trois> [?] .	num|deux&m num|trois&m .
19	jli19.Pa	c'est un pain !	pro:dem|ce$v:aux|être&PRES&3s det|un&m&sg n|pain&m !
20	ant20.Ly	et un carré pour Ana petit (N.B. Self)	conj|et det|un&m&sg adj|carré&m n|pour&m n:prop|Ana adj|petit&m .

N.B. The youngest children in the French group are 11 months old.

THE ROLE OF PERSISTENCE IN STUDENTS' SELF-REALIZATION

Dr. Sergey I. Kudinov, Chair of Social and Differential Psychology,
Peoples' Friendship University of Russia (RUDN University), Moscow, Russia
E-mail: rudn.tgu@yandex.ru
Dr. Stanislav S. Kudinov, Chair of Social and Differential Psychology, Social and Differential Psychology Department, Peoples' Friendship University of Russia (RUDN University), Moscow, Russia
E-mail: kudinov84stas@yandex.ru
Dr. Irina B. Kudinova, Chair of Social and Differential Psychology, Social and Differential Psychology Department, Peoples' FriendshipUniversity of Russia, (RUDN University), Moscow, Russia
E-mail: i.b.kudinowa2012@yandex.ru
Dr. Olga B. Mikhailova, Chair of Social and Differential Psychology,
Peoples' Friendship University of Russia (RUDN University), Moscow, Russia
E-mail: Olga00241@yandex.ru

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ABSTRACT

The paper analyzes the results of an empirical research obtained with the help of a sample of students. The research of persistence was carried out within the framework of the dispositional concept of personality traits and individuality by A. I. Krupnov. The techniques developed by A. I. Krupnov as well as the author's test of persistence were used in the study. After allocating the levels of persistence, the features of self-realization were analyzed in each group of the respondents. The specificity of self-realization was revealed in the context of the author's polysystemic concept, the author's multidimensional questionnaire on personality's self-realization (MQPSR) was used as a diagnostic tool. The empirical study revealed statistically significant differences in the specifics of self-realization of the students with different levels of persistence manifestation. The respondents with a high level of persistence realize themselves more successfully in different spheres of life due to the obvious active behaviour, optimistic attitude, high motivation, creative methods and techniques of self-expression, internal self-regulation and constructive behavior. The students with low persistence lack successful self-realization because of passivity, pessimism, external locus of self-control, a high level of barriers and standard simple schemes of self-expression.

1. INTRODUCTION

According to the numerous recent studies, self-realization not only promotes the development of professional, social and personal competencies, but also provides the level of life quality that affects all the aspects of life and human activities (Maslow, 1954; 1968; Myers, 1992; Boekaerts, 1996; Butler, 2000; Dweck, 2000; Ashton and Lee, 2001; Cheng and Furnham, 2003; Chamorro-Premuzic, Furnham and Ackerman, 2006; Stee, Schmidt and Shultz 2008; Cheung, Vijver and van de, Leong, 2011; Hakimi, Hejazi and Lavasani, 2011; Zhang Ten, 2013).

Most Russian research devoted to the problem of personal self-realization deal with such problems as self-realization in the main spheres of life (Kudinov S. I., Krupnov, A. I. and Kudinov S. S., 2012) the specificity of professional self-realization (Korostyleva, 2005; Novikova, and Zamaldinova 2010; Kudinov S. I., Kudinov S. S., Mikhailova and Ruchina 2015); personal self-realization of students in their professional training Kudinov, S. I. and Kudinov, S. S., 2011; Novikova, Shlyakhta and Baranova, 2013); self-realization in mature and advanced age (Kudinov,

Corresponding Author
Dr. Olga B. Mikhailova, Chair of Social and Differential Psychology, Peoples' Friendship University of Russia (RUDN University), Moscow, Russia
E-mail: Olga00241@yandex.ru

2013; Mikhailova, 2015); gender stereotypes and self-realization (Zhang Ten, 2013).

In this connection there rises a question, concerning the maximum use of internal resources for a full-scale self-realization of the individual (Krupnov, Novikova and Kozhukhova, 2013). One of such resources is persistence as a personality trait, expressed in an effective upholding and advancement of the person's position, beliefs and values, and as a result, ensuring the success of his/her self-realization in the society (Kudinov, 2013). The problem of the interdependence of self-realization and persistence requires a careful consideration in professional training, because it is the key to a successful professionalization of the future experts at the initial stage. The data on the correlation of self-realization to persistence can be the basis for working out scientifically proved programs, the harmonization of these phenomena aiming at optimizing the vocational training of future bachelors and masters.

2. MATERIALS AND METHODS

The research was conducted in Moscow, Russia. 200 people participated in the pilot phase of the study, young men and girls, equal in number, 20-25 years old, the students of the Peoples' Friendship University of Russia.

In the course of the personality self-realization diagnostics, we applied "The multidimensional questionnaire on personality self-realization" (MQPSR), the self-realization assessment express bar chart and the questionnaire "Self-estimation of personality self-realization" developed by S. I. Kudinov (Kudinov, 2013).

The multidimensional questionnaire on personality self-realization contains 16 basic scales, which characterize various aspects of the personal self-realization (*social corporate self-realizing attitudes; subject-personal self-realizing attitudes; activity; inertia; optimism; pessimism; internality; externality; socio-centralized motivation self-realization; egocentric motivation of self-fulfillment; creativity; conservatism; constructiveness; destructiveness; social barriers; personal barriers*).The questionnaire includes 120 questions. The test can be used in the age group from 17 to 70 years old. Testing takes 40-50 minutes.

For studying the persistence of the person "the paper-and-pencil test of persistence" developed by A. I. Krupnov, the author's questionnaire "persistence" and "the experimental test on persistence" developed by the author were used.

The author's "experimental test of persistence" consisted of three kinds of tasks. In the first task, the respondents were given three sets of words and asked to make up three sentences. The second set of words differed from the first task by being more complex. The third set of words did not represent a possibility to make up a sentence.

Interpretation: the time spent on solving each problem was estimated. If it took twice the time to solve the third problem than to solve the first and second problems taken together, it indicated a high level of persistence. If the same amount of time was spent on solving the first two problems, it was estimated as the average level of persistence and if less than this time, then it was diagnosed as the low level of this personality trait.

The second problem was that the subjects were asked to solve three "puzzles". The time was calculated in such a way that the two of them had to be solved during the lesson in the classroom, the average solution time was 15-25 minutes for each exercise, and they had to get down to solving the third puzzle 15 minutes before the end of the lesson. After the end of the lesson, the subjects could be free or complete the puzzle.

Interpretation: The refusal to perform the second exercise was diagnosed as a low level of persistence. The refusal to do the third exercise after performing the first two exercises was regarded as the average level of persistence. Doing all the three exercises, including the last one in extracurricular time, was regarded as a high level of persistence.

The third challenge was giving the participants a set of 12 different words. It was necessary to make up several quatrains, so that all the words were used. Moreover, the fewer quatrains it took — the better. A standard assessment was three quatrains with one word per line. 30 minutes were allocated for the operation. Then additional 10 minutes were granted at the request of the participants, all in all, 30 minutes were added.

Interpretation: The refusal to continue work 30 minutes after failing to carry out the task was interpreted as the low level of persistence. 35-45 minutes spent on solving the exercises was assessed as a medium level of persistence. If carrying out the exercise took over 45 minutes, it was interpreted as the high level of persistence.

For data processing, the following methods were used: quantitative analysis us-

ing the techniques of mathematical statistics (Kolmogorov – Smirnov's criterion, Student's t-criterion, Pearson's linear correlation coefficient, factor, variance and cluster analysis (SPSS program 11.5). Qualitative analysis of the obtained results was based on the comparison, hierarchy of expression and dominance of the structural variables of persistence and self-fulfillment.

3. RESULTS

The results of the study of students' persistence with the help of different research methods and their subsequent quantitative and qualitative processing, allowed establishing different levels of manifestation of this personality trait in the participants. At the first stage of processing, the experiment data were analyzed, where it was required to make up three sentences from three sets of words. In the second task, the participants were asked to solve three puzzles. In the third task, it was necessary to use 12 words minimum in three quatrains, and maximum in six quatrains, the time was not limited. The results were distributed as follows. The high level of persistence was diagnosed in 36 students, the average one in 71 students, and the low one in 73 respondents.

The results of the experiment allowed distributing the respondents into three groups according to the level of their persistence manifestation.

At the next stage the results of the judgments test of persistence, the paper-and-pencil test of persistence and the author's questionnaire on persistence were analyzed. In the analysis of the author's self-assessment questionnaire on persistence, the results showed the similarity with the experimental data in the levels of persistence. The results obtained by the A. I. Krupnov methods showed the identity of indicators' manifestation.

By comparison, to the experiment data it was found out that the highest indicators, on harmonious variables of persistence characterizing the success of the manifestation of this personality trait were recorded in the respondents conditionally allocated to a group with a high level of development of the given property. The highest indicators of the disharmonic characteristics were found in the respondents included into the group with the low levels of persistence on the provisional basis.

To confirm the groups of subjects, provisionally selected according to the levels of persistence manifestation, we conducted a cluster analysis of indicators. According to the cluster analysis results, the validity of the provisional selecting of the above - mentioned groups of subjects was proved. Thus, the sample comprising 200 people was distributed as follows. The first cluster included 46 people, the second - 89, and the third – 65 people. The results of dispersions' comparison acted as the factor proving the homogeneity and specificity of each of the clusters.

To define the differences identified in different groups a comparative analysis using the Student's t-criterion was conducted among the bipolar variables in each component of persistence.

Thus, in the first cluster relating to the high level of persistence, there were established the valid distinctions between such indicators as: the ergicity in the dynamic component significantly exceeds aergicity ($p < .01$); in the regulatory component the variable of internality quantitatively dominates the externality ($p < .01$); the sthenic emotions are more expressed than the asthenic ($p < .05$); and in the cognitive component the meaningfulness surpasses the awareness ($p < .05$) (Table 1).

Table 1. Comparative analysis of average values of variables for respondents with a high level of persistence (n=46)

Variables	Socially Significant Purposes	Personally Significant Purposes	Ergicity	Aergicity	Sthenic Emotions (sthenicity)	Asthenic Emotions (asthenicity)	Internal Regulation (internality)	External Regulation (externality)	Sociocentric Motivation	Egocentric Motivation	Profound Awareness	Superficial Awareness	Objectness	Subjectness
	21.8	20	36,0	16.0	27.0	22.0	35.0	20.0	7.7	9.3	32	28	29.1	28.9
Differences	1.8		20		5		15		- 1.6		4		0.2	
t-Criterium	1.04		6.68		2.55		5.49		.49		**2.41**		.08	
P- Significance level (Sig.)	-		**.01**		**.05**		**.01**		-		**.05**		-	

The second cluster concerning the average level of persistence also contains a number of statistically significant differences among the characteristics inside the components. In the instrumentally-stylistic characteristics, the ergicity is expressed greater than the aergicity ($p < .01$); astenicity dominates over stenicity ($p < .05$); externality surpasses internality ($p>.01$). In the motivationally-meaningful unit, the personally-significant purposes for persistence essentially surpass the socially-significant ($p < .01$), and in the productive component the personally-significant productivity surpasses the object-communicative ($p<.05$), the distinctions were not detected in other components (table 2).

Table 2. Comparative analysis of the values of variables for respondents with an average level of persistence (n=89)

Variables	Socially Signif-icant Purpo-ses	Person-ally Signifi-cant Purposes	Ergi-cy	Aer-gicity	Sthenic Emoti-ons (sthen-icity)	Asth-enic Emot-ions (asthen-icity)	Internal Regu-lation (inter-nality)	External Regul-ation (exter-nality)	Socioce-ntric Motiv-ation	Egocen-tric Motiva-tion	Profo-und Awar-eness	Supe-rficial Aware-ness	Objec-tness	Subjec-tness
	10.1	15.8	34	21	10.9	15.8	23.0	29.0	30.1	29.2	34.7	33.1	7.7	12.5
Differences	-5.7		13		-4.9		-6.0		.9		1.6		-4.8	
t- Criterium	2.7		4.54		2.22		2.72		.14		**1.04**		2.12	
P- Signif-icance level (Sig.)	**.01**		**.01**		**.05**		**.01**		-		-		**.05**	

In the third cluster, corresponding to the low level of persistence the dominant role belongs mostly to the disharmonious variables. Thus, in the dynamic component, aergicity exceeds ergicity at a statistically significant level ($p < .01$); in the emotional component, the asthenic emotions dominate over the sthenic ($p<.01$); in the regulatory, the external locus of control significantly exceeds internality ($p<.05$); in the cognitive component, the awareness significantly exceeds the meaningfulness ($p < .01$) (Table 3).

Table 3. Comparative analysis of average values of variables in respondents with a low level of perseverance (n=65)

Variables	Socia-lly Signif-icant Purp-oses	Persona-lly Signifi-cant Purposes	Ergicity	Aergicity	Sthenic Emotions (sthenicity)	Asthenic Emotions (asthenicity	Internal Regulation (internality)	External Regulation (externality)	Sociocentric Motivation	Egocentric Motivation	Profound Awareness	Superficial Awareness	Objectness	Subjectness
	6.4	6.2	27.1	22.5	9.2	13.6	14.4	17.7	12.4	13.9	10.1	12.5	9.4	9.6
Differences	.2		4.6		- 4.4		-3.3		-1.5		-2.4		-.2	
t-Criterium	.06		2.83		2.78		2.18		1.04		**2.02**		.10	
P-Significance level (Sig.)	-		**.01**		**.01**		**.05**		-		**.05**		-	

The observed statistically significant distinctions within each of the components of persistence allow to consider the specificity of this personality trait manifestation according to one of the revealed types, describing the success or lack of success in persistent behavior.

4. DISCUSSION

The identified quantitative differences in different clusters characterize the levels of persistence manifestation. Judging by the dominance of the variables it is possible to assert that the first cluster includes the respondents with high levels of this trait manifestation. The second cluster is represented by the participants with an average level of the manifestation of the trait under discussion, and the third cluster accounted for the participants with low level of persistence.

The analysis of the hierarchical structure of the persistence variables in the respondents with low levels of manifestation of this quality allowed revealing the dominance in the instrumentally-stylistic block of such characteristics as asthenicity, aergicity and externality, and awareness in the motivationally-meaningful block. The revealed set of characteristics defines the mechanism of persistence manifestation, in this case it is its low level,

due to the dominance of passivity and inertness of behavior, decrease in the emotional tone, weak internal self-regulation and an under-developed system of knowledge and skills of persistent behavior.

A distinctive feature of the manifestation of a high level of persistence in students is the divergent scope of targets, a wide range of incentive motives and the sphere of the implementation of persistence in the conditions of the expressed activity and variability of behavior, good self-regulation of persistent behavior and optimism.

The analysis results of the questionnaire "The personal self-assessment of self-realization" showed that self-realization as psychological formation can be adequately characterized by the respondents with a low level of perseverance. This gives you the opportunity to consider the phenomenon they demonstrate in more detail, using a Multidimensional questionnaire of personality self-realization.

Thus, the empirical results obtained by using this technique in the students with the low persistence level testify that the greatest quantitative indicators have such characteristics as inertia, pessimism, destructiveness, conservative attitude, personal and social barriers of self-realization. The level of expression of these characteristics is considered to be medium-high. In the second place, there are such parameters as activity, externality, self-centeredness and constructiveness in their quantitative expression. The listed attributes correspond to the average level of expression.

The third group was comprised of the remaining attributes of self-realization: socially-corporate purposes and personally-significant attitudes to self-realization, optimism, internal self-regulation, socio-centric motivation and creativity. All the noted attributes correspond to the low level of manifestation in their expressiveness degree. The distribution of the attributes of self-realization on the quantitative scale defines the significance of each parameter, in the mechanism of this phenomenon defining its specific conditionality. In the presented hierarchical model, the main functional load in the manifestation of self-realization is carried by the characteristics that are included in the first group.

We will comment on the given statement from the point of view of the qualitative analysis. Bearing in mind that the first group included only disharmonious characteristics it is necessary to assume their negative impact on the process of self-realization. Thus, inertness is a barrier to the manifestation of the person's activity, the students in this group are more likely to be passive, do not show initiative or purposefulness. Their activity appears only in the compelled situations. Moreover, it is aggravated by their pessimistic mood. They are too unconfident of their possibilities and capabilities, are guided more often by failure and do not believe in the success. Probably considerable social and personal barriers cause such behavior. On the one hand, they have a limited behavioral resource for self-realization, do not have the behavioral flexibility and variability, they do not possess good communicative and social skills. These are the roots of their dominating conservatism. Yet, on the other hand, they have a lot of personality complexes — lack of confidence, shyness, anxiety, etc. All this together, most likely, leads to the self-destructive outcome of their self-realization.

In the psychological structure of self-realization revealed by means of the correlation and factor analysis, we found out that the core constructs are inertia, destructiveness, personal and social barriers that determine the specificity of this phenomenon.

In general, it is possible to ascertain that the respondents with the low persistence level experience considerable difficulties in full-scale self-realization, due to the imbalance in the structure of the individual characteristics in the structure of the given phenomenon. First of all, it concerns the motivational, cognitive and instrumental parameters.

The analyses of the questioner "Personal self-realization self-estimation" helped to conclude that in the students with a high level of persistence have a profound knowledge of the self-realization phenomenon, imagine the main space for the successful self-realization and give a high assessment of their self-realization level in different spheres of life.

The results received with the multidimensional questionnaire of personality self-realization, show that the most expressed in the quantitative equivalent are such indicators as creativity, activity, socially-significant and egocentric motives. The quantitative indicator of these characteristics corresponds to a high level of expressiveness. Internality, constructiveness, optimism, and personally-significant intentions are located at the mid-high level of the expressiveness. Socially-corporate intentions, conservatism and externality are situated at the average level. Finally, the last group with the low level of manifestation is represented by inertia, pessimism, destructiveness, personal and social barriers of self-realization

manifestation.

On the contents side, the presented hierarchy of structural indicators of self-realization expressiveness testifies that the respondents prove themselves in everyday life in different spheres of society very intensively. The students with the high persistence level tend to be involved in all the activities and actions, constantly take the initiative, and at times are organizers in the general mass kinds of activity, initiating associates to participate. They apply different methods and techniques of self-expression, showing flexibility and plasticity of behavior. In many different situations, they take into account the external factors and their own possibilities on the basis of which, they implement certain schemes of their self-realization.

Moreover, these respondents record a very high level of motivation to self-expression. It is noteworthy that their motivation has a wide range from the purely personal motives, providing the satisfaction of their egoistical requirements, for example, connected with the increase of material incentives, or career advancement, to socially-significant ones, providing the solution of general socially important issues by means of self-expression.

Besides, it is possible to see that these respondents are distinguished by the expressed internal locus of control at self-realization. In most cases, they rely exclusively on their own internal resources and hardly take into account the external circumstances, any factors and other people's opinions. In the process of self-realization the respondents are driven by their optimism, the anticipation of positive results, they feel confidence in their actions and behavior and predict extremely favorable outcome of their activities. Thanks to their high activity, self-control, intelligent actions, the expressed motivation and optimism the respondents have good indicators on the success of their self-realization, as it is indicated by their constructiveness.

Thus, the hierarchical analysis of the self-realization characteristics allows ascertaining sufficient success of self-realization of students with a high level of persistence.

The activity, creativity and optimistic attitude act as the backbone characteristics providing stable relations with other parameters in the psychological structure of self-realization of the respondents.

This feature set provides the high efficiency of the process of the respondents' self-expression. The results of the factor analysis confirmed the initial data obtained by means of the hierarchical and correlation analysis of the empirical findings.

Thus, the quantitative and qualitative analysis of self-realization of students with a high level of persistence testifies that they are quite satisfied with the results of their self-realization. They have a wide space for self-expression in educational and professional activities, family relationships and social communities. Their self-realization is characterized by a high activity in different life spaces, positive emotionally-conative regulation of their behavior, activity and communication and non-standard, original ways and methods of self-expression.

5. CONCLUSION

The conducted empirical research has allowed to confirm the viability of the put forward assumption that self-realization is a multidimensional psychological formation determined by a complex of external and internal factors, providing the success of the individual self-expression in different spheres of life in the process of ontogenesis. It has allowed establishing that one of the factors influencing the success of self-realization is persistence as a basic trait of the person.

The obtained data specifies that the high level of persistence manifestation provides successful self-realization of the person while the low level of the development of this quality does not promote a full-scale self-realization of students in different spheres of life.

The received empirical data on the impact of persistence on the self-realization of the person will allow developing the effective complex programs promoting the optimization, both of the persistence and of the self-realization of the person.

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Conflict of interests

The authors declare no conflict of interest.

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EDUCATIONAL POLICIES AND PRACTICAL IMPLICATIONS FOR CHILDREN WITH INTELLECTUAL DISABILITY IN REPUBLIC OF MACEDONIA

Dr. Aleksandra Karovska Ristovska, Institute of Special Education and Rehabilitation, Faculty of Philosophy, University Ss. Cyril and Methodius, Skopje, Macedonia
E-mail: aleksandrak@fzf.ukim.edu.mk
Dr. Biljana Karovska Andonovska, Military Academy "General Mihailo Apostolski", Skopje, Macedonia
E-mail: biljana.k.andonovska@morm.gov.mk
Dr. Nastasha Stanojkovska Trajkovska, Institute of Special Education and Rehabilitation, Faculty of Philosophy, University Ss. Cyril and Methodius, Skopje, Macedonia
E-mail: natasa.stanojkovska@fzf.ukim.edu.mk
Dr. Sofija Georgievska, Institute of Social Work and Social Policy, Faculty of Philosophy, University Ss. Cyril and Methodius, Skopje, Macedonia
E-mail: sofija.arnaudova@fzf.ukim.edu.mk

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quality of life.

ABSTRACT

Educational policy for children with intellectual disability in Republic of Macedonia is not always consistent with the practical implications. The subject of this research was to gain an insight into the current condition of the persons with intellectual disabilities in Macedonia, before all an insight into the barriers that they are facing in their attempts to access educational information and services. This was done through conducting a qualitative (desk-top analyses of the national legislations; semi-structured interviews with parents of persons with intellectual disabilities and focus groups with relevant stakeholders) and a quantitative research (quality of life research for the disabled persons). In the research a total number of 213 examinees were included. As in many other cases, and in many other countries, policy and practice are not always coherent. Legislation in the area of education in our country has to be modified and accommodated to the needs of the persons with disabilities and their parents or care-givers. The final conclusion from our research is that the persons with ID are still on the margins of society, and they lead everyday battles to prove that their needs must be taken into consideration in context of their human rights. Although awareness for the importance of the rightful treatment of this problem is not on a satisfactory level, still we can notice a shift in perception and liberation of prejudice.

1. INTRODUCTION

Organized social care for the disabled persons in Macedonia, in particular intellectually disabled, realized through the protection, education and rehabilitation started after World War II (Ajdinski, 2000). In the last few decades there was a major shift of attitudes and conceptual paradigms which are the base for inclusion for the persons with disabilities, and a transition from the medical to the functional model that focuses on the rights, equal possibilities and total participation of the persons with disabilities. The Convention on the Rights of Persons with Disabilities was adopted on 13 December 2006 (UN, 2016). The UNCRPD raises important issues that governments need to address when developing policies to realize equality, support, inclusion, and protection for people with intellectual disability (Carney, 2013). The countries from the Central East Europe started many system reforms in the period that followed. Macedonia ratified the Convention on 29th of December 2011 (UNTC, 2011). Although there are policy changes related to the enhancement of

Corresponding Author
Dr. Aleksandra Karovska Ristovska, University Ss. Cyril and Methodius, Skopje, Macedonia, E-mail: aleksandrak@fzf.ukim.edu.mk

educational opportunities for the intellectually disabled, the practices sometimes vary from the policies.

Subject of this research was to gain an insight into the current condition of the persons with intellectual disabilities (ID) in Macedonia, before all an insight into the barriers that they are facing in their attempts to access educational information and services. This was done through conducting: a desk-top analyses of the national legislations; a quality of life research for the disabled persons; semi-structured interviews with parents of persons with intellectual disabilities and focus groups with relevant stakeholders. A total number of 213 examinees were included in the research of which: 46 parents (36 for the semi-structured interviews, 10 for the focus group), 143 persons with disabilities and 30 professionals that work directly with persons with disabilities, or work in governmental or non-governmental institutions (for the focus groups).

2. MATERIALS AND METHODS

This study noted the current state in education and the barriers faced by the persons with disabilities during their attempts to access information and services. The research goal was to improve the quality of life of the persons with intellectual disabilities by stating concise recommendations for the improvement of the access to information and services. These recommendations are closely related to the shortcomings in the current legislations and practice and it is expected that they will lead to development of positive policies for the persons with disabilities in general. The research questions were oriented towards:

1. Analyses of national documents concerning the education options for the persons with intellectual disability; and

2. Access to different education options (special education and inclusive education);

The research had a qualitative and quantitative character. Testing of validity and reliability was done with the strategy of triangulation. According to Jakob (2001) by combining multiple observers, theories, methods, and empirical materials, researchers can hope to overcome the weakness or intrinsic biases and the problems that come from single-method, single-observer, single-theory studies. Often the purpose of triangulation in specific contexts is to obtain confirmation of findings through convergence of different perspectives. The triangulation was based on the multiple sources of information, triangulation of methods (quantitative and qualitative), and triangulation of researchers (researchers from different fields related to the persons with disabilities).

Table 1. Techniques and instruments used in the research

Qualitative aspects of research	
Research techniques	Research instruments
A) Document analyses	Desktop analyses
B) Semi-structured interview	Semi-structured interview guide
C) Focus groups	Focus group protocol
Quantitative aspects of research	
D) Survey	Standardized inquiry for quality of life assessment (WHOQOL)

A) Document analyses. Within the desk-top analyses we used primary sources (related to national laws, by-laws, reports), but we also used secondary sources as an addition to the primary with the purpose to gain and insight in the practical implications of the education laws.

B) Semi-structured interview. Thirty-six examinees were interviewed with the semi-structured interviews out of which 32 (89%) were parents of persons with intellectual disability and 4 (11%) were caregivers. Regarding gender, 23 of the examinees (77%) were female, while 7 (23%) were male. The research was conducted in rural and urban areas from different parts of the state. The interviews were conducted in mainstream inclusive schools, special primary schools, day-care centers, a secondary state school for education and rehabilitation and caregiver families.

They gave an insight into the objective situation, coming from their perception of the current policies in the area of education, of the service providers and the end users of those services. They shared their positive and negative experiences.

C) Focus groups. Four focus groups were organized with 40 representatives (I. professionals that are directly involved in the work with persons with disabilities from special institutions and special primary and secondary schools, mainstream primary and secondary inclusive schools, preschool institutions, day-care centers and one center for mental health; II. parents of persons with in-

tellectual disabilities; III. representatives from the NGO sector or representatives of associations that work with persons with an intellectual disability; IV. professionals that work in the area of policy making for persons with an intellectual disability). Based on the qualitative data which was collected, a qualitative analysis was used with the purpose of defining the concept which prevailed.

D) Survey. For the purpose of the survey we used the standardized questioner for quality of life assessment from the World Health Organization (WHOQOL). The quantitative analyses gave us an insight in the objective indicators for the approach to information and services. The questioner was adjusted to the intellectual capacity of the disabled persons. The survey was conducted on 137 persons with disabilities. The questioner is standardized and the manner of data interpretation is defined. The quality of life was examined in 7 domains: material wellbeing, health, productivity, intimacy, safety, societal status and emotional wellbeing.

3. RESULTS

The results will be shown in three subsections: I. desktop analyses; II. analyses of the practical implications of the legislation done through the semi structured interviews and focus groups; and III. quality of life analyses. The results chapter is merged with the discussions of results chapter so that relevant researches and studies are shown in a combination with the results.

I. Desktop analyses

The educational system for children with special needs in Macedonia is organized in three basic segments:

- Special education in special schools;
- Special education in separate classrooms in mainstream schools;
- Mainstream education in the same class with other students.

This type of education is similar to the countries in the region like Slovenia (Schmidt and Brown, 2015), Serbia (Babic, 2017), Croatia (European Agency, 2017) and others.

The decision for the educational placement is made by the parents. During the enrolment of the students with SEN in the regular school the parents don't have an obligation to submit a finding, opinion and assessment of the student's specific needs. There is a large number of children with developmental disabilities which are not covered with education and they usually stay at home. There is no national registry, because of which there isn't any precise data about the number of these persons.

Education of children and youth with special needs is an integral part of the unique educational system in Macedonia. The state is committed to the inclusion of all persons in all areas of life regardless of the type and degree of the disability. This tendency implies inclusion in all educational levels.

The actual conceptual placement of the education for students with special needs is regulated with the Law for primary education and the Law for secondary education (1995).

According to article 6 from the Law for primary education (2008) special conditions are provided for the students with special needs with the purpose of gaining primary education in the regular and special primary schools. These students have a right to individual assistance with the purpose of acquisition of primary education. Parents have a right to enroll their children in regular primary schools. There are also special primary schools and special classes in the regular schools for students with intellectual disabilities and autism.

Our system is based on the idea that inclusive education in some form, does not and should not exclude the special education options. This is in accordance with Florian's view (2008) that in reality, school systems are utilitarian in structure and are organized around the idea that intelligence is fixed, measurable and normally distributed. Thus the schools will meet the needs of most learners, while some may require something additional or different from what is ordinarily available. On the other hand, the policy of inclusion demands equity in education.

In the mainstream inclusive schools, the student needs to follow the regular curriculum. His strong and weak sides need to be noted and an Individual Educational Plan (IEP) needs to be prepared. The IEP should contain achievable goals for the student. The IEP should be prepared by an inclusive team which is formed in every mainstream inclusive school.

Special schools are an independent and parallel system. A student that attends a special school has many barriers if he (or his family) chooses to transit to a mainstream school, while the transition from mainstream to special schools is very simple. According to de Beco (2016) adopting appropriate legislation, developing policies or national plans of ac-

tion, are important starting point to inclusion for all.

Secondary education as well as the primary education is mandatory. According to article 39, paragraph 1 of the Law for secondary education, in the secondary schools for students with special educational needs, they are educated according to adequate curriculums for students with special needs but also with programs for the appropriate vocations or vocational trainings.

Students with special needs have the right to a free transportation, regardless of the distance of their living place to the primary or secondary schools. The Law for construction in article 11 (2009) determines that a public building shall be projected and built so that the persons with disabilities will have an unimpeded access, movement, stay and work to and in the building.

In Macedonia there are four special primary schools for children with intellectual disabilities and two secondary schools for students with mild intellectual disabilities.

On the table below, a number of the students with intellectual disabilities enrolled in the mainstream primary schools, special primary schools and secondary state schools is given.

Table 2. Number of students with ID in different educational placement

School year	Number of students with disabilities in regular schools	Number of students with disabilities in special schools (for students with ID)	Number of students with disabilities in secondary state schools (for students with ID)
2014/2015	471	422	210
2015/2016	707	431	204
2016/2017	725	451	175

There is a noticeable progression of the number of students with intellectual disabilities that attend inclusive schools in the regular educational system. The number has increased from 471 students in 2014/2015 to 725 students in 2016/2017. The Ministry of education and science does not have statistical findings regarding the type of disabilities of the students.

Below, a representation is given related to the number of special educators and rehabilitators employed in the primary and secondary schools in Republic of Macedonia (The data related to the number of students with ID and the number of employed professionals is given by the Ministry of Education and Science after a request for access to information with a public character was sent out).

Table 3. Number of employed special educators and rehabilitators

Special educators and rehabilitators employed in the primary schools 320		Special educators and rehabilitators employed in the secondary state schools 63	
Mainstream primary schools	Special primary schools	Secondary municipality schools	Secondary state schools
172	148	53	10

The table shows that the largest number of special educators and rehabilitators are employed in the mainstream primary schools, 320 of them.

II. Analyses of the access to information and services in education

With the purpose to make a comparison of the current regulations and the current situation on the field - policy vs practice, we made an analysis by using semi-structure interviews and focus groups. In the education area, considering the fact that within the research we had parents and caregivers of children in different educational settings and with barriers in different segments, we defined 6 concepts that in many areas intertwine with the focus groups. The quotations and concepts from the semi structured interviews are showed in tables while the quotations from the focus groups are in-text.

- Primary education;
- Secondary education;
- Transitions of persons with special needs;
- Private centers;
- Accessibility;
- Associations of parents of persons with disabilities.

Table 4. Concept I – Primary education

Sub-concepts	Quotations
Positive sides of inclusive education	*„She wanted to socialize with normal kids, but for us it worked. She was accepted by the surroundings, accepted by the parents."*
Negative sides of inclusive education	*„The largest problem is that we don't have a speech-therapist". We need a speech therapist that will speak Turkish. And Albanian."*
Positive sides of special education	*„I choose this school because here there are classes in Albanian."*
Negative sides of special education	*„We are missing special educators who are Albanians. These children need to be educated in their mother tongue."*

In Macedonia there is a dichotomous system, or a division of the system to inclusive and special education as educational options for the children with special needs. The parents in this study pointed out both the positive and negative aspects of both systems. As positive characteristics of the inclusive schools they point out the positive attitudes of the teachers and the peers towards the students with ID as well as the accessibility of the inclusive schools in terms of ramps, elevators and adapted toilets. The negative side pointed out was the lack of Albanian speech therapists. Still, some parents are not satisfied by the inclusive education and they believe that there isn't any real inclusion in the country and that it all depends on the parents and their means. Similar situation is noted in Slovenia as well. According to Kovsca and Lakota (2010) there is a lack of high-quality professional work and inappropriate placement of children with ID in regular schools.

Regarding special schools, as a positive side, the Albanian classes were pointed out and as a negative one, again the lack of Albanian professionals was stressed.

Within the focus group for professionals that work directly with the disabled persons it was pointed out that the parents are not obligated to bring the document for the specific needs of their child in the schools. Also the parents have an absolute right to choose whether their child will attend a special or mainstream school. Part of the practitioners believe that the insistence for mainstream inclusion is a mistake, because there still is a lack of resources and staff. The discussants of the focus groups agreed that they support the inclusive processes, but not at all costs. The representatives of the special schools stressed that after the introduction of the inclusive process, the special schools are being perceived as an isolation for the students.

"Something needs to change in the current system, which is only and improvisation and is not beneficial for the children nor the parents, and at the same time we are facing large difficulties."

From the focus group of the parents of children with SEN, everyone agreed that there is a lack of special educators and rehabilitators and speech therapists, as well as books for the secondary vocational education for persons with SEN and in the special schools there isn't enough courses related to skills and art. Regarding the inclusive processes, the views of the parents are divided, depending on their personal experiences, the degree of disability their child has and whether the society has accepted their child or not.

"In Gostivar, there is a school with elevators, special toilets, classes with a smaller number of students and a sufficient number of special educators and rehabilitators available but you can't find this everywhere."

In the focus group consisted of representatives from the NGO sector it was pointed out that the lack of appropriate education for the persons with intellectual disability is a problem that lingers throughout the years and there aren't any appropriate answers or solutions for it.

"Children with SEN are often forced to get enrolled into special schools although they have recommendations for mainstream education, and on the other hand there are children who are supposed to attend special schools but they go the mainstream schools because their parents have good "connections" – and because of this fact they do not get the necessary treatment."

Table 5. Concept II – Secondary education

Sub-concepts	Quotations
Re-enrolment in secondary schools	*„Well, he finished with his printing school here, now he is with the cooks."*
Positive sides of the special secondary education	*„These last two-three years things are changing, because when there is a cooperation between us parents there is a cooperation between the children, and there is a cooperation with the teachers."*
Negative sides of the special secondary education	*„These children must grow, must progress, here they stagnate, something has to be done, something must be invented, if it is necessary we'll write the books, or borrow them from the primary schools."*

The first cub-concept relates to the possibility of the persons with ID to re-enroll in the special secondary schools. Parents believe that this option is better for the socialization of their children because there aren't any day-care or other public centers for them. The second sub-concept is related to the positive sides of the special secondary schools. Parents believe that their mutual cooperation is a positive side and that is has a positive influence in the interpersonal relationships of the teachers as well as the relations between the peers. A positive aspect are the competent teachers that work with the students with special needs as well as the opportunity for re-enrolment. The third and most dominant concept is related to the negative aspects of the special secondary education. The view of the parents is that a modernization of the curriculum is necessary as well as printing new books that would satisfy the special needs of the students.

Within the focus group of experts that work with persons with SEN it was pointed out that after finishing primary school these children have to direct themselves towards carriers they hold an affinity or talents for.

"One of our students has a talent and a desire to continue her education in the secondary music school, but we are afraid how she is going to pass the entry exam".

The main recommendations that came from the NGO sector are adjustment of the curriculum for the children with SEN, adjustment of the books used in the educational process and their availability online, engagement of expert staff-special educators and rehabilitators as personal educational assistants in the classes with children with SEN, training of the staff that works in the special schools in the direction of working with children with ID, alteration of the curricula for the primary and secondary schools in direction of education of the children with intellectual disability for more contemporary vocations, not just the current ones.

Table 6. Concept III – Transitions of persons with SEN

Sub-concepts	Quotations
Re-enrolment in secondary schools	*„Well, he finished with his printing school here, now he is with the cooks."*
Positive sides of the special secondary education	*„These last two-three years things are changing, because when there is a cooperation between us parents there is a cooperation between the children, and there is a cooperation with the teachers."*
Negative sides of the special secondary education	*„These children must grow, must progress, here they stagnate, something has to be done, something must be invented, if it is necessary we'll write the books, or borrow them from the primary schools."*

The first two sub-concepts were pointed out by a smaller number of the examinees that had such experiences with their children while the third sub-concept was preferred by more than half of the examinees. Regarding the transition of the students with special needs from inclusive to special schools, the parents point out the lack of capacities and prerequisites in the regular schools for students with SEN as the largest problem. One of the problems is the manner of payment of the educational assistants by professionals. Usually the parents pay for the assistants. They believe that the state or municipalities need to take care of this aspect. The second sub-concept is related to the transitions from special to regular schools. Again the parents point out that they would like their children to visit regular schools if there are

certain conditions, personal assistants before all. The third sub-concept is related to the transition from primary to secondary education. The parents, according their statements remain consistent to the type of education their child attends.

Within the focus group for experts that directly work with children with SEN it was pointed out that it is more useful for the children to attend special schools first, and then eventually to continue into regular schools. Also, it is necessary to pay attention to the cooperation special- regular schools and to raising awareness for the fact that the child can be moved from special to mainstream schools and vice versa.

"It is much more difficult for a child that attended a mainstream school and had no progress, to start with his/her socialization and literacy later, on an older age."

Table 7. Concept IV – Private centers

Sub-concepts	Quotations
Relieving access to services in private centers	*„We took our child in one private center, 4 months, and it is really beautiful there, but for us, that's a lot of money. That should be covered by the state."*
Opening more state supported private centers	*„And they told my daughter that if we make an agreement with the Department of Labor and Social Policy they will call us."*

The fourth concept that arose from the research is related to the private centers for education and rehabilitation of persons with SEN. From the interviews made with the parents, two sub-concept emerged that intertwine in many segments. The parents believe that the conditions in the newly opened private centers (mostly in Skopje) are good with sensory rooms in every center, but the costs for one child are too high especially for parents who are social cases. Their request is that this is financed by the government or the municipalities and that the centers have a standard working time (8-16 0'clock).

Table 8. Concept V – Accessibility

Sub-concepts	Quotations
Physical access	*„Accessibility in this city-somewhere you have it, somewhere you don't, it doesn't matter if we have ramps if there is no handrail, in all the schools I've been in, I didn't see an elevator anywhere."* *"We have ramps, an elevator, toilet adjusted to persons with a combined disability and physical disabilities."*
Access to information	*„We learn from the special educator and rehabilitator, from one person to another."* *"You know how those things go, from one counter to the other, go here, go there."*
Transport	*„Ministry provides transportation for the users, and lunch and hygienic means (day-care centers)."* *"We take our children to school, but the Ministry of Finance reimburses financial means as much as a monthly bus ticket."*

The first sub-concept is related to the physical accessibility. The respondents had divided opinions. Part of them were satisfied with the physical accessibility, but these parents had children who studied in inclusive schools or day care centers which had adequate physical access (usually due to donations). Others believed that access to different buildings is still on a low level. The second sub-concept is related to access to information. Parents generally have a problem with the access to information. The most common manner of information is through personal experience of other parents. Third sub-concept is related to transport. Examinees were generally satisfied with the manner the transportation works. The transport to and from the day-care centers is financed by the Ministry of Labor and Social Policy.

The view of the policy makers is that it is necessary to involve the NGO sector more, to have public debates and discussions, as well as a regular information of the families for their rights and responsibilities (social affairs, health, education).

The inclusive school in Gostivar is a

good example of physical accessibility and an inclusive concept. This school has 1273 students and the education is in three languages: Macedonian, Turkish and Albanian.

"Beside the inclusive approach and the inclusive team, in the school there are many means and tools that can rarely be seen in the region, especially in a regular school. For the needs of the students with special needs, there is a room with a smart table, accessible chairs and tables for working the children with SEN, speech therapy sets, assistive technology and space used for sensory integration."

Table 9. Concept VI – Associations of parents of persons with disabilities

Sub-concepts	Quotations
Negative experience of the parents associations	*„There is something positive about the associations? They benefit from us not the other way around."*
Parent training	*„The parents need training, support as well. We use to have meetings when our children were young."*
Inclusion of parents in legislation processes	*„They are bringing laws and they are not consulting us." We can give solutions that will be the fastest and least painful for the state."*

The first sub-concept is related to the negative experience from the associations of parents. The examinees believe that only the associations benefit, and not the parents. This leads to disunity between the parents. Regarding the second sub-concept the parents said that they need trainings as well and that in the past these trainings took place in different cities in the state. The third sub-concept is related to the inclusion of the parents in the adoption of legal solutions. They believe that they are not included in this process, but on the other hand they know what is best for their children. They often cite the "Nothing about us without us" reference (Charlton, 2000), which means that persons with disabilities and their parents must be the main decision-makers for issues that concern them directly.

III. Quality of life in persons with intellectual disability

Within our study we carried out a research for the quality of life predictors. The analyses showed that the severity of the disability and the placement of the disabled persons have an impact on the quality of life.

Table 10. Quality of life according the degree of disability

Degree of disability	N	IxS	F
Mild intellectual disability	72	69,44%	
Moderate intellectual disability	43	59,84%	<0,01
Severe intellectual disability	22	44,87%	

By using ANOVA it was determined that the persons with severe intellectual disability statistically have the lowest quality of life which is in accordance with other studies.

Table 11. Quality of life regarding age

Domains	**10-19 years old**	**20-28 years old**	**Over 28 years old**	**F**
Material well-being	75%	65%	78%	<0,01
Health	67%	68%	69%	<0,01
Productivity	67%	65%	69%	<0,01
Intimacy	75%	67%	75%	<0,01
Security	83%	72%	78%	<0,01
Place in society	83%	60%	64%	<0,01
Emotional well-being	75%	63%	83%	<0,01

The study showed that there are no differences in the quality of life regarding the age of the examinees with intellectual disability. Other studies showed different results.

Table 12. Quality of life related to the type of educational placement or care

Type of education or care	No of persons	Place	N	IxS
Inclusive education	15	Primary school Mustafa Kemal Ataturk Tetovo	10	39,34%
		Secondary school Pero Nakov Kumanovo	5	39,87%
Special education	45	Special primary school Idnina	10	64,87%
		Secondary state school for education and Rehabilitation - Skopje	20	69,64%
		Secondary state school for education and Rehabilitation – Shtip	15	49,87%
Non-residential care (day-care centers)	20	Center for social work-Kumanovo	10	59,88%
		Poraka nasha-Kumanovo	10	59,74%
Non-residential care (foster families)	6	Lag village	2	39,54%
		Manastirec village	4	49,84%
Non-residential care (supported independent living PORAKA-Negotino)	10			59,89%
NGO for persons with disabilities-Solem	10			69,40%
Institutional care – Institution for rehabilitation of children and youth Topansko Pole	10			69,44%
Persons employed in protective companies	21	Protective company Duki Daso – Negotino	10	59,84%
		Printing house PROPOINT Negotino	7	59,85%
		Protective company Blazhe TM-Negotino	4	49,84%

Based on our analysis, persons from the city of Skopje have a better quality of life than the ones from the other smaller cities or provinces because the capital city offers more opportunities and resources. Also it is evident that the users of the student homes have a better quality of life. If we make a comparison between primary and secondary schools, we see that the students attending secondary schools have a better quality of life probably because of the use of student homes. In the area of non-residential care, the best score is found in the persons that attend day-care centers but that is very close to the area of supported independent living, while the foster families have a much lower value. This is supported by the fact that these are persons with the least social contacts and they are not covered by any treatment options.

4. DISCUSSION

Desk-top research showed that the educational system in Macedonia is similar to the countries in the region like Slovenia (Schmidt and Brown, 2015), Serbia (Babic, 2017), Croatia (European Agency, 2017) and others. The Macedonian system is based on the idea that inclusive education in some form, does not and should not exclude the special education options. This is in accordance with Florian's view (2008) that in reality, school systems are utilitarian in structure and are organized around the idea that intelligence is fixed, measurable and normally distributed. Thus the schools will meet the needs of most learners, while some may require something additional or different from what is ordinarily available. On the other hand, the policy of inclusion demands equity in education. Special schools in Macedonia are an independent and parallel system. A student that attends a special school has many barriers if he (or his family) chooses to transit to a mainstream school, while the transition from mainstream to special schools is very simple. According to de Beco (2016) adopting appropriate legislation, developing policies or national plans of action, are important starting point to inclusion for all.

The number of students in regular and

special schools is continuous and there are no large fluctuations while the number of students enrolled in the secondary state schools for students with intellectual disabilities is mildly decreasing. According to Kalambouka, Farrell, Dyson and Kaplan (2007) over the past 20 years' policy and practice on the education of children with special educational needs has aimed at placing increasing numbers of children in a mainstream school environment.

Regarding the **semi-structured interviews** with parents and the concepts defined, in relation to the first concept primary education a similar situation is noted in Slovenia as well. According to Kovsca and Lakota (2010) there is a lack of high-quality professional work and inappropriate placement of children with ID in regular schools. Peetsma et al. (2001) developed a comparison of children in regular and special education. Children in special and regular education were matched in 2nd grade and were followed for 4 years. After 2 years, the results were mixed: some children developed better in regular education, while others developed better in special education. On average, children in regular education achieved somewhat better on mathematics than children in special schools for learning and behavioral difficulties. This difference was not found for children at special schools for mild mental retardation. After 4 years, the differences were greater. Students in regular education scored better at language and mathematics than children in special education.

In relation to the second concept-secondary education, Myklebust (2007) investigated the effect of inclusive education in Norwegian upper secondary education. He investigated the development of 494 students with special educational needs such as general learning difficulties. After correcting for relevant background variables, he found a positive effect of inclusive education on competence attainment: students receiving additional support in inclusive classes were 76% more likely to obtain formal qualifications than students receiving education in special classes. Students who achieved better at the start of upper secondary education were also more likely to obtain a formal qualification.

Regarding the concept of transitions made by children with SEN in different types of placement, Ravenscroft, Wazny and Davis (2017) believe that structural and cultural inclusion rather than a focus on impairment appear to be important for successful transition. Flexible time-tables and curriculum that responded to children's ideas rather than the other way round, allows for differences between children to emerge rather than a process which focuses on the normalization of every child.

In the fourth concept related to private centers we made a comparison to the research of Fava and Strauss (2010) who showed that sensory intervention decreases disruptive behaviors only in individuals with autism, while Stimulus Preference increases pro-social behaviors only in participants with profound mental retardation with co-occurring poor motor and linguistic abilities. Nevertheless, the existence of private centers with sensory rooms should be state financed and thus beneficial for the persons with ID.

In relation to the transport of children with SEN, which was the fifth concept defined by the semi-structured interview the guidelines for transportation of pupils with SEN in Macedonia is taken from the definition of transportation given in the IDEA (2006) and it usually includes: travel to and from schools and between schools and travel in and around school buildings.

Regarding the **quality of life** of persons with intellectual disabilities and combined disabilities, our research showed that once predictors of QOL are identified, "resources can be allocated to maximize their positive impact on desired personal outcomes" (Schalock et al., 2008, p. 186). Unlike other studies, our study didn't show that age is a determinant factor in the quality of life of the person in case. The type and extent or degree of disability is a valuable predictor of the quality of life (Brown, MacAdam-Crisp, Wang and Iarocci, 2006; Hu et al., 2012). Although our research showed that the age of the persons with ID and combined disabilities some researches carried out with families with children with ID and autism found that the older the children, the higher are the levels of anxiety and stress in parents (Hauser-Cram et al., 2001; Konstantareas, 1991). Our research showed that users of student homes have a better quality of life. This is also confirmed by a research done by Simoes and Santos (2016) where they defined living circumstances of persons with ID as one of the main predictors for the quality of life scores.

A research conducted by Chowdhury and Benson (2011) showed that relocation of persons with intellectual disabilities from large institutions to non-residential setting has a general positive impact of the quality of life of the persons with ID although the improvements were most prominent in the first year and they plateaued after a year. Brown, Mac-

Adam Crisp, Wang and Iarocci (2006) suggest that there is a need to both identify and provide measures of care and support that would enable families to function at an optimum level within their home and community, so they may experience a quality life similar to that of families without a child with a disability.

5. CONCLUSIONS

As in many other cases, and in many other countries, policy and practice are not always coherent. Legislation in the area of education in our country has to be modified and accommodated to the needs of the persons with disabilities and their parents or care-givers. The final conclusion from our research is that the persons with ID are still on the margins of society, and they lead everyday battles to prove that their needs must be taken into consideration in context of their human rights. For improvement of the educational process and the treatment of the persons with intellectual disabilities we must invest in the expert staff. They must follow all contemporary movements, and at the same time we need to prevent occupational burn-out in particular of the professionals who work with persons with severe intellectual disability. On the other hand, in the battle for gaining rights, there is very little time dedicated to the promotions of the very special abilities these persons have. Bearing all of this in mind, we suggest the following:

- Clear and precise strategy for inclusive education and improving working conditions in inclusive schools;
- Relieving the transitional process from mainstream to special schools and vice versa;
- Decreasing the number of students in the class with a child with SEN and simplifying of the educational inclusion of children with severe disability;
- Employment of expert Albanian and Turkish staff (special educators and rehabilitators, speech therapists);
- Education on the rights of the children with special needs and their parents for the expert, teaching and managing staff in preschools and primary schools;
- State employment of teaching assistants and personal assistants;
- Raising awareness in parents of children peers;
- Decision-making regarding educational placement done by all affected parties (parents but also the inclusive teams in the schools);
- Networking of the inclusive and special primary schools with the mainstream and special secondary schools with the purpose of simplifying the exchange of information of children during their transition from mainstream to secondary schools;
- Transformation and restructuring of the special schools and institutions into resource centers;
- Opening of new centers for education and rehabilitation (especially for children with autism);
- State or municipality co-financing of the private centers;
- Organization of parent trainings;
- Inclusion of the parents in creation of new legislation for the children with ID;
- Modernization of the curriculum in the special secondary schools;
- Larger representation of computer technology and aids for improvement of the educational process;
- Education of the persons with ID for sexual and reproductive health and self-advocacy.

Although awareness for the importance of the rightful treatment of this problem is not on a satisfactory level, still we can notice a shift in perception and liberation of prejudice. It is important to understand that the creation of settings in which the persons with disabilities will fulfill their rights, is not a privilege for them. It is a necessity with which the disabled persons will overcome the obstacles they face on the path to fulfillment of rights. Only in this manner, the society will demonstrate its maturity and will enable respect of the dignity for all citizens equally.

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Conflict of interests

Authors declare no conflict of interest.

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SENSE-MAKING TECHNIQUES IN EDUCATIONAL PROCESS AND THEIR IMPACT ON THE PERSONAL CHARACTERISTICS OF STUDENTS

Dr. Irina V. Abakumova, Faculty of "Psychology, Pedagogy and Defectology", Don State Technical University, Rostov-on-Don, Russian Federation,
E-mail: abakira@mail.ru
Dr. Ekaterina S. Zorina, Southern Federal University, Rostov-on-Don, Russian Federation
E-mail: kotenchik@yandex.ru

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ABSTRACT

This study looks into psychotechnics used in education and contributing to initiating logic among students, their personal growth and characterizes psychological features of "sense-deducting". Here you will find a review of the sense-making techniques considering as one of the categories of psychotechnics. The described techniques are based on the human psychology, they improve the quality of instruction, create a favorable and unique system of values, take into account the individual characteristics of all types of education, and influence the sense-making process development among children. Sense-making techniques are stated in the author's classification and extended by practical methods. The study of psychological features of influence of sense-making techniques on the personality of a student lets us see new patterns in personal, subjective and "meta-subjective" results of acquiring of the school program via transformation and development of value/logic consciousness of a child. The work emphasizes that the use of sense-making techniques is effective in the educational and after-school activities of the educational organization. The achieved results make it possible to understand, to substantiate the naturalness and relevance of the sense-technical approach according to personal and academic indicators of students. In the process of competent and correct use of the semantic techniques, we see the possibility of conveying the best, productive and quality pedagogical experience, as well as the perspective of innovative developments in the psychological and pedagogical sciences. For children and adolescents, information, thanks to sense-techniques, starts to be personal in nature, knowledge is objectified, learning activity becomes an individual need.

1. INTRODUCTION

Modern challenges of global development suppose a constant enhancement of the education system as one of the crucial components of the human race evolution process. This fact finds its continuation in the search and testing of innovative forms and technologies of training that have to correspond to the achievements of psychological science and the demands of society. In practice, we are faced with the need for an integrated, multidisciplinary approach that allows not only the skills and knowledge transfer, but also the sense formation initiation as well as the reporting of value and cultural codes, and the facilitation of students' self-actualization.

In support of this over the past decades, many scientists have presented theoretical and empirical materials proving that the child's development can be studied and analyzed through the dynamics of the life-purpose orientation and value system development, since it is closely related to cognitive and emotional processes (Abakumova I. V., 2011; Abakumova I. V. et al, 2013; Anson W., 2004; Asmolov

Corresponding Author
Dr. Irina V. Abakumova, Faculty of "Psychology, Pedagogy and Defectology", DSTU, Rostov-on-Don, Russian Federation, E-mail: abakira@mail.ru

A. G., 1999; Asmolov A. G., 2009; Asmolov A. G., 2014).

The study of the possibilities and prospects of the sense-making paradigm in the humans' teaching and development is reflected in the works of Asmolov A. G. (sense-making pedagogy), Vasilyeva I. A., 2011. (the methods of working on author punctuation), Vorobyeva E. V. Ermakov P. N., 2015. (training of psychology students in the scientific methods of research), Fomenko V. T. et al, 2013. (the developing model of the content of education) and many other scientists. But in practical use, sense-making components, as applied to the educational process, are not enough. There is a request for the search and description of tools that allow students to provide meaningful activity, and the need for disclosure of sources that ensure a sense-making saturation of education. Technological aspects of the research (based on the textbook for masters of psychology and pedagogy (Abakumova I. V., 2011), typology of semantic problems in modern didactics (Zilberbrand N. Y. and Rudakova I. A., 2014.), psychological and didactic features of formation sense-making orientation (Nesterenko I. E., 2009), determinants of the sense-making activity of the individual on material of the study of senior students (Shreiber T. V., 2006), reflexivity features among children with different experience of solving "problems in the meaning" (Fayzullaeva E. D., 2013), psychological conditions for the formation of sense-making (Perelygina I. V., 2008), modularity of education and human integrity (Lankin V. G., 2012).

The system of value is a complex and multidimensional formation, consisting of a number of terms, but it sets the direction of cognition, the features of the key personality traits, motivational involvement of a person in life activity. Sense-making technique (in meaning-making point) is directly related to the individual life-purpose orientation, his existential experience and self-identification. The dominant idea of the sense-making technique in pedagogy and psychology is the creation of the immediate closeness to the child, considering his unique experience, the living space, the inner world. At the same time, the sense-making techniques form the teaching skills, they can be disseminated, replicated, adapted for specific educational tasks, improve in the professional work of the teacher. Highlighting the sense-making techniques from the general variety of psychological techniques, we compiled a classification according to the possibilities of using the sense-making techniques in education (Table 1).

Table 1. Classification of sense-making techniques in educational sphere

№	Type of sense-making techniques	Example	Practical Use
1	Sense-making techniques, addressed to subjective experience	Personal association, generalization, work with images, personal-semantic context	The technique called "cluster", "cinquain", "a basket for ideas", the reproduction of words - associations on a new or previous topics, etc.
2	Sense-making techniques of a dialogue	External, internal, cultural, epochal types of dialogue	"Semantic questions", "Find the riddle word", "Questions to the Time Machine"
3	Gaming techniques	Role-playing, imitation, game-travel, games with natural materials, theatrical plays, etc.	Poetry quiz, role plays with discussion, living through situations
4	Sense-making techniques of self-expression	Reflection, existential choice, living through situations, personalization	Reflection of mood and emotional state, reflection of activity, reflection of the content of educational material
5	Sense-making techniques of support	Emotional stroking, situations of success and recognition, life creation, meaningful immersion, value orientation	The sense support techniques find their embodiment in gestures, intonation, teacher's words, the practice of the "Pollyanna effect", the defining at the end of the lesson of the achievements of students in the nominations
6	Sense-making techniques of creativity	Art techniques, eurhythmy, creative works, installations, etc.	Group pictures to the topic under study, cartoons on the issues under consideration, drawing up diagrams, historical collages, infographics, etc.
7	Sense-making techniques of a problematic character	Tasks on "meaning", "insight", Mindsight, assignments on life experiences, problematic	"Blum's questionnaire method", "Article for the newspaper" technique, "Six hats of thought"

2. MATERIALS AND METHODS

To implement the empirical part of the study, a practical base was formed; teachers and students from the following educational institutions of Rostov-on-Don participated: MAOU "School # 39" in Leninsky district, MBOU "School # 40" in Oktyabrsky district, MBOU "School # 82" in Voroshilovsky district, "Palace of Creativity of Children and Youth" and the "Center for Children's Creativity" in Voroshilovsky district. They took a direct part in conducting a complex experiment to identify the psychological qualities of the influence of the sense-making and technical process on the educational process and schoolchildren's' system of value. Students of the second and third levels of education presented the respondents' composition of this study from 9 to 11 grades. Altogether there were 210 people, including 72 teachers.

The work initially examined the attitude of teachers towards psychotechnics in general and sense-making techniques in particular by questioning. After processing the results of the author's questionnaire, a working group was formed from the number of teachers interested in the sense-making approach or already using individual elements. It included teachers of history and social studies, Russian language and literature, psychological educators, teachers of additional education institutions, based on the conducted experiment, totaling 17 people. For teachers who were ready to work with sense-making techniques, a program to familiarize the sensemaking-based instructional method was developed. After a special training of the teachers who made up the group of innovators, from January 2014 to May 2016 of the academic year, the above-described semantic techniques were used in classes and after-class activities. In the course of the experiment, a complex model of the sense-making techniques using in the educational sphere was implemented, and a humanitarian-semantic examination was used to track the dynamics of the transformations in the value/semantic (or axiological) "consciousness" of the students. As a main criterion for choosing a semantic technician, we have singled out a description of the characteristics and dynamics of the system of value development among the students of grades 9-11, as well as carried out an analysis of the academic progress of children.

The study included two directions: humanitarian and psychological (students' value system/sense-making consciousness development in experimental classes) and academic (determining the degree of schooling in accordance with the generally accepted formula).

To study up the system of value, the psycho-pedagogical instrumentarium consists of psychometric, identification and introspective methods, as well as of methods that describe individual characteristics of adolescents.

Personal and life-purpose orientation diagnostics for students of the second and third levels of training was conducted in accordance with the characteristics studied [Table 2].

Table 2. Humanitarian and sense-making development study support

Sense-making consciousness	Diagnostic technique
Sense-making rationale	Test of humorous phrases by Shmelyov A.G. and Babina V.S.
Attitude to the surrounding reality, a hierarchy of values, meaningful attitudes	The "Human figure" test by Harris G. The "Personal biography" test by Motkov O.
System of values and life-purpose orientation	"Life-purpose Orientations" test by Rokich M. "Unfinished sentences" test
Personality behavior regulated by system of values and life-purpose orientation	Approach by Abakumova I.V. for determining the level of personal and sense-making consciousness development of schoolchildren

The primary stage of the humanitarian-sensemaking study was implemented in the beginning of the 3rd term of 2014-2015 academic year. Two groups of adolescents were formed for the humanitarian-sensemaking examination. The first group was experimental and included three students of 9-11 grades in Voroshilovsky, Leninsky and Oktyabrsky districts, total 105 students. Lessons of history, social studies, law, the Russian language and literature, extra-curricular activities (quizzes, performances, debates, etc.) were carried out with based on the sense-making techniques. The second group was the control group with the same students of the 9-11 grades, a total of 105 students. They were engaged in traditional study programs without the use of the sense-making techniques.

After the training course based on the sense-making techniques for the schoolchildren experimental group were completed, the second stage of the study was implemented in

April and May of 2016 year.

The choice of criteria for assessing the initiation of sense formation was focused on identifying the characteristics of changes in the sense-making consciousness development among the adolescent's personality, identifying leading motives, attitudes toward the surrounding reality, transformation of individual life-purpose orientation that were studied in the control and experimental groups at the beginning and at the end of the study. The choice of a diagnostic base with tests application and standardized methods was based on the idea of a single sense-making field for the formation and development of the value system and life-purpose orientation.

3. RESULTS

We processed the results obtained from the control and experimental groups of schoolchildren data before and after the experiment. We used methods of statistical data processing, parametric (binomial distribution, quartile approach) and nonparametric statistics methods (determination of the Spearman rank correlation coefficient, Wilcoxon, Mann-Whitney, Friedman criterion) as well as an assessment of the data central trend and its spreading. As a result we determined that changes in the sense-making consciousness development among schoolchildren, which occurred in both groups during the period under the study, are more dynamic and pronounced among adolescents from the experimental classes where sense-making techniques were actively used in education and training. Schoolchildren from the experimental group demonstrated an aggression decrease with the predominance of orientation toward a peaceful way out of the conflict, and adequacy of evaluation of one's own person and surrounding people.

It is noteworthy that the sense-making development approach influenced the reorientation of values: the five most significant for the students included "Active Life", "Development", "Health", "Cognition", "Having good friends" points. Among the instrumental values were "Education", "Latitude of views", "Responsibility", "Tolerance", "Independence".

Positive appraisal dynamics were found on-scales "Attitude to the Future", "Life Goals", "Fears and anxiety", "Consciousness of Guilt", which indicates a constructive assessment and psychological maturity. The extremes have decreased too; extreme, categorical assessments, especially negative ones transforms into neutral or less negative. Teachers conducted an independent expert review of the schoolchildren works determined that the sense-making techniques using positively influenced on the creativity development, individual creative abilities development, thinking imagery skill. The indicator of emotional well-being also grew, same as the motivation to communicate with other people increasing and rejection and aggression reduction.

The respondents of the experimental group demonstrated that the greatest changes occurred in such parameters as life self-determination, self-realization and personality transformation. Among them, we can state an increase in the number of adolescents with an average and high level of meaning-making development, which indicates self-actualization, the system of values improvement and life-purpose orientation strengthening, self-analysis empowerment, objectivity development, same as the development of the ability to receive and comprehend information at different levels.

The analysis of academic indicators revealed a higher degree of schooling among schoolchildren who attended classes based on the sense-making approach, than did students from the control group who studied according to the traditional program.

4. DISCUSSION

Theoretical and empirical study of this topic allowed comprehensively approaching the phenomenon of the sense-making techniques. We can also study its influence on the educational process. The following conclusions were made:

1. There is a special kind of psychotechnics called sense-making techniques, which are directly connected with emotions, feelings and experiences of a person, his system of values, personal senses, life purpose orientation and meaning-making. These techniques form certain groups in the educational process and can be used depending on the subject area, the topic of the lesson, the goals to be achieved, and the socio-psychological characteristics of the students. This allows a teacher to form and improve the necessary sense-making instrumentarium.
2. Sense-making techniques introduc-

tion in the educational process is possible only with the personal involvement of a teacher and after his/her finishing the sense-making approach training course.

3. The methods and approaches included in the humanitarian-sensemaking studies correspond to the modern requirements for the evaluation and diagnosis of the personality characteristics of a person, same as his sense-making (meaning-making) consciousness, and are combined with classical methods of assessing the quality of education (calculating the schooling degree of classes in the subject).
4. The influence of the sense-making approach on the meaning-making consciousness development among the adolescents in the experimental group was reflected in the list of features:
   - characterizing the changings in relation to themselves, the leading values for the students of the experimental group after the sense-making techniques introduction became education, responsibility, independence; self-conception is harmonized as the number of positive and neutral assessments in the analysis of the indicators «consciousness of guilt» and «attitude toward oneself» were increased; there was also an increase in the overall constructiveness of the individual among schoolchildren; the criterion of the quality of life self-realization and the capacity for transformation has increased, indicating an intensification of the processes of meaning-making and its interpersonalization;
   - as for interaction, the tendency towards a decrease in the level of aggression was noted, as the predominance orientated toward a peaceful way out of the conflict presented; a balanced assessment of the actions and behavior of others, tolerance for the shortcomings of others were also noted. A relationship with the father, family, school and teachers, which constitutes the basic circle of communication and interaction at school age, became better; the value of «having good friends», «tolerance», «breadth of views», «happiness of others», «sensitivity» increased in the reference communication.
   - a transformation of social meanings took place: the transformation from situational to stable personalities conditions was evidenced by the revealed correlation dependence: with the growth of the motive «human stupidity», the values «having good friends», «public recognition», «independence», «honesty», «productivity» , «intransigence to shortcomings», «cognition» were grew up; but at the same time, a significant reduction in the expression of the value «happiness of others» and «breadth of views»; with the growth of the motive «mediocrity in art», the importance of values such as «productive life», «tolerance», «sensitivity», «courage in upholding one's opinion» naturally grows, but «efficiency in business» is reduced. The number of adolescents with an average and high level of sense-making consciousness development has increased, which indicates self-actualization development too, same as the improvement of the system of values and life-purpose orientation strengthen, the opportunity for self-analysis and objectivity skills appearing and the development of the ability to receive and comprehend information at different levels.
5. The introduction and use of sense-making techniques approach in the educational process is possible only with the comprehensive development of the instructional method programs for the use of the sense-making techniques in a certain subject area, taking into account the specifics of the educational institution, the work program and the requirements of the Federal State Educational Standard.

5. CONCLUSION

A comprehensive analysis of the results of psychological methods included in the humanitarian-sensemaking study made it possible to determine that the introduction of sense-making techniques approach into educational and upbringing program is such a way of organizing the educational process which will ensure the development of sense-making consciousness development, as well as the initiation of meaning formation and the transformation of knowledge into Personal level.

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Conflict of interests

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STYLES OF DECISION MAKING AND MANAGEMENT AND DIMENSIONS OF PERSONALITY OF SCHOOL PRINCIPALS

M.Sc Anita Azeska, PhD Candidate, MIT University, Faculty of Psychology, Skopje, Republic of Macedonia
E-mail: a.azeska@gmail.com
Dr. Jasmina Starc, Higher education centre Novo Mesto, Slovenia
E-mail: jasmina.starc@guest.arnes.si
Dr. Ljupco Kevereski, Faculty of Education, University "St. Kliment Ohridski", Bitola, Republic of Macedonia
E-mail: kever@mt.net.mk

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ABSTRACT

This paper explores preference to the style of decision making (managerial, analytical, conceptual and behavioural), (Alan Rowe, 1992), management styles (relationship-oriented leadership and management by objectives), (Fiedler, 1987) and personality traits (extraversion, neuroticism and psychoticism), (Eysenck, 1998). The convenience sample of 61 respondents (principals of primary and secondary schools from Macedonia) were subjected to decision making style inventory (Decision Style Inventory - DSI) of 20 claims, a questionnaire to assess the management style (Least preferred coworker - LPC) composed of 18 bipolar adjectives, and a personality test (Eysenck Personality Questionnaire - EPQ) composed of 90 items in the form of questions. Results show that schools lean towards directive style of decision making with a combination of democratic-participatory style that includes subordinates in the process of decision making. The results also demonstrate that school principals prefer management style motivated by relationships; they are more introverted and emotionally stable. The findings indicate a necessity for a new generation of managers who will be different from the traditional managers. It is evident that the future will require managers with leadership styles different from the traditional in Republic of Macedonia. Given that the school is a basic organisational cell on which the educational system of the country is based, the proposed findings present an occasion for developing new ideas and practices that may yield great results. This would increase the flexibility and adaptive capacity of the school as a modern organisation. Thus, these findings have practical implications as they may direct special training of principals in order to apply the best management style, or style that is most appropriate for certain situations, certainly through coordination of the desired profile of the principal and the business strategy, development and maturity of the organisation.

1. INTRODUCTION

Leadership begins and ends with people; their aspirations, feelings, motivations and the way they communicate. Winston Churchill characterised leadership as intelligent use of force (Anderson et al., 2001).

Rowe (Rowe et al., 1989) states that the future requires leaders who have a vision as well as ability to inspire others, and who can turn their vision into reality that way.

Making decisions is one of the main activities of a leader. Wren and Voich (Wren and Voich, 1994) believe that decision making is mandatory for successful execution of any managerial function. According to the Four Quadrant Model of the Brain of Ned Herman, Rowe (Rowe et al., 1989) defined four styles of decision making. The activity of each quadrant of the brain is the basis for

Corresponding Author
M.Sc Anita Azeska, PhD Candidate, MIT University, Faculty of Psychology, Skopje, Republic of Macedonia
E-mail: a.azeska@gmail.com

a particular style of decision making. Rowe (1992) determined styles of decision making through combining cognitive complexity and value orientation. Cognitive complexity stems from the use of information to the conceptual ability of parallel information processing and generalisation, i.e. determining strategy. Value orientation is based on the orientation of technical values (tasks) to the orientation of organisational values (people). The styles of decision making that Alan Rowe talks about are the following:

- **Directive** - used by autocratic leaders who show tendency to behave aggressively. They make decisions on the basis of a relatively small amount of information and lack tolerance for vague information.

- **Analytical** - managers with analytical style in cognitive terms are complex. They make decisions by researching extensive data and have increased tolerance for vague information.

- **Conceptual** - is notable in managers with need for recognition and success. They make decisions based on extensive elaboration of data and tend to be creative and inventive.

- **Behavioural** - characterises managers with exaggerated need for acceptance (affiliation) and democratic relations with subordinates. They make decisions taking care to maintain good relations with other employees.

Early analyses of leadership, from 1900 to 1950, defined the features of the relation between a leader and their followers. The findings that not a single feature or combination of features can explain leadership abilities in entirety has prompted many researchers to begin studying the impact of situation on leadership skills and behavior (Day and Antonakis, 2012).

Fiedler's contingency theory is an attempt to explain how the situation models the relation between the personality of the leader and effectiveness (Nikoloski, 2000). Fiedler attempted to predict leader effectiveness based on a personality trait called least preferred coworker (LPC). This theory covers two management styles - relationship-oriented leadership and management by objectives. Managers motivated by objectives are primarily focused on achieving goals, while managers motivated by interpersonal relations aim to develop close interpersonal relationships with subordinates. These two styles are analogous, perhaps even completely identical with the styles oriented towards people and work.

The preferred management style reveals various aspects of organisational behaviour, in which the variables of personality have great importance because they are one of the major conditions that affect the behaviour and the person determines behaviour in a defined situation as per Catell (Peck, 1978). Or, "leadership is largely a phenomenon that stems from the personality of a leader" - Čizmič (Čizmič, 1995, p. 64). The discovery of the relation between management styles and personal traits enables strategic implementation of organisational goals, greater efficiency and higher performance (Yukl, 2010).

Eysenck defines personality as "a whole set of actual and possible forms of reaction of an organism determined by heredity and environment, and accrued and developed through interaction of four main areas: cognitive (intelligence), conative (character), affective (temperament) and somatic (constitution)" - Eysenck (Eysenck, 1998 per Lojk, 1991). In his research and study of personality Eysenck (Eysenck, 1998 per Lojk, 1991), using a statistical technique factor analysis, extracted three basic dimensions or personality traits that he believed to be most important in addition to intelligence:

A) The trait extraversion (E) is a continuum whose ends are arranged in "clean", extreme forms of extraversion and introversion, which include fewest people because most people are closer to one or to the other end of this continuum. Each individual occupies a different position in the same continuum.

B) The trait neuroticism (N) is described by two extremes: emotional stability and emotional lability.

C) The trait psychoticism (P) is defined by two extremes: hardness, rigidity, intransigence, aggression, indifference of the person as opposed to a person that is indulgent, sensitive, empathic, cares for other people.

These traits are normally distributed in the general population, which means they are present in all humans in varying degrees and only the extreme forms of the continuum of normality represent pathological abnormalities.

The definition of the research problem and the postulation of the hypotheses in this study were determined by the: Theory of human nature, in particular the view of the complexity of human nature and its variability, Bojanović (Bojanović, 1988); Fiedler's contingency theory, which is an attempt to explain how the situation models the relation between the personality of the leader and effectiveness, Fiedler (Fiedler, 1978); Eysenck's theory of personality, which provides useful model for

understanding individual behaviour and creation of verifiable predictions, Peck (Peck, 1978); Thus, there are three hypotheses:

1. School principals have more pronounced directive and conceptual style of decision making and less pronounced analytical and behavioural style of decision making.
2. School principals prefer relationship-oriented leadership and show lesser preference for task-oriented management (management by objectives).
3. In school, principals' extraversion is most notable as a trait, while psychoticism is the least notable.

2. MATERIALS AND METHODS

2.1. Respondents

The survey was conducted on a convenience sample of 61 respondents (principals of primary and secondary schools). According to the number of valid questionnaires for variable styles of decision making and personality types, the number of respondents is 58 principals of primary and secondary schools. According to the number of valid questionnaires for variable management styles, the number of respondents is 61 principals of primary and secondary schools.

2.2. Measurement instruments

The decision making style inventory (DSI) by the author Rowe consists of 20 claims that the respondent completes with 4 different statements concerning the 4 styles of decision making: managerial, analytical, conceptual and behavioural style. The respondent is required to rank the statements of every claim according to a 4 - degree correspondence scale of 1 (least correspondence) to 4 (most correspondence for the respondent - a manager). Data on the internal homogeneity of the applied measurement instrument obtained for the sample in this study show that the values of α - coefficients for the four styles of decision making are of low internal consistency.

The questionnaire "Least preferred coworker" (LPC) developed by Fiedler (Fiedler, 1984) was used in the study in order to assess management style.

The management style is determined by describing the least compatible coworker when it comes to performing tasks, i.e., the least-preferred coworker score is determined by asking the manager to remember all of their past and current associates, choose the one with whom they would not work well, and rate the associate on a scale that consists of 18 bipolar adjectives by selecting the corresponding number from 1 to 8 for each of the adjectives (e.g. friendly - hostile, cooperative - uncooperative, efficient - ineffective).

The final score is the sum of the ratings rounded up to 18 items. The lowest possible score is 18 and the highest possible score is 144. If the score is lower, it indicates that the individual is motivated by tasks, whereas a higher score on the scale indicates individuals motivated by relationships. The internal consistency, that is, the value of the α-coefficient of the LPC scale, obtained on the sample in this study, is high.

The personality test (EPQ) consists of 90 items in the form of questions. The respondent responds by selecting one of the two offered alternatives - YES or NO - during an indefinite period of time. The total individual score for each scale is obtained by simply counting all selected YES and NO responses that measure the corresponding dimension using the appropriate scoring key for the answers. In the EPQ inventory, the traits neuroticism and extraversion as well as the L - scale have acceptable internal consistency, while psychoticism is of low internal consistency.

2.3. Procedure

Data collection took place in the period from January 2016 until May 2016, in the workplaces of the respondents.

2.4. Statistical data processing

Data are processed with the statistical program SPSS – 20 and the basic statistical indicators (arithmetic mean, standard deviation, highest and lowest score) are presented for all the used variables.

3. RESULTS

From the data presented in Table 1, it is evident that school principals favour the directive style, while the behavioural style is least pronounced.

Table 1. Basic statistical indicators for styles of decision making

Directive style	N	M	SD	Lowest score	Highest score
School principals	58	58.55	6.41	36.00	74.00
Total	58	58.55	6.41	36.00	74.00
Analytical style					
School principals	58	55.26	4.02	42.00	64.00
Total	58	55.26	4.02	42.00	64.00
Conceptual style					
School principals	58	44.50	4.98	38.00	57.00
Total	58	44.50	4.98	38.00	57.00
Behavioural style					
School principals	58	41.60	6.56	30.00	68.00
Total	58	41.60	6.56	30.00	68.00

From the data presented in Table 2, it is evident that school principals are more motivated to have close interpersonal relationships with other people in their work.

Table 2. Basic statistical indicators for management style

Management style	N	M	SD	Lowest score	Highest score
School principals	61	79.92	11.96	55.00	103.00
Total	61	79.92	11.96	55.00	103.00

From the data presented in Table 3, it is evident that school principals display more extraversion and neuroticism, while the psychoticism trait is less pronounced.

Table 3. Basic statistical indicators for extraversion, neuroticism and psychoticism

Extraversion	N	M	SD	Lowest score	Highest score
School principals	58	12.72	2.67	4.00	18.00
Total	58	12.72	2.67	4.00	18.00
Neuroticism					
School principals	58	9.59	3.68	3.00	19.00
Total	58	9.59	3.68	3.00	19.00
Psychoticism					
School principals	58	9.52	0.96	7.00	11.00
Total	58	9.52	0.96	7.00	11.00
L - honesty					
School principals	58	15.17	4.26	5.00	21.00
Total	58	15.17	4.26	5.00	21.00

4. DISCUSSION (DISCOURSE)

The basic constructs in this paper are styles of decision making, management styles, personality traits and workplace. Namely, on numerous occasions, referring to the results of the research that dealt with the issues of the aforementioned variables, it was emphasised that decision making is one of the most frequent and most important managerial activities and that leadership, among other things, is a projection of the personality of the manager, that is, leadership is a phenomenon that stems from the personality of the leader.

The definition of the research problem and the postulation of the hypotheses were guided by the: Theory of human nature, in particular the view of the complexity of human nature and its variability, Bojanović (Bojanović, 1988); Eysenck's theory of personality, which provides useful model for understanding individual behaviour and creation of verifiable predictions, Peck (Peck, 1978); Fiedler's contingency theory, which is an attempt to explain how the situation models the relation between the personality of the leader and effectiveness, Fiedler (Fiedler, 1978).

The results of the research showed that primary and secondary school principals have significantly pronounced directive style.The prominence of the directive style of school principals or dominance of this style in the application within these institutions suggests that they are more autocratically managed organisations. These managers make decisions quickly and prefer clearly defined rules and relations, order and security (Karavelioğlu, 2014). The descriptive statistics also show that the analytical style is present in levels above-average. Rowe (Rowe, 1992 according to McKenna, 2000) suggests that the analytic style is inherent for managers who value achievements and who display a certain tendency towards autocratic governance.

Starting from the findings of Burns and Stalker (1961 according to McKenna, 2000), the directive and somewhat analytical style are considered relevant to a bureaucratic (mechanical) structure that is organised on the basis of hierarchical relations of authority, vertical one-way communication in top - bottom direction in the organisation, and centralisation of decision making. Applying the analytical style suggests a certain tolerance managers have for insufficiently clear information as well as endeavour to make right and sound decisions for the organisation. The two prevailing styles emphasise the need for power and the achievements of the managers.

Rowe (1992, according to McKenna, 2000) also points out that the directive and analytical decision making style belong to the left hemisphere, which is responsible for logical thinking, analysis, serial information, speech management as well as abstract logical reasoning.

Descriptive indicators further point out that the conceptual and behavioural styles are less pronounced among principals of (primary and secondary) schools, partly confirming

the first hypothesis. Given that these styles belong to the right hemisphere, intuition and creativity in making decisions are inevitable. Thus, these principals, in addition to directive style that indicates tendency for autocratic behaviour, nevertheless apply democratic-participatory style that includes subordinates in decision making, in order to make better decisions influenced by intuition and creativity. In the role of auxiliary styles, they use the conceptual and behavioural styles of decision making. This finding mirrors Rowe's opinion (1992, according to McKenna, 2000) that the styles of decision making are never expressed in absolute pure form, so that when one of the styles is prominent this does not mean that there are no impurities from another style in combination.

The conclusion is that in schools there is a tendency towards directive decision making with a combination of a democratic-participatory style that includes subordinates in making decisions. According to the average expression, managerial decision making styles can be ranked starting from directive as the most pronounced to behavioural as the least pronounced style, which is in accordance with the ranks of percentage distribution of styles among the Yugoslavian (Serbian) managers - 85% directive, 81% analytical, 73% conceptual and 60% behavioural style, Maletić et al. (Maletić et al., 1994). These results are similar to the results obtained in Marković's research (Markovič, 2006) where the situation is as follows: the analytical style is prevalent, then the directive, conceptual and ultimately, the behavioural style. The only difference is in the reverse order between the analytical and the directive style. Research carried out about managers in Japan, according to Maletić et al. (Maletić et al., 1994), show that the prevalent style among Japanese managers is the conceptual, and then analytical, directive and behavioural, while the analytical style is distinct among US managers, then the conceptual, directive and behavioural style.

What appears significant, and serves as a bold conclusion, is that when it comes to the managers in Macedonia and the managers from the countries of the former Yugoslavia, the styles of one brain hemisphere are distinct and prevalent, seeing as both the directive and analytical style belong to this hemisphere. In Japanese and American managers, the conceptual and analytical style are most pronounced, and these belong to different brain hemispheres - the conceptual to the right, whereas the analytical style belongs to the left hemisphere. It is evident, even though it is a bold conclusion, that the managers from the more developed world, e.g. Japan and America, use the two hemispheres of the brain in the process of making decisions, unlike the Macedonian managers and the managers from the countries of former Yugoslavia, where the prominent styles stem from the same hemisphere. This interested Ned Herman (Ned Herman, 1996), who studied the dominance of a particular quadrant of the brain and, accordingly, the mental preferences of members of different nations.This certainly represents a wide area for further research.

In the second hypothesis, as expected, the school principals showed preference for a management style motivated by relationships, rather than motivated by objectives.

From the descriptive statistics on management styles, it is evident that school principals manifest significantly more pronounced tendency towards close interpersonal relations.

The obtained results from this research, in accordance with Fiedler's interpretation (Fiedler, 1978) that the LPC score is an indicator of the hierarchy of the motives of the manager, suggest that school principals are more motivated to have close interpersonal relationships with employees, whereas the attainment of their objectives is a secondary motive that will become important only if the primary motive for affiliation is already satisfied. These managers see their least preferred associate in a positive light, because their primary need is to maintain good relations with others, to get along, and their secondary needs are directed towards the objective. Similarly, Likert (Likert, 1961, according to Bojanović, 1988) states that: People-oriented managers do not give detailed instructions on how the work should be done, but instead offer only general instructions, starting from the assumption that the employees are responsible and capable of organising the work on their own. This can also be considered as a justified assumption in our research. In addition comes the research of Shawn (2009), which shows that there is a positive relation between all the factors of transformational leadership and all the factors of school culture, seeing as the transformational leader treats their employees as the greatest valuable of the organisation. Furthermore, this type of leader stimulates the employees intellectually, offers them a significant role in decision making and motivates them to pursue higher goals, not just objectives of immediate interest, and enables employees to give their

best contribution to the organisation - Hunt, Osborn (Hunt, Osborn, 1995). In view of the fact that the role of a principal is considered essential for the successful implementation of educational goals, the demands of school leaders are constantly increasing, creating an unlimited number of challenges. Kahn and Katz (Kahn and Katz, 1978) believe that some managers are inclined towards one, and others to another management style, because the styles in question fit their personality traits. The orientation to objectives and people may be taken as two tasks performed by the manager; the most favorable circumstance is when the two tasks are undertaken by the same manager. In the same vein, Kahn and Katz argue that orientation to objectives and people is not only a reflection of the manager's personal attributes, but also reflects the characteristics of the organisation.

The contingency theory emphasises that leaders are not effective in all types of situations. It is also very important that when considering the concept of leadership, the situation in the organisation should be taken into account. This theory provides information about the type of leadership that is highly likely to be effective in a particular context. By obtaining the LPC scale score and describing the three situational variables, the likelihood of one individual's success in a particular situation can be determined. The data obtained from the LPC scale can also serve in development of a leadership profile, and can be used along with other data in human resource planning in order to develop the profile of the individual and the best way they can fit into the organisation.

A research by Ahmad, Wagar and Khan (M. Ahmad; S. Wagar; R. M. Khan, 2010) suggests that the management style should have a direct impact on the level of organisational commitment of the employees and is moderated by the characteristics of the employees as well as environmental factors. Efficiency here depends on the way managers manage to balance the demands of the objective and the relations between employees.

According to Bojanović (Bojanović, 1988) the efficiency of the work depends on the motivation of the employees and their abilities. Sometimes the nature of the work requires authoritative management style due to the motivation type of the employees and their personality traits. Considering the fact that many features of the human nature change throughout life, the way of making decisions in the work, that is, the management style should present a challenge to those characteristics of a person that are susceptible to change.

The findings about the personality traits - extraversion, neuroticism and psychoticism - among school principals will be discussed in continuation.

Psychologists have always been aware of the meaning of the description of the main forms of human behaviour. The review of Eysenck's book (Lojk, 1991) confirms the aspect, which recognises the existence of two clear and very important traits. These are extraversion - introversion and neuroticism, or emotional balance - imbalance. Even though Eysenck does not want to deny the existence and meaning of other personality factors, he is convinced that E and N contribute more to personality description than any other combination of factors outside the cognitive domain.

In accordance with the hypothetical framework of this research, it was assumed that the school principals predominantly displayed extraversion as a trait, whereas psychoticism was the least expressed of the traits among them. Descriptive statistics support this assumption, thus confirming the hypothesis.

Extraversion, as the prefix suggests, has no relevance to the categorical distribution, but as previously mentioned, represents a continuum whose ends hold the "pure", extreme forms of extraversion and introversion, which include the smallest number of people, taking into consideration that most people approach one or the other end of this continuum. Each individual takes up a different position in the same continuum. According to the results of this research, it follows that bank presidents are more extraverted than school principals, or friendlier, more communicative, socially more expansive, easily adaptable. They are less fond of individualistic activities, preferring changes, and they are more initiative, adventurous, and optimistic compared to school principals.

In terms of prominence of neuroticism as a trait, arithmetic means show that school principals are emotionally stable. They are balanced and their emotional reactions are slower and milder.

Studies have confirmed that neuroticism is closely related to the hereditary degree of lability of the autonomic nervous system, while extraversion is dependent on the degree of prevalence of the excitation phase, i.e. inhibition of the central nervous system. This balance is probably genetically determined and related to the ascending pathways of the reticular formation.

The influence of the inheritance of ex-

traversion and neuroticism has often been the subject of research of various authors, and perhaps the clearest evidence for this is the Shields survey from 1962 (Lojk, 1991), which discovered that there is high correlation of both extraversion and introversion found in monozygotic twins who were reared separately. Generally, it can be concluded that many stakeholders speak in favour of the view that legacy still has a very important role in the development of all three personality traits: extraversion, neuroticism and psychoticism. It seems that when it comes to individual differences, genetic factors play a greater role than the environment.

Personality development according to Eysenck is a result of interaction of genetic predispositions, the basis of which are the structure and functionality of the nervous system and the external environment in which a person develops. Taking into account that the nervous system of different organisms possess differing properties, different persons establish dissimilar relations with the same environment. In this way, the same objective environment participates in creating differences between people in terms of personality traits. Considering the varying genetic basis of the introverted and extraverted persons, socialisation as the most important way to personality development would be successful on different levels; an extraverted predisposition will often be countered by existing norms, unlike the introverted disposition.

It should be pointed out that Eysenck does not overemphasise the genetic conditionality of a person in terms of environmental factors, but himself claims that whether the extraverted disposition will become a personality type depends on the environment. The autocratic way of educating children is a more convenient method for the socialisation of extraverted types of individuals than for the introverted types of individuals.

Considering that the EPQ questionnaire has been used for a long time, and Eysenck himself has devoted considerable time to its creation through factor analysis as well as auditing it, the instrument should be trusted. What is favourable is the fact that in the main review of existing factor analytic studies of personality, suggests the existence of three main factors, which are very similar to the factors measured by EPQ (Lojk, 1991). This confirms that the choice of the three factors is neither superficial nor subjective, but rather the result of an experimental record. In addition, according to Pek (Peck, 1978), Eysenck's theory is practical for creating verifiable predictions and presents a useful model for the differences between groups of individuals. However, Pek suggests that more attention should be paid to other factors, above all to social learning and cognitive factors.

On that account, according to the results of this research, the conclusion is that school principals prefer a management style motivated by relationships; they are more introverted and emotionally stable. School principals lean towards directive style of decision making with a combination of democratic-participatory style that includes subordinates in the process of decision making.

Observing the results of this study, the discussion is further elaborated upon with the findings presented in the Gino, Grant and Hofmann study (Gino, Grant and Hofmann, 2010). Based on previously conducted research, the authors state that the success of the leader depends on the members of the team when it comes to choosing between an introverted or extraverted person. In fact, when team members possess a lot of knowledge, the introverted leader is far superior to the extraverted leader, who, as a rule, diminishes the success of such a team due to their own desire for domination. In a situation of this type, a moderate, mild and non-directive management style, which introverted people normally possess, gives significantly better results compared to the directive style.

Unlike introverts, extraverted individuals are more dominant and aim to have the final word. Because of this, extroverts are not particularly good listeners and tend to assume the ideas of other people. Their inclination to impose their own solutions only presents an advantage when managing people who need to be told what they need to do, but not in the case of managing a professional team.

It can be said that integrity (possession of strong moral principles) is characteristic of introverts who are prepared to distance themselves from others and remain alone against everyone if their moral principles and their personal dignity are threatened. It is harder for extroverts to do the same, because they are constantly looking for company and they are emotionally dependent on other people to an extent.

The position head of company carries with it a burden of loneliness that introverts are able to tolerate more easily compared to extroverts.

Although at first glance, according to Gino, Grant and Hofmann (Gino, Grant and

Hofmann, 2010), extroverts seem destined to become successful leaders, experience shows differently in many cases. The best examples of introverts becoming successful leaders are Bill Gates, the founder of Microsoft and Jeff Bezos, the founder of Amazon.

Some new studies warn that the work system that does not recognise the value of introverts experiences a loss when they fail to promote them to higher positions. Due to the stereotypical representations of leaders, the general view is that the leader is an extraverted, assertive and dominant person. Not only that, but also that the majority of decisions in the process of selecting managers is based on big ego and personal ambitions of one such person. It is not unusual to comment in professional circles that someone is not capable of being a manager because they are too modest, withdrawn and insufficiently fierce.

This attitude is not uncommon in Macedonia and in the countries of former Yugoslavia, taking into account the results of studies which show that aggressive styles are more desirable in this region compared to other countries, as discussed above.

Even though decisions made by employers should be impartial and free from the influence of their personal value system, this is not the case in practice. In fact, decisions about hiring or promotion in good part are determined not only by the personal value system of the decision-maker, but also are a reflection of the organisational culture, and indirectly, the national culture.

Thus, the results of a 2009 study by researchers at the University of Minnesota, according to Gino, Grant and Hofmann (Gino, Grant and Hofmann, 2010), speak of the fact that extraverted individuals climb the hierarchical constellation more easily because extraversion is more desirable than introversion in the Western culture. In fact, out of all the executives who were included in the study, as many as 60% of them were singularly extraverted.

Introverts have leadership qualities as well, though they are not obvious at first glance. In actuality, introverted individuals are generally receptive to different ideas; they listen carefully, give preference to deeper conversations rather than small talk, and are particularly aware of how others perceive them and what others expect from them.

Researchers who explore this area according to Gino, Grant and Hofmann (Gino, Grant and Hofmann, 2010) advise that it is crucial for introverted people to fight for visibility when it comes to their personal qualities and work, so that others would not benefit unfairly from their contribution. Introverts have numerous qualities that are significant for leadership positions, especially nowadays, considering the increasing tendency towards the fifth level of leadership (Level 5 Leadership: The Triumph of Humility and Fierce Resolve; Good to Great: Why Some Companies Make The Leap and Others Don't by Jim Collins). Introverts are more suited to this type of leadership than extroverts. Namely, according to Gino, Grant and Hofmann (Gino, Grant and Hofmann, 2010), the qualities of this type of leader are modesty, mildness, calm determination, highly developed self-awareness and self-control, and patience. That is, as people say - "Still waters run deep".

5. CONCLUSION

The culture, beliefs and value system in Republic of Macedonia as well as the specificity of the current state of the country influence the decision making process. The findings indicate a necessity for a new generation of managers who will be different from the traditional managers. It is evident that the future will require managers with leadership styles different from the traditional in Republic of Macedonia (Azeska, 2015).

Managerial education and training, coupled with organisation and other measures, would diminish the extreme characteristics of autocratic leadership and would contribute to strengthening the leadership that would be equally oriented towards both objectives and interpersonal relationships, which would be much more convenient for the current as well as the coming times. In fact, accepting and integrating possible leadership styles would result in the best opportunities for success. For a successful appearance and persistence in the processes of globalisation, the necessity for permanent and organised managerial education is implicit (Azeska, 2015).

The conclusion is that this research contributes to the expanding of empirical knowledge in the area of decision making within the school as fundamental organisational cell on which the educational system of the country is based.

Conflict of interests
The authors declare no conflict of interest.

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THE EMOTIONAL ANALYSIS OF CHILDREN WITH SPECIAL NEEDS DURING TABLET USAGE IN EDUCATION

Dr. Emrah Soykan, Near East University, Ataturk Faculty of Education, Cyprus
E-mail: emrah.soykan@neu.edu.tr
Dr. Fezile Özdamlı, Near East University, Ataturk Faculty of Education, Cyprus
E-mail: fezile.ozdamli@neu.edu.tr
Dr. Deniz Özcan, Near East University, Ataturk Faculty of Education, Cyprus
E-mail: deniz.ozcan@neu.edu.tr

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ABSTRACT

The aim of this research is to determine the emotions of the students who need special education during the teaching process through Tablet. Document analysis method was used to determine the emotions of the students who need of special education in the process of teaching through tablet. Five years old, three mentally retarded students were involved in the process of using the software. In the study, descriptive analysis method of Strauss & Corbin was used for the analysis of data obtained through interviews and observation forms. According to the results of the artificial intelligence emotions analysis, it is seen that the students are happy and eager to learn in the process of teaching with tablet. Another common point is that they are a bit confused sometimes, although they are eager in the initial teaching sessions. As a result, it can be said that the positive results of the emotional analysis and positive results obtained from the teaching sessions with the tablet support each other.

1. INTRODUCTION

There is an opinion that advanced learning technologies can optimize the delicate balance between emotion and learning of academic knowledge. Students are unlikely to be able to say or enjoy having an intense new jargon row, complex systems with many components, mental models exchanged between variables, solutions to difficult problems, and other difficult academic content. Technology should be designed according to models that allow students to experience emotional satisfying experiences while trying to investigate the boring, over-compulsive or seemingly useless subject. In an ideal world, technology will bring students right into the most appropriate concentration environment that targets the relevant knowledge.

As learners learn difficult academic content, they have a wide range of technology that includes a commitment to coordinating their emotions and knowledge. Below is a summary of some of the technological approaches that have led to in-depth learning of the student (Graesser and D'Mello, 2014):

- Create a flow situation (or intense participation) to the point where you are tired and lost in time. This can be accomplished by a simulation or play that presents knowledge, tasks and scenarios to the student's most appropriate challenge area. This is not very easy or very difficult, but it is obvious that it is correct.

- Make an impressive storytelling that will continue to be of interest and consistency. The expression you make will integrate with the academic subject and increase its value.

- If the student is not interested in the topic, reward him / her with the points / sources that intensify or enrich the experience.

- Have the interaction checked to ensure effective student, autonomy and self-control.

- Give materials that can achieve success to build self-confidence and self-efficacy.

- Collaborate step-by-step with the stu-

Corresponding Author
Dr. Deniz Özcan, Near East University, Ataturk Faculty of Education, Cyprus
E-mail: deniz.ozcan@neu.edu.tr

dent to improve interactivity and social readiness.

- Give the students feedback on time to see what they have learned more clearly.

- Give feedback and guidance about the student's feelings to follow the coordination between feelings and learning. A student who is discouraged and demotivated can sometimes think that teaching material is confusing, annoying, or boring.

The designers of some learning environments have deliberately thought about emotions of students while creating intelligent textbooks that are sensitive to effects, and serious games. It is important to know about emotions that students experience and how they are related to learning since sometimes emotions help learning but sometimes they affect the learning negatively.

The instant emotions are intuitively open during learning process. For example, high motivated students insist on completing the tasks and having positive feelings when tasks are successfully completed. They are curios when they are interested in the topic. They feel happiness when they make an invention and do not care about their fatiques. However, there are sometimes oppositional tendencies. When students face with various obstacles such as comprehension, production, reasoning and problem solving, frustration, irritation and other negative emotions, they feel disappointment and negative emotions. They can also get bored when they encountered with small amounts of barrier as well as intensive technical content (Graesser and D'Mello, 2014).

Researchers have used a variety of methods to measure the immediate feelings students in technology-based learning environments. (Calvo and D'Mello, 2010; Du Boulay et. al., 2011; D'Mello and Graesser, 2010, D'Mello, Picard and Graesser, 2007; Picard, 2010; Woolf et. al, 2009).

One of the most used methods to observe the emotions is the observation made by educated observers. Educated observers periodically classify or rate the learners' feelings during the learning session. (Baker, D'Mello, Rodrigo, Graesser, 2010; Craig, Graesser, Sullins, Gholson, 2004). Observers can have a checklist (eg, happy, sad, confused, etc.) or scoring scales with separate categories for the dimensions of feelings or categories. Observers tend to focus on identifying emotions before deciding not on the emotions that students experience during the process of interacting with technology.

Emotion analysis, computational thought evaluation in text are related to emotion and subjectivity. With emotional analysis, it is aimed to determine the opinion of a speaker or author according to a certain subject or target. Opinion can express the author's thoughts, ideas or appraisal, emotional state or intended emotional communication. (Grafsgaard, Boyer, Phillips, Lester, 2011). Emotion analysis studies use approaches such as natural language processing, machine learning, computational linguistics and symbolic techniques. Makine öğrenmesi, verilen bir problemi ortamdan edindiği bilgiye göre modelleyen It is a subdivision of Artificial Intelligence discipline. Recently, besides textual emotional analysis, it has become possible to reveal emotional analysis in visual sense. To reveal it, there are different artificial intelligence applications or programs. One of the is microsoft emotion detection api.

The emotion detection API, which is an API developed by Microsoft, which recognizes the emotions by analyzing the faces of the people in the photographs, serves the users with the help of a website. By using this website, you can analyze the feelings of the people in the photos that you upload. There are feelings of anger, disgust, fear, happiness, neutral, sadness, confusion and hate as identifiable emotions in the uploaded photographs.

The feelings of this service implemented by Microsoft is very different from the six "basic" emotions that easily emerge in the facial expressions searched by Ekman (1992). These are sadness, happiness, anger, fear, disgust and surprise. It is also different from Pekrun's longer-term emotions in academic, class, and social contexts, such as classifying academic feelings as epistemic, achievement, subject, and social feelings. (Pekrun, 2006; Pekrun, Elliot, Maier, 2006).

Assistive technologies provide a great advantage to overcome the learning problems of mentally retarded individuals. (Alnahdi, 2014; Kuzu at al., 2014). The use of visual and audiovisual tools and materials in the learning-teaching process enriches the learning environment and ensures is more permanent and more meaningful learning for the students. (Yanpar, 2008). Therefore, if the more kinds of different materials are used in the education of mentally handicapped individuals, and the more numerous sensory organs are addressed for the better learning and the persistence of knowledge (Soykan and Ozdamli, 2016).

While the use of educational technology have great importance in the education of mentally handicapped individuals, it has

been proved that children with mental retardation are interested in technological devices. (Dempsey, Lucassen, Haynes and Casey, 2010; Neely, Rispoli, Camargo, Davis and Boles, 2013). When we look at studies with children with mental disabilities, it is concluded that technological devices are very effective, especially in the development of academic and communication skills or in the teaching of new concepts. (Bayram, 2008; Dempsey et. al., 2010; Shah, 2011; Compeau and Higgins, 2011; Çankaya, 2013).

That is, the use of educational technologies in this field has become widespread and efficient results have been obtained. it is also important that students enjoy the devices or teaching materials to obtain fruitful results and to learn the skills or concepts successfully. Thus, it is planned to teach concepts to students who need special education through tablet and tried to reveal the emotions of these students during this teaching process. The aim of this research is to determine the emotions of the students who need special education during the teaching process through Tablet.

2. MATERIALS AND METHODS

Document analysis method was used to determine the emotions of the students who need of special education in the process of teaching through tablet. Documents are important sources of information that must be used effectively in qualitative research. In such research, the researcher may obtain the data without the need for observations or interviews. In this sense, document analysis will contribute to the researcher in terms of saving time and money. Besides written sources, visual materials such as film, video and photographs. can be used in qualitative research. (Yıldırım and Şimşek, 2013). Document analysis is a scientific approach that enables an objective and systematic examination of verbal, written and other materials. (Tavşancıl and Aslan, 2001).

There are several important advantages of videos and photos for the researchers. One of them; is to present non-verbal behaviors such as facial expressions, body movements and mimics, in their original form and with a certain continuity. Beside this, it allows the researchers to watch the same behavior at multiple and different intervals. Moreover, it allows to determine the events and facts that occurs rarely. Finally, these documents can be used by other researchers; It might be possible to test the validity of the results of the study or or it might be possible to reach some other and alternative results (Marshall ve Rossman, 1999; Yıldırım and Şimşek, 2013).

In the descriptive analysis, the obtained data are summarized and interpreted according to the previously determined theme. The data can be organized according to the theme set out by the research questions, or by considering the questions or dimensions used in the interview and observation processes. In descriptive analysis, direct citation is often given in order to reflect the views of the interviewed or observed individuals in a striking way. The purpose of such analysis is to present the findings to the reader in an organized and interpreted way. The data obtained for this purpose is first described systematically and explicitly. Later on, descriptions are explained and interpreted. Cause and effect relations are examined and some results are optained. The association of the emerging themes, their meaning and their presence for future predictions can also be among the dimensions of the researcher's interpretation. (Yıldırım and Şimşek, 2013).

In this research, some themes have been set up in order to reveal the emotions in detail. The documents are analyzed and tabled under the theme of anger, disgust, fear, happiness, neutral, sadness, confusion and hatred. After the themes were determined, a total of 52 teaching sessions were held over a period of three months, and videos of students' work using tablets were recorded. Software that is used for educational purposes in the process is a concept teaching practice in the Google Play Store that can be reached through the "Concept World" key word.

Five years old,three mentally retarded students were involved in the process of using the software. Two of the students are girl with down syndrome and one is an autistic boy. In addition to these three students, two special education teachers were included in the study. Thus, the opinions of the teachers were obtained about teaching process with tablet. Participants were selected with appropriate sample method. Students who did not know the concepts in the developed software and have the ability to learn were selected to reach the purpose of the study.

In the study, students' responses to the material were recorded by the video recorders. with the permission of the parents. Thus, all students' behaviors, problems and reactions encountered in the teaching process were recorded and analyzed.

In the study, descriptive analysis method of Strauss and Corbin (1998) was used for the analysis of data obtained through interviews and observation forms. In this analysis, the data are summarized and interpreted according to the predetermined theme or category. The videos were analyzed according to the following themes; Anger, Hate, Disgust, Fear, Happiness, Natural (Neutral), Sadness and Astonishment. The reason for choosing these themes is that the software used to analyze the photos (Microsoft Emotion Detection API) only has the ability to analyze these emotions. The following steps were followed for the analysis of the documents; Selecting the sample of analysis, development of categories, determination of analysis unit, quantification and use of data.

The video recordings of the students during the process of the tablet usage was stopped when the instructions and reinforcements were used in the software than screenshots were taken. Laten on, data was analyzed using the "Emotion Detection API" from artificial intelligence APIs developed by Microsoft as part of the Project Oxford. Thus, students' emotions in the process of using Tablets in their education were analised. The visualization of the emotion detection API is shown in Figure 1.

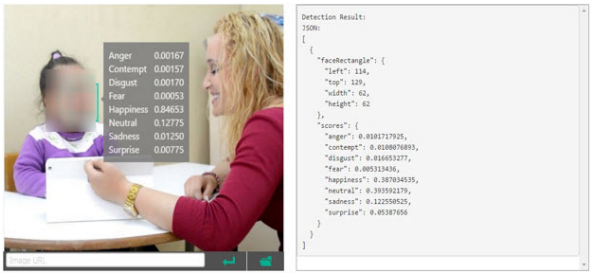

Figure 1. Emotion Detection API Analysis Screen

Before pilot applications, teachers were informed about the tablet computer, the use of the software, the pilot process and important points. of As a result ofmeeting, the concept of "less" has been determined within the scope of the software.

A total of 52 instructional data were collected during all the teaching activities. A total of 52 videos were watched by researchers and special education specialists, and the emotions of the students during the activities were determined.

3. RESULTS

As s result of analysis, average of the total values was calculated, and it was tried to find out what emotions the students were having while using the tablet and concept world software. Thus, during the teaching activities that teachers have realized, students are observed how much they are willing and how they are using the software as well as their emotions are supported by this data. The emotional analysis that the student is intensely involved in is stated in the following steps.

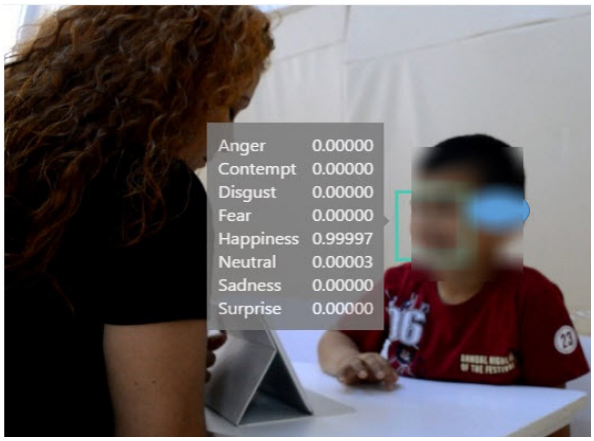

Figure 2. Student 1's emotional analysis results.

As it is seen in Figure 2, when all the instructional sessions of Student 1 are analyzed, as a result of emotion analysis, it can be said that student is "happy" when he use the concept world software and enjoy the lesson during the process.(happiness=0.99997). It is seen that student 1 is happy and entertained in the process of teaching with tablet, and it has also great influence on learning the concepts faster. Moreover, Student 1's positive attitude in the lecture process have been supported by teacher opinion. Teacher's opinion on this situation:

"Student 1 is enjoying using a tablet. I used to predict even before using this software, it could be effective.. Because Students 1 always spent time using hi own tablet outside the school. He is never get bored. I think it was a pleasant process for student 1. "

When the emotional analysis results of Student 2 are examined, although the student displayed an average of "neutral" (neutral = 0.04472) gesture in the process of initial use of the software, in the later process (Fig.4), there is an increase in "happiness" emotion (happiness = 0.95142). in addition to these, it was observed in the beginning that the re-

sponse to the software was not only natural facial expression but also in the average sense of "surprise" (surprise = 0.00224).

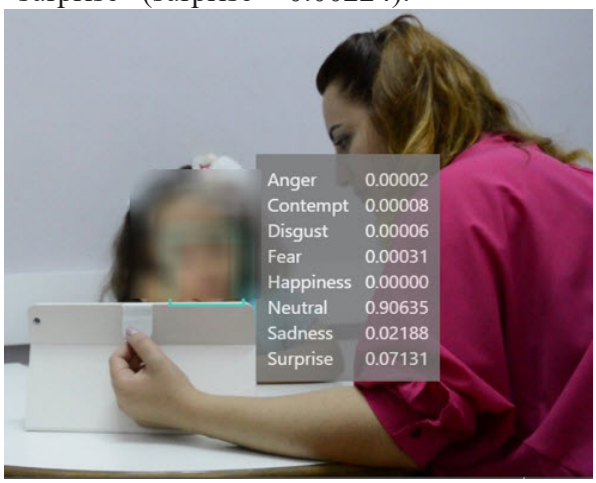

Figure 3. Student 2's emotional analysis results.

But, in general terms, the averages of the analysis have shown that student 2 was happy in the process of using the concept world software. Teacher 1 explained this result as students 2 had adaptation problem in the beginning since she did not use Tablet before. Teacher's opinion on this situation

"Student 2 is not normally a very laughing and excited student. Sometimes it can be very difficult to make her laugh. Initially, she exhibited the same timid behaviors while teaching with tablets as she did it with using new teaching and learning materials before. But as it seen from the videos, she adapted very quickly and after three or five sessions we had fun and enjoyed the lessons. Sometimes, she even responded to the directions taken from the Tablet. Normally, she does not prefer to talk."

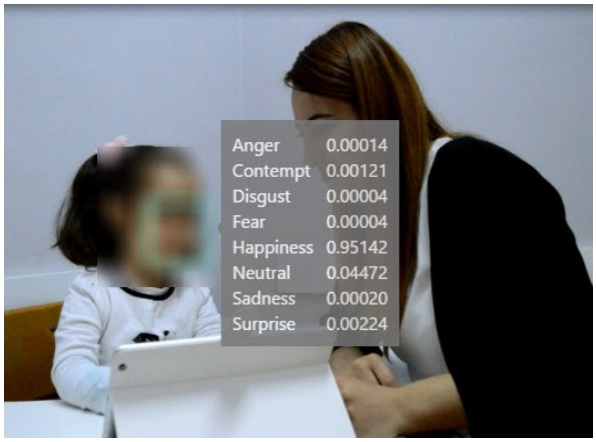

Figure 4. Student 2's emotional analysis results.

Student 3 sometimes tended to talk with the guidelines in the software during the teaching process with the concept world software and asked the teacher to reinforce the guidelines given by touching the tablets as well as her own answers. Generaly, it can be said that during this process, student 3 learned and enjoyed learning with Tablet. Emotional analysis also supports this situation. Student 3's teacher stated about this situation as:

"*She is the most cheerful students in the school. As soon as she comes to the school, she salutes everyone, and also has a diffent energy to attract everyone's attention. This energy also reflects her lessons however, her attention is distracted in a short time in the class. While using tablet we have not had any attention problem. As it is seen in videos, she was constantly interacting with the characters and directives in the Tablet and was always talking during the teaching process. I think this is another important effect of Tablet using except teaching the concepts effectively. That is Tablet using increase the attention of the student during the lessons."* Figure 5 shows the happiness of Student 3 during the teaching session.

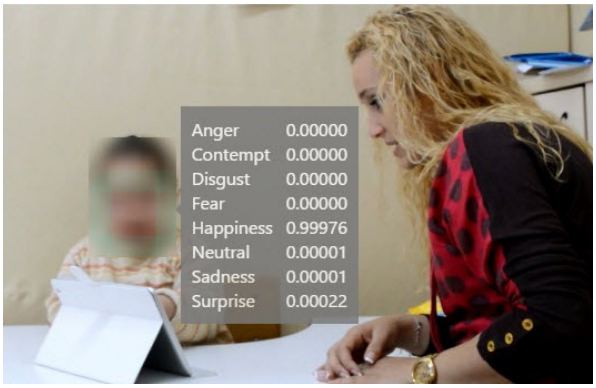

Figure 5. Student 3's emotional analysis results.

According to the analysis, it can be said that student is "happy" when she use the concept world software and enjoy the lesson during the teaching process(happiness=0.99976).

4. DISCUSSION

According to the results of the artificial intelligence emotions analysis, it is seen that the students are happy and eager to learn in the process of teaching with tablet. Another common point is that they are a bit confused sometimes, although they are eager in the initial teaching sessions. As a result, it can be said that the positive results of the emotional

analysis and positive results obtained from the teaching sessions with the tablet support each other.

Students' willingness and pleasure during the teaching and learning process reflect on their success positively.

As it is seen in the results of the emotional analysis conducted during the teaching process, it is observed that students are confused in the begining then they adapt to the tablet usage in education in a short time, and this application make them happy. Thus, it can be said that education with Tablet increases the communication skills of students with mental disabilities also affect the motivation and attitutudes towards this kind of teaching tools positively. There is an important connection between students' satisfaction and materials used during teaching process. Effectiveness of this situation on students' success is supported by researches.

In the literature, there are studies about students' motivation and attitudes towards tablet however all the data has been collected only with teachers' opinions. (Arpacık, Kurşun and Göktaş, 2013; Soykan and Ozdamli, 2016). In this study, emotional analysis has been conducted to increase the reality to make the situation more realistic. When student enjoys his performance during the study, happiness appears automatically. Appreciated students performs better performance in every aspect of life than the students not having any appretiation. The reason of this situation can said as enjoyment of the acted performans. (Öztürk and Dündar, 2003).

The features that distinguish human beings from other creatures are their emotions. Emotion is an affective state of consciousness in which joy, sorrow, fear, hate, or the like, is experienced, as distinguished from cognitive and volitional states of consciousness (Titrek, 2013). One can experience a single feeling of happiness, happiness, sadness, or very sadness at different intensities while experiencing different feelings such as happiness, joy, sadness, grief, anger, enthusiasm, and fear. In fact, there are two basic feelings in people as mainly positive and negative. while positive feelings are promoting and sustaining people's life, negative feelings threaten and cause intellectual and physical harms (Karabekiroğlu, 2014; Uskan, 2014).

In particular, the negative emotional experiences can lead to the loss of the interest, the feeling of worthlessness, anxiety, unhappiness, embarrassment, irritability, anger and anger as well as being easily tired and slowed down in their movements. It also can cause difficulties in making decisions, feeling less energetic and powerless. (Uskan, 2014; Duygu Durum Bozuklukları, 2009). According to results of this study, having positive emotions of sudents during teaching process teaching process they have been using on their tablet computers, showing that the material used can be more effective and motivating. Like other technological devices, tablet has been shown to be effective in the education of individuals who need special education, but there have been no studies showing how students are emotionally involved in the use of these devices. From this point of view, it can be said that the teaching activities with these devices can have a positive effect on the students' both achievement and motivation.Moreover, the results of the study put forward that the number of educational software developed for use in tablet cis inadequate in our country, it takes the necessary steps in terms of tablet computer-assisted education in which such positive results are obtained and suggests to design various teaching environments.

5. CONCLUSION

In this study, the process has been only performed with the specified software. In the new researches, it is important to put forward the emotional analysis and motivation of students as well as their success with different educational softwares which are also important in terms of using technology in the field of special education. Thus, this shows how much fun and enthusiasm students have when using these devices, and the studies to be done in this direction can be enhanced. The best indicator of happiness being a positive feeling is smile. Happiness can be observed from mouth and eye area as a facial expression. Happiness does not cause significant changes in brow and forehead area. Happy people are more cautious and have a better ability to concentrate. (Konrad ve Hendl, 2001; Schober, 1999). According to analysis results, it has been seen that the students are happy in the teaching process with tablet.

Sadness is an emotional state that causes severe depression in the individual when suffering grief, cheerlessness, gloom, melancholy, self-pity, loneliness, boredom, hopelessness and pathology. Sadness makes energy lower in the individual, slows down metabolism as it gets deeper and closer to depression, causing it to drift away from things that are enjoyed in

life. (Goleman, 2005). Symptoms of sadness are fatigue, loss of appetite, insomnia, and inability to concentrate. (Konrad ve Hendl, 2001; Schober, 1999). It is obvious what are the negative consequences of the students being sad in the process and how badly they can be affected both in terms of achievement and motivation. As s result, students' happiness and positive fellings during the process of using tablet computers in education demonstrate the necessity of increasing the educational use of this kind of tools.

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Conflict of interests

The authors declare no conflict of interest.

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EDUCATION PROCESS VISUALIZATION IN METACOGNITION DEVELOPMENT AND SUSTAINABILITY

Dr. Elena Aleksandrovna Makarova, Taganrog Institute of Management and Economics, Taganrog, Russian Federation
E-mail: helen_makarova@mail.ru
Dr. Elena Lvovna Makarova, Southern Federal University, Russian Federation
E-mail: elmakarova@sfedu.ru
Dr. Anna Mikhailovna Varaksa, Novosibirsk State University of Economics and Management, Russian Federation
E-mail: anny.v@rambler.ru

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ABSTRACT

The article reflects on the role of visualization in education. Modern society is characterized by rapid growth of information that people have to process in order to maintain progress and sustainability in science and development of education. The amount of information is growing so quickly that a person is no longer able to perceive actual data about the outside world and process it using traditional methods. The basis of the "image of the world" contains not only concepts, but the semantic images created with the help of visual thinking. In our study we assume that students are quite limited in their knowledge about cognitive phenomena or in their meta-cognition and do relatively little monitoring of their own memory, comprehension, and other cognitive enterprises. But we also assume that every student is potentially capable of meta-cognition, which is thinking of how better to perform cognitive actions and to be aware of how to learn. Developing meta-cognitive awareness is important because it helps learners become more efficacious and more autonomous. For many of them it can be identified as the most effective way of acquiring knowledge. Visualizing the very process of learning can help see how well it is going. Schema theory offers different ways of using schemas, especially in education. So far, there have been researches on schema as a tool for particular skills such as better comprehension, memorizing and retrieval of the knowledge received. It means students can use schemas to better understand the process of learning and skills acquired.

1. INTRODUCTION

Visualization involves the creation of real or unreal images in the mind's eye. It usually refers to visual images, sounds, movements, touch, taste and smell, in general, all the images that can be perceived by human senses or imagined by human mind.

Corresponding Author
Dr. Elena Aleksandrovna Makarova, Taganrog Institute of Management and Economics, Taganrog
E-mail: helen_makarova@mail.ru

In Piaget's opinion, there is a possibility of the development of perception as a gradual activity for establishing relations between individual details of the sensory field. He shows that the child in his young age does not yet have a genuine perception of objects and space; he does not even differentiate objects and himself in the world without distinguishing the changes in the type of objects caused by his own movements, from changes that have arisen in result of the child's actions or objects movements. The constant character of the object appears as a consequence of the spatial field organization, in other words, the internal scheme of the immediate environment, of the world around, through which the child is able to anticipate the consequences of his own movements in the environment. Spa-

tial field, in turn, is formed in connection with the coordination of the child's movements. Thus, the basis of perception is the internalized sensor-motor schemes of locomotion and manipulation of objects. As J. Piaget puts it, "knowledge of the world is not discovered, but is created as an image". "The image is a subjective picture of the world or its fragments, the subjective representation of the objects of the external world, conditioned both by sensually perceived signs and hypothetical constructs" (Piaget, 1986). The image is a subjective phenomenon that arises as a result of objectively practical, sensory-perceptual, intellectual activity, which is a holistic integral reflection of reality, in which the main perceptual categories are space, movement, color, form, texture, sounds, etc. In the information sense, the image is an unusually capacious form of representation of the surrounding reality. Images are multidimensional, multi-categorical and poly-modal.

In the age of accelerated technological progress and digital gadgets the incoming information comes in the amounts that are impossible to process, exchange and memorize using traditional methods of education. Visualization is a holistic way to deal with the image of the world not divided into separate details and ideas, but with holistic visual images created via visual thinking and visual operations producing images easy to perceive and memorize. Visual images can range from detail graphic representations (such as pictures and photographs) to abstract schemes, diagrams, graphs and mind maps. Besides, visualization is connected with emotional sphere of a person: in order to be memorized visual images should be positive, not only perception of the reality around, but also visual thinking should become positive emotional experience.

Visually presented information can be read and interpreted as well as any verbal text. Modern students would not pay attention to boring, difficult to understand verbal texts, but rather be attracted by colored structural schemes and diagrams. After comparing different teaching technologies it is concluded that visual representation is more effective because of their structured and systematized form that makes it easy to teach and to learn. Such structures are kept in long-term memory and easily reached and actualized if necessary, thus contributing to memorizing a lot of information. Visualization in teaching is based on the special properties of mental images as objects of knowledge, expresses the degree of accessibility and clarity of these images for the subject. It relies on one of the most important principles of learning (the principle of clarity) (Makarova, 2016).

Mental images, often called "visualization or quasi-perceptual experience", resemble real perceptual experience, sometimes with the same emotional attitude, but arise in the absence of an appropriate perceptual stimulus. They are associated not with imagination and fantasy, but with cognitive functions such as memory, perception, reflection and thinking. Although mental images arise in all sensory modes, most works on philosophy, psychology and pedagogy are focused only on visual images leaving audio and tactile modes behind. Since the concept is more like a scheme, the human psyche is not an image, but a sense of the world created by the imagination of the subject and includes the person himself, other people, the spatial environment and the temporal sequence of events. Being the basis for the implementation of practical actions to master the external world, the image is also determined by the nature of these actions, during which the original image is modified, increasingly satisfying practical needs. In its intellectual development, the subject proceeds from a search of semantic, emotionally saturated and expressive action to the construction of the meaning, containing the prerequisites for modeling the world in its semantic perspective and semantic integrity. Semantic integrity is that ideal environment, the mental space within which all objects, qualities and properties of the material world are depicted from a certain point of view thus acquiring a certain meaning.

In this study trying to connect visualization to metacognition, we suppose that students mostly are not aware of many cognitive phenomena they encounter in the process of study, so they cannot monitor their advance in learning and success or control their comprehension and memorizing. In order to make students' learning more conscious we suggest to use visual tools for regulation of cognition, study progress and results of learning. This is how students get knowledge about the way they should plan their cognitive activities, implement metacognitive strategies into their learning process, comprehend, memorize, monitor and correct errors, assess progress and also evaluate their results. It means they stop being passive recipients of knowledge, but start to actively participate in planning, management and evaluation of knowledge acquisition. Aware students can understand what they are doing and how to better achieve de-

sired result thus directly improving their performance.

Visual reality is presented as an informational construct, which must be 'readable' and can be interpreted in the same way as any verbal text. Visual reality has ceased to be perceived as a secondary or subordinate dimension; thinking and imagination collide in the semantic form. As a source for learning, visual material is unique in its cognitive potential and the multilevel information encoded in it. Comparative analysis of different ways of presenting information leads to conclusion that visual methods are more effective, since they present information in a more structured and systematized form, making it easy to comprehend and to memorize. Graphic representation helps visualize and understand the structure and sequence of information. With increased motivation to study, thinking becomes more flexible, so a student can get rid of typical stereotypes, turning dogmatic thinking into a critical and creative one. Images, representations and concepts unite in the meaning, giving way to logical thinking.

Visual thinking is thinking through visual operations, and so it allows using human ability to see and understand images, then to analyze data received. Accordingly, the task of visualization is the transformation of huge arrays of information into graphic images that are comprehensible to human perception when connected by a single meaning. Visual images can range from detailed graphic images to abstract structures, graphs, charts, diagrams, etc. This is how visualization is connected to meta-cognition which is "one's stored knowledge or beliefs about oneself and others as cognitive agents, about tasks, about actions or strategies, and about how all these interact to affect the outcomes of any sort of intellectual enterprise" (Flavell, 1979).

Visualization is a way of fixing and sharing information, not only complementary, but also serving as an alternative to undividedly prevailing verbal and written communication. At the present time, a 'copying of cultural environment' is under way, in which all the achievements of mankind, fully reflected in the written texts before, receive an audiovisual expression. Visualization in comparison with verbal communication is psychologically more capacious and easy, socially - more massive and accessible, but less stable and unidirectional way of structuring knowledge. "Meaningful teaching and learning experiences should provide equitable, authentic learning opportunities. Today's increasingly diverse students seek alternative ways to complete tasks, often utilizing technology. Immersive learning experiences can provide real-life contexts for training and deeper conceptual thinking. …The use of immersive visualization should support equity, engagement and learning" (Schaffer, 2017). These features of visualization form its socio-cultural and cognitive functions. In the communicative function, visualization quickly becomes the leading medium of mass communication, assuming the associated social and regulatory duties. Throughout the world, there is a gradual shift from the verbal component to the visual: the visual images have such an influence that people are becoming less able to perceive the printed word; they cannot concentrate their attention on the verbal text for a long period of time. We can say that visualization penetrates into all spheres of human life and activity.

With the methodically competent use of visualization methods, students can not only plan their own education process, evaluating results and monitoring progress, but also make transition to higher levels of cognitive activity, mastering the subject content as well. In the process of implementation of visualization methods in teaching, it is necessary to take into account the psychological features of the cognitive mechanisms activity. Meta-cognition helps students to become aware of the correlation of the word and image in the visual material, of the very concept "meta-cognition", to properly organize and plan their learning, to evaluation results and progress assessment. Meta-cognition has been defined by Schraw and Dennison as the "ability to reflect on, understand, and control one's learning" (Schraw and Dennison 1994). As Flavell put it, "meta-cognitive experiences are conscious cognitive or affective experiences that occur during the enterprise and concern any aspect of it—often, how well it is going. Research is needed to describe and explain spontaneous developmental acquisitions in this area and find effective ways of teaching meta-cognitive knowledge and cognitive monitoring skills" (Flavell, 1979).

Visual methods in teaching allow solving various developmental problems: the development of observation, visual memory, imaginative thinking, also decision making abilities. The visual image creates the prerequisites for the development of left- and right-hemispheric mental processes. Text thinking is performed by the left hemisphere, which is associated with rational behavior. Visual thinking is carried out by the right hemisphere,

which is closer to the irrational thinking. But both hemispheres contribute to meta-cognitive thinking development and to successful learning and practical application of knowledge to problem solution and decision making processes (see Fig. 1).

Initially studied for its development in children (Baker and Brown 1984; Flavell, 1979), "focusing on both the fascinating nature of children's thinking and the excitement and change in this area, using an integrated topical approach", the studies explored the developmental aspects of social cognition, perception, memory, and language. Theoretically balanced, they considered the full spectrum of approaches-from Piaget's developmental stages, to information-processing (including connectionism), dynamic systems, contextual, theory-change, neo-Piagetian, evolutionary, neuroscience, and constraint approaches. Later, researchers began to look at how experts display meta-cognitive thinking and how, then, these thought processes can be taught to novices to improve their learning (Abdellah, 2015; Jiang, Lin, Liang, 2016; Saenz, Geraci, Miller, Tirso, 2017).

2. MATERIALS AND METHODS

This study investigated the effect of visualization on meta-cognition and academic performance among students of Taganrog Institute of Management and Economics using a mixed method approach. It also explored differences in meta-cognition between second language writing and second-language reading by students of different majors in law, economics, and management. A total of 238 college students studying English as a Second Language participated in the study. Quantitative data were collected from the Meta-cognitive Awareness Inventory, aptitude tests, achievement tests in ESL, problem solving assignments and schemas presentation and analysis. Qualitative data were collected using questionnaires and interviews. The mixed-method study consisted of a test approach interviews and students' individual schemas representing significant differences in meta-cognition at the beginning and at the end of experimental course of ESL. Block diagrams, graph schemes, logical-semantic models - visual representations of knowledge are the equivalents of cognition and together they constitute the so-called visual plan of meta-cognitive thinking. The main role here is played by students' intellectual resources, formed as mental structures.

Reading was based on the professional thesaurus in different disciplines; comprehension was checked with the help of multiple choice tests. In order to monitor students' problem solving abilities case method was used.

Quantitative data were analyzed using statistics and represented in charts and diagrams. Qualitative data were analyzed, categorized and also visually displayed. Although 52% of female and 48% of male students took part in experimental learning and outperformed male students on problem solving tests, gender effects were not noted in the research. At the beginning of the experiment highly efficacious students did better on the tests and performed more successfully on problem solving assignments than less efficacious students.

For the goals of the experiment writing of the academic essay was chosen as this writing experience elicited greater meta-cognition than short story writing and became more professionally useful for college students of different majors. Besides writing an essay is a comparatively new kind of writing for Russian students demanding less emotional, but more professionally creative writing strategies to become successful. In the experiment students had to plan and foster their meta-cognition and awareness, monitor the writing process, be aware of academic word choice, assess quality of writing, consider grammar and style, follow instructions to comply with the task requirements. Meta-cognitive strategies help provide psychologically comfortable teaching and learning environment and sustainable development of ESL reading and listening skills, also promoting writing skills and problem solving decision making abilities.

3. RESULTS

This study aims to investigate the relationship between visualization and meta-cognitive strategies the integration of which can lead to development of a trainee's reflective thinking and meta-cognition skills. The study was applied on 238 students of Taganrog Institute of Management and Economics majoring in law, economics and management. Schema theory was applied in English as a Second Language classes as English is included in all students' schedules. There are equal requirements as to grammar, vocabulary, text and listening comprehension, so the emphasis of the

study is put on meta-cognition development as well as knowledge management skills, good planning skills, reflective thinking and results evaluation.

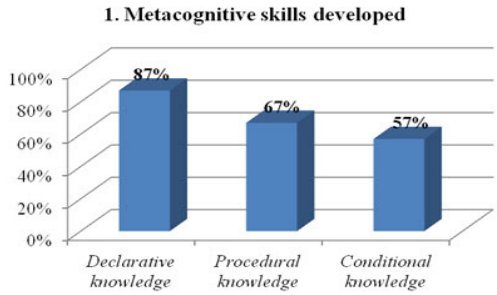
"A person's ability to control a wide variety of cognitive enterprises depends on the actions and interactions among these components" (Mevarech and Karmarski, 1997).

In the course of experimental leaning Meta-cognitive Awareness Inventory (Schraw and Dennison 1994) for a quick assessment of meta-cognitive skills, planning, information management, monitoring, debugging, assessment or evaluation strategies was administered twice to the same groups of students at the beginning and at the end of the course of studies. This inventory measures different components of meta-cognition (e.g. procedural, declarative, and conditional knowledge of cognition; and aspects of regulation of cognition, like planning, monitoring, debugging, etc.), also the levels of students' reflective thinking (feeling - description - analysis - action plan - evaluation - conclusion) can be identified. According to the Inventory we split meta-cognition into two categories: knowledge and regulation, relating both to strengths of meta-cognition and performance results. Meta-cognitively aware students were able to self-assess their abilities and to plan their learning activities accordingly to implement them into problem solution/decision making.

Comparing learning to research in experimental course of studies, we could see that students think meta-cognitively all the time, reflecting on their current understanding of information, on the research questions posed, and their thinking changing with new information acquisition. Showing students how to think procedurally in solving problems\decision making teachers demonstrate and students learn where to start, what to do first and next, how to check and evaluate the correctness of their solution, how to know what is done and whether it is done right—it is one example of meta-cognitive modeling. As it came the results before and after meta-cognitive skills development show clear differences in the students' grades on the test and their performance in class.

Table 1. Meta-cognition awareness development (at the beginning of the experimental learning)

1. Meta-cognitive skills developed	Percent
Declarative knowledge	87%
Procedural knowledge	67%
Conditional knowledge	57%
2. Regulation of cognition	
Planning	89%
Information management strategies	54%
Comprehension monitoring	52%
Debugging strategies	27%
Control	45%
Evaluation	24%



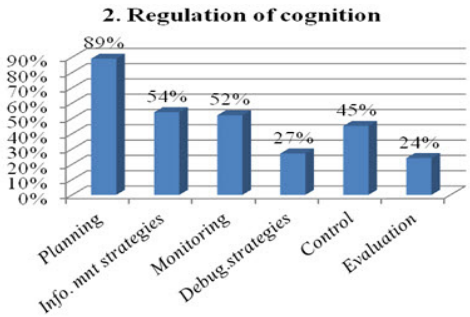


Figure 1. Meta-cognition awareness development (at the beginning of the experimental learning)

Table 2. Meta-cognition awareness development (at the end of the experimental learning)

1. Meta-cognitive skills developed	Percent
Declarative knowledge	92%
Procedural knowledge	78%
Conditional knowledge	59%
2. Regulation of cognition	
Planning	90%
Information management strategies	48%
Comprehension monitoring	69%
Debugging strategies	54%
Evaluation	35%

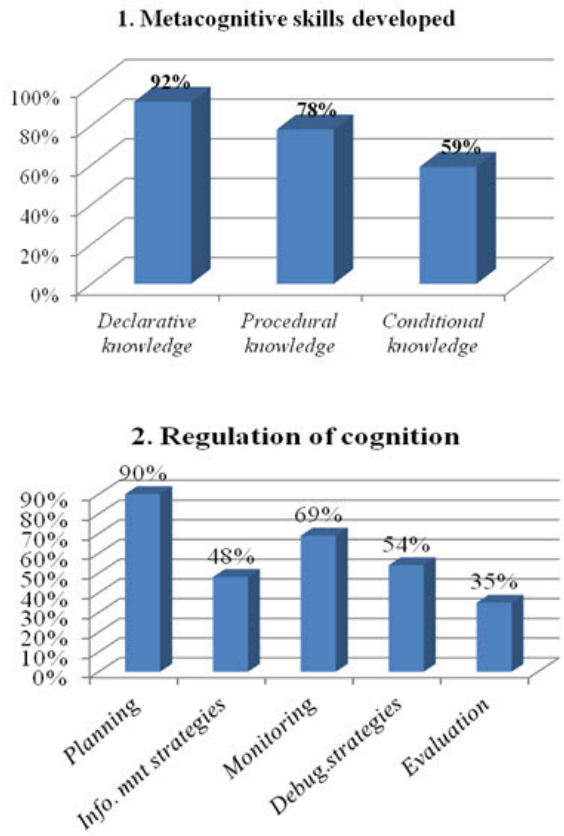


Figure 2. Meta-cognition awareness development (at the end of the experimental learning)

According to the results of the experiment, a statistical hypothesis was put forward about the significance of the discrepancies between the initial and final results of the experiment, the reliability of the results is confirmed by Fisher's angular transformation (φ*; P).

In general, the experimental groups differed significantly in the results of the main assessments, which is indicative of the effectiveness of the experimental work and the chosen author's strategy of the organization of meta-cognition awareness development technology.

In Section 1, students' meta-cognitive skills development is demonstrated. With declarative knowledge of about 90% students usually obtain knowledge via discussions, presentations, demonstrations, but need to learn how to process knowledge for practical application or to use critical thinking to assess and evaluate their results.

With procedural knowledge of about 70% students understand the very process of learning as well as the possibility of knowledge practical application in various situations, so they obtain knowledge via cooperative learning, team-work, problem solving activities and discovery.

With conditional knowledge of about 60% students obtain knowledge via problem situation modeling, they know when, why and how to use meta-cognitive strategies.

In section 2, Regulation of cognition is displayed. With planning of about 90% students plan their cognitive activity, consider several ways to solve a problem and choose the best one.

With information management strategies of about 50% students use selective focusing to choose among their learning skills, organize and sequence them in order to process information more efficiently, summarize and elaborate details of the problem to be solved or decision to be made.

With comprehension monitoring of about 70% students use self-assessment strategies to check their comprehension, make sure they understand concepts, their relations and options when solving a problem or making a decision.

With debugging strategies of about 60% students evaluate their learning and learning strategies used in order to find and correct errors in comprehension and performance.

With evaluation of about 30-35% students analyze every learning episode and meta-cognitive strategy effectiveness, assess their performance when solving a problem and make a decision.

The first stage of the experiment included studies of students' cognitive control. At this stage, students' own knowledge and thinking processes and how they can control both of them are studied. Within this stage the accuracy of the prediction, effort and the distribution of attention are assessed. Oral reports of the students during this stage allowed determining what knowledge an individual derived from memory for solving the problem.

The second stage included studies of self-regulation of cognition (thinking and reflection). Usually, problem solution\decision making requires knowledge transfer and strategy choice. In general the procedure is choosing strategies for performing a specific task. Once students demonstrate an understanding of the strategy, they are given a task, different from the first, but structurally equivalent to it. So students need knowledge and strategies transfer, but have to decide whether to use this strategy as it is or change it according to the new task. Another possibility is to abandon it in favor of another strategy that could be used to solve a new problem.

The third stage included control and regulatory studies in which students control available information in the process of think-

ing and then use this information to regulate other learning processes. Reflection is also included in this stage.

Finally, the fourth stage of the metacognitive study included practical application of information obtained and strategies mastered to different problem solutions or decision making. Students answered a very important and fundamental question – whether or not their learning outcomes improved with the help of meta-cognitive processes.

Metacognitive processes include planning, strategy choice, conscious control over the learning process, mistakes correction, analysis of cognitive strategy efficiency, and change of cognitive behavior when necessary. All of these can be packed into 4 structures; goal setting, its achievement support, schedule compilation and results control.

Experimental program was aimed at students' self-regulation of their cognitive activity at three levels: cognitive, metacognitive and intentional. Cognitive experience was based on mental structure providing storage, ordering and transformation of existing knowledge. Metacognitive experience was aimed at finding a suitable niche for the new knowledge in already existing blocks of information, providing control over individual intellectual resources, thus regulating intellectual activity.

Intellectual activity regulation requires:

1. ability to plan cognitive activity,
2. ability to predict results and their consequences,
3. ability to assess results of cognitive activity,
4. ability to choose and modify cognitive strategies.

In our experiment, qualitative data were collected as students went through their cognitive activity. The results of students' metacognitive activity: goal setting, its achievement support, schedule compilation and results control were checked. The given processes require reflection, so the Berezhnova L.N. test "Self-development reflection" was used to define the level of self-development, self-evaluation of achievements and also assessment of potential and abilities for future development.

Also Achievement Tests and Aptitude Tests were used to measure students' development and results of their learning. Aptitude Test contained Numerical Reasoning, Verbal Reasoning, Diagrammic Reasoning and Situational Judgment sections.

4. DISCUSSIONS

Despite the increasing use of didactic means, which involve combining information impact on various human senses and on the ways of presentation of educational information, the leading type of perception of information when working with various teaching aids is visual, which involves the development of both traditionally visual and innovative learning means and techniques, allowing to activate the work of vision in the learning process. Gradually, the need for innovation becomes more and more obvious, and requires an early understanding. We need new didactic principles based on information technology, and a new didactics, based on the formation of meaning patterns for creating the "meta-cognitive prompt" of the trainee. Using the enormous capabilities of the visual analyzer when visualizing educational information requires taking into account the laws of visual perception, the competent use of visual methods in teaching and the role of meta-cognition in developing conscious and aware learning. Therefore, with special structuring, coding and presentation of the material, with the help of visualization tools and meta-cognitive strategies, large amounts of information can be transmitted in a collapsed form, and cognitive mechanisms that supplement the verbal channel of information entry can be updated. The following structured information matrixes are a new generation of learning materials, in which the image and text are combined organically, mutually reinforcing each other. The main idea of such materials is to convey the idea in the unity of the image and the text, proceeding from the thesis that the figurative and verbal components of thinking are much stronger in unity.

The creation of meta-cognitive schemas should be the person's cognitive task planning, in which, along with the sensation, memory, thinking, imagination, personal meaning, meta-cognitive strategies participate as well. Any external reality is reflected in the framework of some model in the inner world of the person, created with the help of specific activity, expressed in the process of perception. All the information perceived from the outside is received first in the form of separate primary sensations, but everything that he sees, hears, feels, is refracted through the prism of comprehension and awareness, and only then becomes a mental construct, an image of reality which can be interiorized (see Table 3).

Table 3. Self-assessment guide promot-ing students' meta-cognition

Activity	Planning	Monitoring	Evaluation
Brainstorming session	What are concepts involved in the problem?	Do I need all the words on a brainstorming list?	Is my focusing on the problem accurate?
Problem situation modeling	How does it relate to what I already know?	Is the model facilitating problem solution\decision making?	Is this material personally relevant?
Discussion	What else can I do to improve problem solution?	Do I need to change my learning strategies?	Is this approach efficient?
Reflective thinking	What are my assumptions?	What is impeding learning and problem solution?	What mistakes have I made? How do they affect problem solution?
Essay writing	What parts do I need in my essay?	Am I describing my learning activities in full?	Are the learning strategies facilitating learning?

There is close connection between external and internal means helping to explore and understand both the internal and external worlds of the individual. Any external means can be fixed in the form of images, models, descriptions, or can be internalized by actively reflecting them in person's consciousness. The internalized external means include many additional elements and connections between them, conditioned by knowledge, experience, features of the psyche and actualized mental processes of a student. The model of any external objects and activities can be represented as some internal images and schemas, the study of which serves as a means for obtaining knowledge in a certain sphere. The modeling method is based on visualization intended to foster meta-cognition awareness and to enhance students' learning. Visualization of educational content and meta-cognitive strategies should be adopted by a student and interiorized, which means presentation, structuring and designing educational knowledge in the information content of static (paper) or dynamic (multimedia) teaching and leaning aids.

Repeated testing with visualization support results in significantly greater retention of information taught in English language class. Testing in our study is considered as indispensable assessment device for its potential impact on students' self-evaluation (see Table 4).

Table 4. Repeated testing with visualization support results

Knowledge and regulation	Performance	
	Before	After
Vocabulary	22%	63%
Grammar	18%	44%
Listening compre-hension	19%	23%
Reading compre-hension	49%	74%
Writing	30%	73%

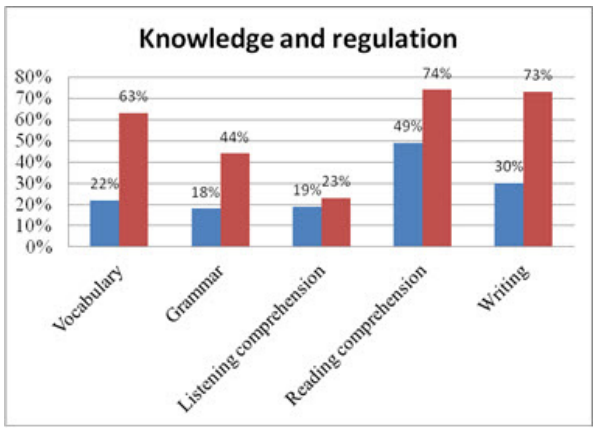


Figure 3. Repeated testing with visualization support results

In the study subjects of different majors were offered English language tests similar in form, but referring to different spheres of knowledge (Law, Economics, Management). The assumption was that performance won't depend on the nature of information, but on the meta-cognitive skills developed prior to test administering. Results of approbation proved our assumption, that is meta-cognitive abilities depend greatly on students' visualization of the learning process and on the type of instruction, providing intellectual development of students.

When the students moved along the schema and practiced problem situation modeling, decision evaluation, knowledge transfer and different levels of reflective thinking by writing brief essay of these reflections and discussed them through brain-storming sessions, it definitely had a direct impact on meta-cognition awareness development providing upgrade to the next education level. Meta-cognitive awareness also helps to promote knowledge transfer to other spheres of students' learning activities.

5. CONCLUSIONS

When visualizing educational content and ways to comprehend and memorize it, it is necessary to take into account different personality traits, types of a trainee's cognitive ability, different types of leading sensory modalities, and undoubtedly abilities to be meta-cognitive about their learning. Visual methods in teaching, relying on the psychological characteristics of trainees, allow solving various developmental problems: the development of observation, visual memory, imaginative thinking, creativity, awareness, etc.

The thinking process with the use of meta-cognitive strategies visualization in training can also be strengthened by expanding the activated types of thinking. Along with the abstract-logical, visualization of information allows to include mechanisms of visual-efficient, figurative, associative thinking, to strengthen the activity of imagination (reproductive and creative) (Makarova, Abakumova, Ermakov, 2006).

Scientific knowledge can become an integral part of mental content of a trainee only if it is internalized through the polymodal components of the cognitive mechanism - through the trainee's personal meanings. Only in this case, a trainee can comprehend not only sensibly perceived objects, but also things that are not observable in the actual perceptual space, but exit in general phenomenological theory.

This approach determines the view on thinking (meta-cognitive thinking), as the internal action, the activity of the mind, thanks to which it becomes possible to comprehend the connections and relations between the objects studied within the learning content in the modern educational space.

Introduction of meta-cognitive strategies into a trainee's learning activities is determined by the modern trends in education as the most acceptable and effective way of information perception, comprehension, processing and memorizing. In the practice of teaching, several areas of visualization of educational content and meta-cognitive strategies have been identified, which are examples of the organization of educational activities:

• presentation of new information as illustrations, in the form of diagrams, tables, graphs, drawings, graphic images, etc.;

• consolidation of the information in the form of text and graphic images, as well as systematization of computer graphic information;

• planning of learning activities, pacing the progress, anticipating the results in acquiring knowledge;

• preparing trainees for the preservation of information in the forms effective for perception, comprehension and memorizing;

• interpretation of information, transformation of educational content into schemes and cognitive constructs convenient for memorizing and retrievable if necessary.

With the help of visualization tools, meta-cognitive experience of a trainee can be used to manage educational activities, self-regulation and self-assessment in learning. Information processing using visual tools leads to certain mental constructs appearance in the learner's mind, they can be of different degrees of generalization: from detailed pictures to schemes, graphs, maps, diagrams, individual symbols, abstract signs. But the most important thing is that the new educational environment creates fundamentally new roles for the teacher (facilitator) and the learner (the independent researcher), and a new relationship between them.

Unfortunately, meta-cognitive awareness toward one's learning does not appear automatically or easily transfer from a teacher? It has to be taught. Student's self-analysis about learning and thinking could include: What assumptions do I hold about the problem and its solution? Do I have proof for those assumptions? Why do I make the decisions and how do I come up with them? What do I know about learning process? What would I like to learn? What am I confused about? These analyses can also become more specific to particular details, ranging from an individual class session to the scope of an entire course of studies.

The most general provisions of the concept of students' meta-cognition are: 1) knowledge of thinking process, motivational sphere and emotional states; 2) the ability to consciously and deliberately control and regulate their knowledge, the processes of thinking, of motivational and emotional states.

In the conclusion, we would like to emphasize that it is premature to consider that visualization (schemes, frames, gestalts and other images) can completely replace the verbal method of presenting information. However, visualization of the information content, giving it personal meaning and sensual experience, will allow to direct the thought in the required direction, pay attention to meta-cognitive awareness essential for understanding concepts and knowledge transfer, and most importantly, the integration of visual and ver-

bal ways of presenting information will help students to comprehend the meaning of the reality around them and to build their own 'image of the world' adequate to this reality.

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Conflict of interests

Authors declare no conflict of interest.

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THE IMPACT OF USING SOCIAL MEDIA ON ACADEMIC ACHIEVEMENT AND ATTITUDES OF PROSPECTIVE TEACHERS

Dr. Murat Tezer, Near East University, Atatürk Education Faculty, North Cyprus
Email: murat.tezer@neu.edu.tr
M.Sc. Ata Taşpolat, Near East University, Atatürk Education Faculty, North Cyprus
Email: atataspolat@gmail.com
M.Sc. Ömer Sami Kaya, Near East University, Atatürk Education Faculty, North Cyprus
Email: omer@alfamcyprus.com
M.Sc. Hamza Fatih Sapanca, Near East University, Atatürk Education Faculty, North Cyprus
Email: fatihsapanca@gmail.com

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ABSTRACT

The current study was conducted to investigate the impact of using social media and internet on the academic achievement of prospective teachers. Focus group of the research could be expressed as 204 prospective teachers that were studying in 2016-2017 fall semesters. To collect data, Attitudes Towards to Social Media Scale was employed. Result of the study revealed that, prospective teachers' attitudes towards to social media had an influence on academic achievement. Furthermore, it could be stressed that prospective teachers with lower attitudes towards to social media were more likely to have lower academic success when compared with the prospective teachers with higher attitudes towards to social media. In addition to these, results of the current study also expressed that prospective teachers with social media accounts were achieved better grades when compared with the prospective teachers who did not have any social media account. Lastly, it could be indicated that prospective teachers' attitudes towards to social media was at a moderate level.

1. INTRODUCTION

No doubt that, we are experiencing with technological developments which are influencing our daily life. Beside of this, social media tools are becoming vital for society especially for the students. (Subrahmanyam et al., 2008). Kaplan and Haenlein (2010) have identified social media as a web-based application groups that are shaped by the technological and ideological characteristics of Web 2.0 which provide users an opportunity to create and modify the content. Moreover, the widespread use of social media tools has also revolutionized habits of society such as reading, research, shopping and communication. Furthermore, high interaction in social media has triggered cooperativeness at a working environment and the usefulness of it within the education and training process.

It could be discussed that advancements and popularization of computers and mobile phones have led the community to spend more time on the internet and social media. Camila, İbrahim and Dalhatu (2013) indicated that social media has become one of the most influential communication tool which could be effectively used on teaching process. Moreover, Bedir and Gülcü (2016) have argued that teachers and students could effectively discuss and exchange their course related ideas via social media. In addition to these, it is believed that multi-functionality of social media encourages students to actively engage with group works, discuss and share more easily

Corresponding Author
Dr. Murat Tezer, Near East University, Atatürk Education Faculty, North Cyprus
Email: murat.tezer@neu.edu.tr

among themselves about what they have learnt and communicate via multiple chat rooms.

1.1. Significance of the study

It could be indicated that characteristics of the society are rapidly changing with the transformation from industrial epoch to information age which facilitates the generation of updated information. Thus information which people have elicited by traditional learning context could be characterized as insufficient.

Needless to mention that, in today's dynamic world, people are more likely to focus more on continuous education to update and advance their knowledge by actively concentrating on researching for having a better life. Therefore, people should intensively engage with discussions, sharing and exchanging ideas, deal with group works to deepen their knowledge. Furthermore, it might be argued that all these above-mentioned activities to advance learning could be provided through social media which is also enriched with well-designed audio and visual communication options for promoting virtual learning environment to fuel boundless learning.

Aside from these, this study could be considered significant in several ways. First, since the present literature fails to provide sufficient research on the impact of using social media on academic achievement and attitudes of prospective teachers in TRNC. Thus the findings of this study are expected to expand the understanding of the role of using social media for educational purposes. Secondly, the current study may be considered as one of the initial study to add scholarly research and literature about the impact of using social media on academic achievement and attitudes of prospective teachers

1.2. Previous studies

Alwagait et al. (2015) have conducted a study to test the impact of using social media on academic success on 108 students in Saudi Arabia. Study revealed that there is no linear relationship among students' weekly social media use and their grade point average. Moreover, students also indicated that time management has negatively influenced their achievement.

Mawdsley (2015) conducted a study to measure students' perceptions of social media in education, to consider how social media may be incorporated as a complementary learning tool. Focus group of the study could be indicated as undergraduate pharmacy students that are studying in University of Manchester. Study revealed that 92 % respondents reported that they are actively using social media; nonetheless, 57 % favours the University virtual learning environment in preference to social media for learning. Study also stressed respondents have reservations regarding online professionalism, and doubt the place of social media in education which includes the teacher.

Sarsar et al. (2015) conducted a single case study on 18 doctoral students at Ege University during Fall Semester in 2012-2013 to determine their opinions regarding usage of social media tools on teaching and learning process. The results outlined that all students met their expectations during the course and they had positive attitude towards using Facebook. However, only the half of students thought that Blogger is a useful tool for the course activities.

Bulut et al. (2016) have conducted a research to investigate general attitudes of students towards the use of social media with the light of some socio demographic variables such as their class, gender, academic background of their parents, socio-economic status, memberships regarding social media tools, social media environments and lastly tools which used for connecting social media accounts. Study indicated that groups were statistically different in terms of frequency of using social media and time spent in social media environments. Moreover, research also revealed that students' attitudes towards using social media were high and positive.

1.3. Aim of the study

The aim of the current study could be stated as to determine the attitudes of prospective teacher towards to usage of social media in education and to investigate their attitudes towards to usage of social media in education with the light of various variables and lastly measuring the impact of using social media and internet on academic achievement.

1.4. Research questions

Research questions of the current study could be mentioned by the following:

In context of academic achievement of prospective teachers is there any statistical significance with

- Having a social media account,
- The time spent on the internet,
- The purpose and frequency of using social media
- The most frequently used social media tools

In context of prospective teachers' attitudes towards to social media is there any statistical significance with

- Grade point averages,
- Their departments,
- The most widely used social media tools,
- The purpose and frequency of using social media.

2. MATERIALS AND METHODS

It could be argued that current study aims to investigate the impact of using social media on academic success and as well as analyse the attitudes of students towards the usage of social media in education. Moreover, it may be mentioned that relational survey model was employed as a research method for the study.

2.1. Participants

Prospective teachers at private university who are studying in faculty of education during 2016-2017 fall semesters constitute the participants of the study in North Cyprus. Moreover, the participants of the study consist of 204 participants that randomly selected among 1800 prospective teachers through simple random sampling method.

2.2. Data collection tool

Moreover," Attitudes Towards to Social Media Scale", which was proposed by Bedir and Gülcü (2016), was employed as a data collection tool for the current study. The questionnaire consists of 3 parts. On the first part of the questionnaire, the questions are designed to address socio-demographic profile and the grade point averages of the respondents whereas on the second part, 8 questions are administered to determine respondents' habits and frequency of using in internet and social media tools of the students, and in the last part attitudes towards social media scale is appointed in the forms of five-point Likert type and 17 items. The Cronbach alpha reliability coefficient of the scale was 0.839.

3. RESULTS

It could be stressed that of those 204 respondents 46.1 % were male while 3.95 % were female. Moreover, it might be discussed that most of the respondents were studying at Guidance and Psychological Counselling, preschool teaching and special education departments. Furthermore, it might be indicated 33.8 % of the respondents had at least 3.00 grade point average. Lastly, it could be stated that majority of the respondents had social media account (Table 1).

Table 1. Demographic profile of the participants

Variables	Group	f	%
Variables	Male	94	46.1
	Female	110	53.9
	Total	204	100.0
Departments	Computer Education and Instructional Technology	16	7.8
	Guidance and Psychological Counselling	34	16.7
	Special Education	28	13.7
	Music Teaching	19	9.3
	Elementary School Mathematics Teacher Education	19	9.3
	Department of Pre-School Teaching	28	13.7
	Elementary School Teaching Department	19	9.3
	Social Sciences Teacher Education	18	8.8
	Turkish Language Teaching	23	11.3
	Total	204	100
Grade Point Average	Less than 2.00	18	8.8
	Between 2.00-3.00	117	57.4
	At least 3.00	69	33.8
	Total	204	100
Having Social Media Account	Yes	177	86.8
	No	26	12.7
	Total	203	100

Descriptive findings regarding the attitudes and grade point averages of prospective teachers were illustrated by Table 2. As seen from the table above, mean scores for attitude and grade point average could be indicated as 3.59 and 2.79 respectively.

Table 2: Descriptive findings of prospective teachers' attitudes and grade point averages

	N	$\bar{X}$	Std.
Attitude	204	3.59	.058
Grade Point Average	204	2.79	.039

Table 3 exhibits the findings of parametric independent samples t test which related with the impact of having social media account on grade point average. Findings revealed that two groups were statistically significant ($t_{(201)}$=2.325, p<.05). In other words, prospective teachers who have social media account tend to achieve higher academic achievement ($\bar{X}$=2.82) when compared with the grade point averages of prospective teachers who do not have social media account ($\bar{X}$=2.5515).

Table 3. Impact of having social media account on grade point average

Having Social Media Account	N	$\bar{X}$	Sd.	df	t	p
Yes	177	2.82	.552	201	2.325	.021
No	26	2.55	.642			

It could be argued that t test finding of the current study regarding the impact of having social media account on grade point average was parallel with the findings of Al Rahmi and Othman (2013) while it was not congruent with the study of Alwagait et al. (2015) since scholars found that having social media account does not have any impact on grade point average.

Table 4. Impact of time spent in the Internet on to the grade point average

	Sum of Squares	df	Mean Squares	F	p
Between Groups	1.228	4	.307	.947	.438
Within Groups	64.542	199	.324		
Total	65.770	203			

One way Anova test was conducted to test statistical difference among time spent on the internet by prospective teachers and their grade point averages (Table 4). With the light of the findings it may be stated that there was no statistical difference among time spent in the interned by prospective teachers and their grade point average ($F_{(4-199)}$=0.947, p>.05).

Table 5. Impact of time spent on the social media on to the academic achievement

	Sum of Squares	df	Mean Squares	F	p
Between Groups	1.687	4	.422	1.310	.268
Within Groups	64.083	199	.322		
Total	65.770	203			

One way Anova test was conducted to test statistical difference among time spent in social media by prospective teachers and academic achievements (Table 5). Findings revealed that stated that there was no statistical difference among time spent by prospective teachers and their academic achievement ($F_{(4-199)}$=1.310, p>.05).

To test correlation between purpose-frequency and academic achievement Spearman's rank correlation analysis had been employed as collected data failed to match with normality conditions (Table 6). Non- parametric correlation analysis revealed that purpose - frequency of using social media and academic achievement were not statistically significant (p>.05).

Table 6. Correlation between the purpose-frequency of using social media and academic achievement

Purpose of using social media	N	r	p
To share photos and videos	204	.059	.405
To follow the agenda	204	.029	.680
To find friends	204	.011	.871
To chat	204	.009	.895
To make new friends	204	-.014	.844
To advance foreign language	204	.073	.299
To follow friends	204	.094	.183
To play interactive games	204	.070	.321

To test relationship among most widely used social media tools and academic achievement One-Way Anova method was employed

(Table 7). Findings revealed that most widely used social media tools and academic achievement were not statistically significant ($F_{(4-199)}$ =1.657, p>0.05).

Table 7. Relationship among of most widely used social media tools and academic achievement

	Sum of Squares	df	Mean Squares	F	p
Between Groups	2.119	4	.530	1.657	.162
Within Groups	63.651	199	.320		
Total	65.770	203			

Analysing prospective teachers' Social Media Attitude Scale scores with the light of some variables

The main goal of this part of the study is to investigate statistical differences between prospective teachers' Social Media Attitude with grade point average groups which could be expressed as less than 2.00, between 2.00 to 3.00 and lastly at least 3.00. It could be argued that prospective teachers' social media attitude scores had failed to match with normality conditions thus non-parametric k independent samples test (Kruskal-Wallis H test) was conducted to test statistical significance among prospective teachers' social media attitude scale scores and academic achievement (Table 8).

Table 8. Impact of prospective teachers' attitudes on academic achievement

Grade point average	N	Mean Rank	df	X^2	p	Statistical Significance
1 Less than 2.00	18	66.08	2	7554	0.023	1-2
2 2.00 - 3.00	117	105.52				1-3
3 At least 3.00	69	106.88				
Total	204					

Findings of the analysis stressed that prospective teachers who had less than 2,00 as grade point average were found to statistically different with grade point averages of the prospective teachers who least 3.00 (χ^2=7554, p=0.023, p<.05). The main reason behind of this finding could be stated as prospective teachers with lowest academic achievement may be unconscious about using social media.

One-Way Anova was conducted to test significance among department of prospective teachers with their attitudes towards to social media (Table 9). Findings revealed prospective teachers' department and their attitudes towards to social media were not statistically significant ($F_{(8-195)}$ =1.183, p>.05).

Table 9. Impact of prospective teachers' departments on attitudes towards social media

	Sum of Squares	df	Mean Squares	F	p
Between Groups	6.486	8	.811	1.183	.311
Within Groups	133.684	195	.686		
Total	140.170	203			

To test the impact of most widely used social media tools on attitudes of prospective teachers, One- Way Anova test was employed (Table 10). With light of the findings it could be stressed that most widely used social media tools and attitudes of prospective teachers were not statistically significant ($F_{(4-199)}$ =1.877, p>.05).

Correlation between the purpose- frequency of using social media and attitudes of prospective teachers was tested with the Spearman's rank correlation analysis as collected data failed to match with normality conditions. Findings stressed that except advancing foreign language, other items were found to be positively correlated and statistically significant with the attitudes of the prospective teachers.

Table 10. Impact of most widely used social media tools on attitudes of prospective teachers

	Sum of Squares	df	Mean Squares	F	p
Between Groups	5.096	4	1.274	1.877	.116
Within Groups	135.074	199	.679		
Total	140.170	203			

4. DISCUSSIONS

No doubt that Web, 2.0 technologies have directly influenced the living styles of societies on both advanced and developing nations. Moreover, usage of social networks has also shaped patterns of advertising, marketing, shopping, entertainment, communication and education. To be more accurate, social media tools have promoted interactivity, also stimulated cooperativeness at working sphere.

Furthermore, it is discussed that usage

of social media tools could be as both teachers and students could be online and engage with course related discussions through social media tools.

Aside of these, current study revealed that prospective teachers' attitudes towards to social media and their academic achievement are positively related. Moreover, study also revealed that students who have social media accounts tend to achieve better grades when compared with the students who do not have social media accounts.

Current study also indicated that time spent on internet and social media, purpose and frequency of using media were found to have no impact on the academic achievement of prospective teachers. Social media can improve the academic success of students if they are used correctly in the classroom environment. It also encourages active participation in the class (Alghazo and Nash, 2017). In some studies, it has been stated that social media does not influence the academic success of students. For example, Gupta and Irwin (2016) have said that Facebook can disturb students, especially making their learning duties less important. A similar thought was shared by Junco (2012).

5. CONCLUSIONS

Correlation between the purpose- frequency of using social media and attitudes of prospective teachers was tested with the Spearman's rank correlation analysis. Findings stressed that except advancing foreign language, other items were found to be positively correlated and statistically significant with the attitudes of the prospective teachers. Moreover, it might be no statistical difference was investigated among attitudes of prospective teachers towards to social media and their academic achievements. In addition to that, it could be expressed that departments of prospective teachers and the most widely used social media tools were not statistically significant.

As a conclusion it is believed that sharing course related videos and photos, intensively engaging with course-related discussions and exchanging ideas would positively affect the academic achievements of the students thus it would be beneficial to use social media tools for educational purposes.

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Conflict of interests

The authors declare no conflict of interest.

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LEARNING STYLES BASED ADAPTIVE INTELLIGENT TUTORING SYSTEMS: DOCUMENT ANALYSIS OF ARTICLES PUBLISHED BETWEEN 2001. AND 2016.

M.tech Amit Kumar, Ph.D. Candidate, School of Computer Science and Engineering, University of Petroleum and Energy Studies, Dehradun, Uttarakhand, India
Email: amitanit007@gmail.com
M.tech Ninni Singh, Ph.D. Candidate, School of Computer Science and Engineering, University of Petroleum and Energy Studies, Dehradun, Uttarakhand, India
Email: ninnisingh1991@gmail.com
Dr. Neelu Jyothi Ahuja, School of Computer Science and Engineering, University of Petroleum and Energy Studies, Dehradun, Uttarakhand, India
Email: neelu@ddn.upes.ac.in

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ABSTRACT

Actualizing instructional intercessions to suit learner contrasts has gotten extensive consideration. Among these individual contrast factors, the observational confirmation in regards to the academic benefit of learning styles has been addressed, yet the examination on the issue proceeds. Late improvements in web-based executions have driven researchers to re-examine the learning styles in adaptive tutoring frameworks. Adaptivity in intelligent tutoring systems is strongly influenced by the learning style of a learner. This study involved extensive document analysis of adaptive tutoring systems based on learning styles. Seventy-eight studies in literature from 2001 to 2016 were collected and classified under select parameters such as main focus, purpose, research types, methods, types and levels of participants, field/area of application, learner modelling, data gathering tools used and research findings. The current studies reveal that majority of the studies defined a framework or architecture of adaptive intelligent tutoring system (AITS) while others focused on impact of AITS on learner satisfaction and academic outcomes. Currents trends, gaps in literature and ications were discussed.

1. INTRODUCTION

With the growth and advancement in internet technology there has been rapid progress in education delivery employing e-learning mode as (Chrysafiadi. K and Virvou. M, 2012). The motivation of e-learning is not just conveying learning material to the prospective learner on web, but also to cater to the needs of instructors, and students/ learners, who are looking for developing their own subject specific repositories. E-learning offers education to different learners, without probing into their learning preferences, needs and their knowledge level. Each individual is different and hence the learning process followed is significantly different from the other individual. There are diverse learning traits which influence the learning procedure and to a greater degree determine the learning style of the learner. Several studies have been carried out around these differences with an aim to improve the effectiveness of learning, while designing the teaching and learning environment (Bozkurt and Aydogdu, 2009; Demirbaş and Demirkan, 2003). Numerous instructive hypotheses and studies guarantee that learning gain can be improved, when the learner's learning style is recognized. when compared to the real time class room teaching, there are several shortcomings in the traditional web-based and standalone education systems, such as lack of adaptability, flexibility support and feedback, absence of synergistic support amongst learners and the tutoring system (Xu,

Corresponding Author
M.tech Amit Kumar, University of Petroleum and Energy Studies, Dehradun, Uttarakhand, India
Email: amitanit007@gmail.com

Wang and Su, 2002). This is the reason for growing interest of the researchers towards adaptivity in e-learning, ultimately towards the goal of providing benefits to learner (Schiaffino, Garcia, and Amandi, 2008).

Adaptivity is important in learning process to provide and manage learning route adapted for each user, monitoring and interpreting user activities as per their needs and learning preferences. Adaptive feature of e-learning framework matches the activities, and personality of the learner with learning material (Park and Lee, 2003). According to Felder and Silverman (1988), many researchers believe that tutoring can be very effective and influential by coordinating the learning material with the learner's preferences and their learning styles. We identified a strong relationship between learning style and adaptive tutoring system. Different learners have different way of learning, and each learner prefers to learn in his/her own individual way that best suits as per individual's characteristics such as learner past knowledge, learning style, cognitive and intellectual ability and the like. Tutoring as per these individual characteristics of learner, make learning effective and promote use of adaptive tutoring system for improving the learning. To improve performance of learning, the teacher should anticipate which learning style is most adapted to the learner.

Learning style is characterized as the strength, quality and inclination in which individuals get and process data. It alludes that each individual has own particular strategy or set of techniques when learning (Felder, R.M and Spurlin, J. 2005). Learning style does not have a single definition, according to Jonassen and Grabowski (2012), learning style is defined as a connected intellectual style, cognitive ability in the field of learning elated one more level from unadulterated handling capacity. As confirmation of this evacuation, learning styles are generally in view of self-revealed learning inclinations. For measuring them, instruments are utilized that gather some information about their inclinations. Conversely, subjective styles are distinguished by undertaking applicable measures, which test the genuine capacity or expertise.

James and Blank (1993), characterized learning style, as a condition under which, students most beneficially and suitably observe, process, store and recollect what they aspire to learn. After identification of learners learning style, teachers could design the tutoring strategies and provide learning material according to their learning style (Felder and Silverman (1988). Index of learning style questionnaire defines the dimensions of learning style on a scale ranging between +11 to -11 (Felder and Silverman, 1988). In addition, Felder questionnaire due to its reliability and validity (Litzinger, Lee and Wise, 2005; Van Zwancnberg, Wilkinson and Anderson, 2000) is widely accepted for use in adaptive intelligent tutoring system (Kuljis and Liu, 2005).

An imperative issue in design of adaptive tutoring system is selection of learning characteristics specifically termed as 'attributes' or objects to be considered. Given different learner characteristics, it is important to examine each and in different learning context to be able to mark its importance for future research studies. Many studies reveal that, adaptive tutoring systems based on learning style are more productive, increase learner fulfillment level, minimize learning time and improve academic achievement of learner (Tseng, Chu, Hwang, and Tsai, 2008; Graf, Kinshuk and Liu, 2010). Learning style is a significant feature to focus on individual differences while developing an adaptive system (Graf, Liu and Kinshuk, 2009; Liegle and Janicki, 2006).

1.1. Literature Review

Recently, there has been a rapid research in the field of online learning hypermedia particularly focused on adaptation and personalization of web-based learning situations. In the recent past, there have been number of studies focused on the preferences and learning style of learner. Learning style theories and their applications have been used in practice in mid-2000 in the different fields (Ozyurt et. al., 2015). Nowadays, many educational institutes, universities prefer teaching using e-learning courses. There is little focus given to the needs, choice, and characteristics of individual learners and therefore, all learners are treated in same manner. The concentration of the present study is intelligent tutoring systems/ adaptive educational frameworks that suit learning styles. As demonstrated in advance, despite the fact that the significance of learning styles in versatile guideline has been addressed, latest research directed in technological improvements has promising ramifications (Shih et. al. 2008). Work Proposed by Stash, N. (2007) also studied the impact of learning style specifically on adaptive hypermedia systems. The results section of the proposal presents quantified evaluation

on significant improvement of user/learner's interest and understanding of specific content.

To build our comprehension about existing patterns in adaptive tutoring systems, to put together our contemplates based on learning style and to distinguish conceivable crevices to be returned to in future work, we directed a substance investigation of distributed learning style models and executions on intelligent tutoring system based on learning styles.

We trust that the present investigation adds to the field, prompts more powerful intelligent tutoring system activities, and encourages instructional creators to adapt well to the dynamic learning content creation for academically intelligible e-learning. In the following segment, inquiry and examination methods are compressed trailed by the discoveries of the detailed documents investigation, and conceivable bearings for additionally contemplates. This analysis anticipates to add to the decisions of the present circumstances, and the sorts of studies that are required in this area, its application, the impact of learning style on AITS, and the current slants in the field. Moreover, it has a huge investigation, it plans to decide the present patterns about an adaptive intelligent tutoring system in light of learning styles and existing literature gaps, which will advise for the future investigations. This analysis can add to the improvement of more proficient and gainful AITS. In addition to that, the investigation is relied upon to manage e-learning system developers on the most proficient method to make e-learning with a solid academic foundation. So along with this, the aim of this literature analysis is to do a broad investigation of articles focused on learning styles of learner published from 2001 to 2016 and answer the accompanying research questions.

1. What are the main focus, purpose, research type, and method of study of AITS addressing learning style?

2. What are the types of participants and their levels, area/field and data gathering tools employed?

3. What are the learning style applications, and learning style classification algorithms that have been used in AITS?

4. What are the learning styles models accommodated in adaptive intelligent tutoring systems?

5. What are major findings and summary concerning learning styles as an attribute of learner?

2. MATERIALS AND METHODS

The current study examines the learning style based AITS, which was conducted through the document analysis published from 2001 to 2016. Document investigation is depicted as systematically organizing, classifying, looking at contents and acquiring outcomes from literature (Ary et. al., 2013). The purpose behind picking the document investigation strategy is that, this joins information which are similar to each other in view of specific ideas, methods, purposes, and applications. A variety of research is being done in this field. Most of them can be classified majorly in three different dimensions such as, Search Strategies, Criteria for Inclusion and Exclusion and finally, Data Accumulation and Investigation. These are being explored in coming subsections.

2.1. Search Strategy

There is a drastic growth in the field of adaptive tutoring systems since 1990 (Modritcher, 2008). Extensive document review was conducted over electronic databases including ScienceDirect, GoogleScholar, Dissertations, InderScience, Thesis and SpringerLink. For this keywords namely "personalization", "web-based learning system", "adaptable learning systems", "personalize learning system", "adaptable tutoring system", "adaptation/adaptively learning style", "adaptability", "learning style", "adaptive hypermedia", "adaptive instruction", "adaptive behavior", "adaptive instructional system", "learning system /intelligent tutoring system", "user modeling/learner modeling/student modeling", "artificial intelligence" were used. This study is limited only to these keywords.

2.2. Criteria for Inclusion and Exclusion

The accompanying incorporation criteria were utilized for the article determination: articles which are more cited in view of learning style were preferred with an attention on mapping of experimental research for the adequacy of an adaptive intelligent tutoring system. Additionally, the articles which were resolved to be AITS works created in view of learning styles were gathered. Among the rehashed articles, just a single article was incorporated into the study. Through the document

analysis, above 90 research papers were gathered and it was observed that some of them were redundant with respect to a particular framework of learning styles. So under such conditions, the most extensive article based on a similar framework was incorporated while others were barred. The explanation behind the inclusion/exclusion was that these examinations that depended on a similar framework/item/foundation, are kept separately for isolated investigations. Consequently, superfluous redundancy was stayed away from analysis. The third aspect for inclusion is that the study must concentrate on learner characteristics i.e. learning style. Since some articles were separated that could be ordered as experimental validation of AITS effectiveness, we chose to incorporate hypothetical recommendations of such frameworks likewise, in which it was proposed that further research should concentrate on exact research findings.

2.3. Data Accumulation and Investigation

Document analysis covering several articles has been conducted. The information was sorted based on frequencies and rating of articles. The collected literature is reviewed in the light of research questions outlined earlier in this work. In the second phase, findings/outcomes of the study have been discussed, under categories, purpose, research types, methods, participant's types, participant's level, subject area/field and data gathering tools, based on learning style in adaptive tutoring system, application of Learning style and LS classification algorithms, adaptive intelligent tutoring systems accommodating learning styles, findings and summary of each study on AITS based on learning style were detected. This systematic organization of data was undertaken to ensure ease of investigation and drawing meaningful conclusions.

3. RESULTS

Over 78 studies and reviews published from 2001 to 2016, on adaptive intelligent tutoring systems and related aspects, have been critically examined. Several of these publications are published in high impact journals such as 'Expert systems with applications', 'Computers in human behavior', 'Educational technology and society' and many more. Different criteria have been identified to group these studies and results have been tabulated. For a meaningful analysis and ease of representation, a set of criteria have been taken as one group and discussed under one heading. Considering criteria, under a group, the total number of studies are grouped, showing their comparison results in tabular formats. In the present paper, five sets of criteria are presented from section 3.1 to 3.5. Each set holds a list of criteria, which have been used to group the studies and represent the comparison quantitatively as percentage.

3.1. Main focus, purpose, research type, and methods

Considering the criteria 'main focus' of research, out of a total of over 78 studies (n=78), a total of 63 studies focused on 'adaptivity based on learning style' as their purpose of research, amounting up to 80.77%, whereas rest 15 studies focused on other learner parameters, as their purpose, making up remaining 19.23%. In addition, defining the purpose of the research, 27 of the studies (34.61 %) focused, on the proposed ITS model, based on the adaptivity. 13 of the studies (16.66 %) concerned with impact of learning style on the adaptivity of the intelligent tutoring system as their purpose. 12 of the studies (15.38 %) were about AITS usability/preferability and the learner satisfaction level with the learning contents. 10 of the studies (12.82 %) have explained the impact of AITS on the academic achievements or learning outcomes. 6 of the studies (7.69 %) were used in model for automatic learning style prediction. 8 of the studies (10.25 %) had the purpose for determining the effectiveness of the AITS and 2 of the studies (2.56 %) used the 'other parameter', concerning the adaptive tutoring system. In inspecting the motivation behind the reviews, the reviews concerned with assessing the learner execution were considered tentatively and hypothetically. In the majority of the study that is in, 47 of the studies in total (60.25 %), learners were used as participant and learner evaluation was the motivation of the study. In this review both quantitative and subjective information was assembled from the learner. 12 of the studies, in total (15.38 %) were empirical studies. At last, 'no assessment' was given in case of 19 of the reviews (24.35 %). Concerning the methods of the reviews, 33 of the reviews (42.31 %) used experimental method and 45 of the studies (57.69 %) used case studies.

Table 1. Summary of main focus, purpose, research type, and method for the investigated contemplates

		Frequency (f)	Percentage (%)
Main Focus (n=78)	Adaptivity based on learning style	63	80.77
	Other	15	19.23
Purpose (n=78)	Proposed model of ITS based on Adaptivity	27	34.61
	Learning Style impact on Adaptivity	13	16.66
	Determining the usability, learner level of satisfaction	12	15.38
	Impact of adaptive tutoring system on academic achievements/ learning outcomes	10	12.82
	Model for automatic learning style prediction	6	7.69
	Effectiveness of AITS	8	10.25
	Other	2	2.56
Research type (n=78)	Theoretical	19	24.35
	Empirical studies	12	15.38
	Learner evaluation	47	60.25
Method (n=78)	Experimental	33	42.31
	Case studies	45	57.69

3.2. Participants type their levels, subject area/field and data gathering tools

With reference to the second research question, participant's type, their levels, subject area/field, learner modelling, modelling tools, and data gathering tools used in the studies published between the year 2001 and 2016 were examined. Information outline of these discoveries is shown in Table 2.

As displayed in Table 2, considering the 63 participants in experimental review, majority of participants were learners i.e. (n=52; 82.84 %), while only (n=7; 11.11 %) were teachers/educators and very small number (n=4; 6.34 %) were both learners and educators. Considering the criteria 'participants level', out of a total of over 73 studies, 53 of the studies (72.60 %), were conducted at advanced education level or at engineering level. 10 of the studies (13.72 %), were conducted at the secondary and elementary education level. Remaining, 10 of the studies (19.69 %) were over mixed group of participants belonging to different levels. The studies, whose level is not specified, are not included in this.

When the reviews were assessed regarding the branch of subject area/field, out of a total of over 87 studies, there were (n= 47; 54.02 %) offered in computer science/engineering making up the highest share. (n=11; 12.64%) were offered in Arithmetic, (n=7; 8.1%) were offered in chemistry, (n=6; 6.89%) were offered in Management science, (n=3; 3.45%) were offered in Administration, (n=2, 2.3%) were offered under Social science, (n=2, 2.3%) were offered under law and some others were offered where the learning material was miscellaneous domains or was independent of a particular domain.

Considering the criteria 'tools for dynamic modelling', out of a total of over 34 studies, 9 of the studies (26.67 %) were conducted in tracking of learner behavior during tutoring, 7 of the studies (20.58%) were used in test results, 6 of the studies (17.65%) were used for examining the learner feedback, 4 of the studies (11.76%) were used in analyzing time spent on learning material, 3 of the studies (8.82%) were used to identify the individual profile of learner to provide appropriate learning material and 5 of the studies (15.70%) were based on mix types of modelling tools. These aspects listed here, such as tracking learner behavior, test result and feedback, time spent on learning material, identifying individual profile have all been considered here as the 'tools' that have been employed for 'dynamic modelling' within the system.

Data gathering tools used in current studies published from 2001 to 2016 were analyzed. It was seen that 134 data gathering tools were used in the current studies. Some articles report utilization of more than one data gathering instrument on account of more than one reason. As presented in Table 2, considering the criteria 'data gathering tools', out of a total of over 134 studies, it has been observed that a largest share of data gathering tools used was learning style inventory or questionnaire. Learning style questionnaire or inventory tools make up to (n=55; 41.04 %), learning progress test (n=26; 19.40 %) and online questionnaire (n=23; 17.16 %). In addition to these, system log report (n=14; 10.45 %), through interview form (n=7; 5.22 %), Cognitive style inventory (n=7; 5.22) and other intelligence inventory (n=2; 1.5 %) tools were employed in this studies.

Table 2. Summary of participant's type and their levels, learning modelling/tools, subject area/field, and data gathering tools

		Frequency (f)	%			Frequency (f)	%
1.	**Participants type (n=63)**			**5.**	**Data gathering tools (n=134)**		
	Learner	52	82.54		Learning style inventory /questionnaire	55	41.04
	Teacher/Educator	7	11.11		Learning progress test	26	19.40
	Mixed	4	6.34		Online questionnaire	23	17.16
2.	**Participants level (n=73)**				System log report	14	10.45
	Higher education/ Engineering	53	72.60		Through interview form	7	5.22
	Secondary education	6	8.22		Cognitive style inventory	7	5.22
	Elementary education	4	5.5		Other intelligence inventory	2	1.5
	Mixed	10	19.69				
3.	**Learner Modeling (n= 59)**			**6.**	**Subject area/field (n=87)**		
	Static	40	67.79		Computer science/ Engineering	47	54.02
	Dynamic	19	32.20		Arithmetic	11	12.64
4.	**Tools for dynamic modelling (n=34)**				Chemistry	7	8.1
	Tracking learner behavior	9	26.47		Management science	6	6.89
	Test result	7	20.58		Administration	3	3.45
	Learner feedback	6	17.65		Social Science	2	2.3
	Time spent	4	11.76		Law	2	2.3
	Learner selection based on profile	3	8.82		Domain independent/ Undermined	9	10.34
	Mixed	5	14.70				

3.3. Application of learning style (LS) for developing adaptive tutoring system and learning style classification techniques

With reference to the third research question, the use of learning style for developing adaptive tutoring system is shown in table 3. It is also important to note that more than one application is targeted in one paper/ article.

Table 3. Summary of Application of Learning Style in adaptive tutoring system

Application of LS "What is adapted?"	Article (f)	References
Learning material/ learner characteristics	22	Ketamo, H. (2003), Alkhuraiji, S., Cheetham, B.,& Bamasak, O. (2011), Vassileva, D. (2006), Baldiris, S. et al. (2008), Sun, S., Joy, M., & Griffiths, N. (2007), Reategui, E., Boff, E., & Campbell, J. A. (2008)., Cabada, R.Z., Barrón Estrada, M.L., & Reyes García, C.A. (2011)., Cabada, R.Z et al. (2009), Germanakos et al. (2008), Conlan, O., Dagger, D., & Wade, V. (2002). , Jovanovic et al. (2009), Dwivedi, P., & Bharadwaj, K.K. (2013), Sun, S., Joy, M., & Griffiths, N. (2007)., Kelly, D., & Tangney, B. (2005), Klašnja-Mili´cevi ´c et al. (2011), Beal, C. R., & Lee, H. (2005)., Özyurt et al. (2013b), Sun et al. (2007), Del Corso, D., Ovcin,E., & Morrone, G. (2005)., Tseng,J.C.,Chu,H.-C., Hwang,G.-J.,& Tsai,C.-C.(2008)., Yang et al. (2013), and Yasir,E.A.M.,& Sami,M.S.(2011).
Learning media, contents and resource format	4	Yasir and Sami(2011), Franzonietal.(2008), Kellyand Tangney(2005), Baldiris et al.(2008)
Learner knowledge	8	Alepis et. al. (2008), Mitrovic, Martin and Mayo (2002), Vassileva and bontchev (2006), Melis and Andres (2005), Mitrovic, A., Koedinger, K. R., & Martin, B. (2003), Popanikolaou et al. (2003), Xu and Wang (2006), Carmona et al. (2008),
Recommended tutoring materials /pedagogy	8	Limongelli et al. (2011), Essaid El. B., E.H.A., and Adnani, El., M. (2011)., Reategui et al. (2008), Franzoni et al. (2008), Latham et al. (2014), Latham et al. (2012), , Schiaffino et al. (2008), Wang et al. (2008)
Intelligent game	2	Lin et al. (2013), Feldman, J. et al. (2014).
Learner evaluation and practice	3	Wen, D. et.al. (2007), Baldiris, S. et al. (2008), Cabada, R.Z. et. al. (2011).
Other/Mixed	6	Sanders et al. (2010), Shute, V. J., & Towle, B. (2003). Zakrzewska, D. (2012), Beal, C. R., & Lee, H. (2005), Xu, D., & Wang, H. (2006), Aleven, V., McLaren, B., Roll, R., & Koedinger, K. (2006),

As seen in Table 4, a systematic review of the learning style classification techniques, which have been utilized as part of adaptive tutoring systems, is displayed. While some articles have utilized one algorithm for detection/identification of learning style of learner, most others have used combination of algorithm to provide adaptivity based on learning style.

Rule-based is one of the most popular methods that has been used widely and applied by the 17 articles that help researchers to generate learning style rules to provide system adaptivity. Graf et al. (2009) used Felder index of learning style questionnaire and emphasized that active dimension of learning style model is best among four LS dimensions. The second well known strategy is Bayesian networks methodology which is based on Bayes theorem or Bayes hypothesis. Garcia et al. (2007), Schiaffino et al. (2008) and Garcia et al. (2008) use Bayesian network technique that utilizes Bayes condition to estimate the probability that a learner has preference for a specific learning style when given an activity. Over critical review 7 studies applied this technique, while other 5 studies utilized the Naïve Bayes method, which is also the extended form of Bayesian networks method. 5 studies used artificial neural network techniques, 3 studies used decision tree method, 5 studies used Naïve Bayes techniques, 2 of

the studies used Markov and Reinforcement model, 1 study used Genetic algorithms, and a remainder of 7 of the studies used, other techniques or mixed techniques for learning style classification.

Table 4. Summary of Learning Style Classification techniques

Classification technique	Article (f)	References
Rule- based	17	Scott et al. (2014), Tseng, J.C., Chu, H.-C., Hwang, G.-J.,& Tsai, C.C.(2008)., Ketamo, H. (2003), Dorça et al. (2013b), Sun, S., Joy, N Griffiths, N. (2007), Graf, Kinshuk, & Liu (2008), Latham et al. (201 Melis, E., & Andres, E. (2005)., Graf, KinshuN, Maguire, & Shtern (Ray, R. D., & Belden, N. (2007)., Xu, D., & Wang, H. (2006)., , Graf (2009), Sangineto et al. (2008), Romero et al. (2006), Aleven, V., Mc B., Roll, R., & Koedinger, K. (2006).
Bayesian technique	7	Aslan, B. G.et al. (2014)., Botsios, S., Georgiou, D., & Safouris, N. (Garcia et al. (2007), Mc Quiggan, S. et al. (2008)., Conati, C. et al. (2 Garcia et al. (2006), Carmona, C. et al. (2008).,
Artificial Neural Network	5	Cabada et al. (2011), Cabada et al. (2009), Fazlollahtabar and Mahdav (2009), Kelly, D., & Tangney, B. (2005), Koutsojannis and Hatzillygeroudis (2003), Villaverde, J. E. et. al. (2006).
Decision Tree method	3	Cha, H.J, et al. (2006), Mc Quiggan et al. (2008), Özpolat, E., & Akar (2009).
Naïve Bayes	5	Feldman et al. (2014), Kelly, D. (2008), McQuiggan et al. (2008)., Zakrzewska (2012), Kelly, D., & Tangney, B. (2005).
Reinforcement Learning	1	Dorça et al. (2013), Balasubramanian, V., Margret Anouncia, S.(2016
Markov model	1	Cha, H. J. et al. (2006).
Genetic Algorithms	1	Chang, Y. C. et al. (2009).
Other	7	Read, T. et. al. (2006), Vassileva, D., & Bontchev, B. (2006), Hong, F Kinshuk, D. (2004)., Reategui, E. at al. (2008). , Sanders and Bergas (2010), Fazlollahtabar, H., & Mahdavi, I. (2009), Koutsojannis, C., & Hatzilygeroudis, I. (2003).

3.4. Adaptive intelligent tutoring system accommodating learning style model

With reference to the fourth research question, 78 studies were examined. Analysis reveals that some of studies have more than one purpose, for example identifying learning styles, learning style classification, listing learning style predictor elements and data gathering tools. Some of the reviews used combination of more than one learning style model, for example both Felder and Kolb learning style models were utilized as a part of some studies. Therefore, these kinds of learning styles are termed as mixed learning styles. With reference to the first research question, 'learning styles used in adaptive intelligent tutoring system', the research review articles published from 2001 to 2016 were analyzed. Critical analysis reveals that Felder-Silverman learning style model was the most popular learning style model used in adaptive intelligent tutoring system. Felder-Silverman learning style (n=30, 42.85%), trailed by Kolb (n=4, 14%), VARK learning style (n=2), and other are (n=3). Apart from these, limited number of studies include Honey and Mumford (n=3), Myers-Briggs type indicator (n=2) used in the analyzed studies.

Table 5. Summary of Learning Styles models utilized in AITS summarized in analyzed studies

Learning style models	Frequency (f)	References
Felder-Silverman model	30	Adetunji, A. & Ademola, A. (2014), Alkhuraiji, Cheetham, and Bamasak (2011), Alfonseca, E. et al. (2006), Baldiris, S. et al. (2008), Alkhuraiji et al. (2011), Lin, C.F., Yeh, Y., Hung, Y.H., & Chang, R.I. (2013)., Essalmi et al. (2010), Feldman et al. (2014), Filippidis, S. K. & Tsoukalas, I. A. (2009), Franzoni et al. (2008), García, P., Schiaffino, S., & Amandi, A. (2008)., Garcia, P., Amandi, A., Schiaffino, S., & Campo, M. (2007)., Graf, S., Kinshuk, K.D., & Liu, T.-C. (2008)., Graf, Kinshuk, Maguire, & Shtern (2010), Graf, S. et al. (2009), Hong, H., & Kinshuk, D. (2004). , Limongelli, C., Sciarrone, F.,Temperini,M., & Vaste,G. (2011). , Huang, E. Y., Lin, S. W., & Huang, T. K. (2012)., Hwang, G.-J., Sung, H.-Y., Hung, C.-M., & Huang, I. (2013). Kinshuk, Liu, T. C., & Graf, S. (2009)., Klašnja-Milic´evic´ , A., Vesin, B., Ivanovic´ , M., & Budimac, Z. (2011)., Latham, A., Crockett, K., McLean, D., & Edmonds, B. (2012). , Jovanovic, Gaševi ´ c, and Devedži ´c (2009), Kelly and Tangney (2005), (2011), Lin et al. (2013), Sancho et al. (2005), Mahnane et al. (2013)., Sanders and Bergasa-Suso (2010),
Kolb Model	4	Akkoyunlu, B. and Soylu, M. Y. (2008), Moura et al. (2013), Lu, H., Jia, L., Gong, S. H., & Clark, B. (2007), Manochehr, N. N. (2006).
VARK model	2	Yasir and Sami (2011), Wnah et al. (2008)
Honey and Mumford Model	3	Anthony, P. et al. (2013), Del Corso et al. (2005), Kurilovas et al. (2014)
Myers-Briggs Types Indicators (MBTI)	2	Essaid E. B. et al. (2011), Kim, J., Lee, A., & Ryu, H. (2013).
Other	3	Yang, T.-C., Hwang, G.-J., & Yang, S.J.-H. (2013), Read, T., Barros, B., Bárcena, E., & Pancorbo, J. (2006), Sun, S., Joy, M., & Griffiths, N. (2007).

3.5. Findings and rundown of current reviews on AITS in light of learning styles

With reference to the last research question, discoveries and outline of the reviews on adaptive intelligent tutoring systems distributed from 2001 to 2016, which address the learning style, were analyzed. Considering the discoveries and outlines of the present reviews, estimation of learning style and adaptability in view of learning style, shows high accomplishment levels with all said being done. Besides, it can be reported that there are high positive opinions concerning learner fulfillments and usability with these situations and their impact on academic accomplishments as well as their learning preferences and needs. Overall finding has been classified under ten main titles as shown in Table 6. Seven of these indicate positive prospective towards adaptive tutoring system while rest indicate negative prospective. The positive findings have a largest share (n= 95; 90.47 %) and negative findings are (n= 12; 9.52%) which is very limited or less. Data summary of the discoveries/ results is displayed in Table 6.

Table 6. Rundown of findings in the analyzed studies

		Frequency (f)	Percentage (%)
Positive perspectives (n=95)	Learner satisfaction, preferences, usability, and adaptivity based on learning style	30	28.57
	Correct prediction learning style	13	12.38
	Relationship between learning style and other learner characteristics or navigation	8	7.62
	Positive effect on learner learning	18	17.14
	Positive effect on learning achievements	15	14.29
	Positive effect of learner modelling	11	10.48
Negative perspectives (n= 10)	No correct prediction of learning style	5	4.76
	Not making constructive outcome on academic and learners achievements	3	2.86
	No effect on learner modeling	2	1.90

4. DISCUSSION AND OUTCOMES

This study concentrates on the learning style based AITS, which is an innovative

field of computerized learning at present days. This study is significant, because it puts forward crucial findings regarding the development of multiple areas, such as, adaptive intelligent tutoring systems, types of courses, types of participants, various applications of the field, classifying algorithms and current research trends in the field through literature gaps which opens the door for future studies. This study incorporates different research perspectives, model designs and findings that may be utilized blindly for the development of the learning style based educational system. However, we welcome all the distinct viewpoint, ideas, and personal perspective based on experience in the educational research.

This study does not contribute only in evaluations, but also helps to propose models, designs and frameworks. In addition, this covers the learners and teacher's views in light of the learning style focused on adaptivity for AITS (Klasnja-Milicevic et. al., 2011). Some students or researchers look for different methods and techniques to improve the performance of the e-learning environment, this in turn makes the system easy and efficient. In this way, AITS is developed to support the current educational system and needs the teacher to review for the correct assessment of learner. Getting their views would increase the effectiveness of the intelligent tutoring system, which will make education productive and will also have a great importance in the future studies of this field.

The finding in Section 3.1 reveals that, considering the empirical and theoretical study, the learning style contributes to a vital role for adaptivity in ITS. AITS that accommodates learning styles has a strong impact on academic achievements and learning outcomes. As shown in section 3.2, the learning style questionnaire/survey is mostly used for the identification of the learning style. This approach is suitable for the traditional teaching where it is difficult to analyses the learner's preference. In this sense, this type of survey suffers from disadvantages like, it depends only on the learner's decisions or it may be biased. While many studies reveal that learning styles can change over time and fixing this makes classification incorrect and inaccurate (Vermount, 1998). This section reveals that the highest participants were learners, and belonged to higher education. Section 3.3 reveals that learning style is mostly utilized to: provide adaptive learning materials to the learner, recommend the best suited pedagogy and to provide correct evaluation of the learner to improve the effectiveness of the tutoring system.

The contribution of this research finding is not only to be a guide for the adaptive intelligent tutoring system developer, but also serves to improve the effectiveness of the learning style classification algorithms. The finding in Section 3.4 reveals that the automatic learning style prediction algorithms are Rule-Based, Bayesian, Artificial Neural Networks, Decision Tree, Naïve, Reinforcement Learning and Markov Model in which Rule-Based was one of the most popular technique for learning style classification.

The above findings also reveal that a lot of studies of ITS based on learning style were published in high impact national and international journals, in-fact some of them were related to proposing new models. Most of the studies focused on the impact of learning styles on education, productivity of learning system, learning gain, their usability, and higher learner satisfaction. The findings in Section 3.5 reveals that, accommodating learning styles in the intelligent tutoring system makes learning easier, effective and increases learner satisfaction levels towards learning. The positive perspective for accommodating this analyzed study based on the learning style in AITS holds the largest share of about 90%, and holds a very limited negative perspective i.e. about 10%.

5. CONCLUSION AND FUTURE DIRECTIONS

As many as 78 studies on adaptive intelligent tutoring systems between the period 2001 to 2016 have been critically examined, classified and compared uncovering developments, trends, research gaps and future prospective. It has been concluded that many of the researchers have used Felder-Silverman learning style models and successfully integrated them in educational/tutoring systems for adaptivity. It has been observed that 'learning style' characteristic of learner has been widely explored to make the systems increasingly adaptive.

Analysis of reviews reveals that learning style highly impact on academic accomplishments, learning performance, and learner satisfaction level. This analysis also reveals the selection and evaluation criteria's of the learning style classification algorithms. Rule-Based and Bayesian Network algorithms were increasingly used for automatic prediction of learning style of learner.

Through the findings and discussion of the studies recommendation and future scope have been put forward. Firstly, there is a chance to investigate a fusion of learning style models in adaptive education systems/ tutoring systems. So it is recommended to explore mixed learning style models for implementation of adaptability in educational system. Though Felder learning style model has been widely used, it would be interesting to note how other contemporary models such as Kolb, Honey & Mumford model have been used and contributed to adaptivity, based on their specific strengths and weaknesses. Additionally, there is an opportunity to apply algorithms for detection of mixed learning styles for improving the adaptivity in tutoring systems. Finally, as a learner attribute, learning style is sufficiently explored, other learner attributes too deserve to be explored and analyzed.

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Conflict of interests

The authors declare no conflict of interest.

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A THEMATIC ANALYSIS OF TECHNICAL DOCUMENTS: THE COLLECTION AND FORMALIZATION OF INFORMATION RELATING TO THE NEEDS OF PERSONS WITH DISABILITIES

Dr. Mabrouka El Hachani, Elico, Université Jean Moulin, Lyon, France
E-mail : mabrouka.el-hachani@univ-lyon3.fr
Dr. Omar Larouk, Elico, Ecole Nationale des Sciences de l'Information et des Bibliothèques, Lyon, France
E-mail: omar.larouk@enssib.fr

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ABSTRACT

This article addresses the issue of technical documents and the impact their structuring has on professionals working in the field of disability. A model was developed to accompany users with disabilities when entering information; it was based on the linguistic analysis of an assortment of technical documents (institutional forms). We studied the problems related to technical documents by using a methodological approach which was based on a combination of complementary studies. The first was a terminological study, which aimed to look for relevant themes. It was complemented by a second one, which analyzed the discourse that was transmitted by the texts and which was centered on exploring the logical links between propositions and paragraphs. We completed these two studies with a final one, the logico-cognitive analysis. This which allowed us to look for contextual clues, which were produced by the texts in the documentary environment. It was therefore possible to formalize information and communication operations thanks to the reference discourse's targeted environment in view of designing an automated information system.

1. INTRODUCTION

The main mission of the MDPH (*Maison Départementale des Personnes en situation de Handicap* – a local agency for people with disabilities) is to individually assist people with disabilities and to meet their specific needs. The goal is to present the chronological process in which a composite file (identity, region, contributing factors, etc.) is completed in order for the assessing team to make a quick decision for each situation. This composite folder (file) is a technical document with a specific structure. The linguistic content of these forms includes textual information referring to the user's situation. It takes into account the information and needs of persons with disabilities. Professionals and social workers participate in providing guidance for the applicants. Our collection of documents was composed of the technical files of the MDPH-France, which are decisive in the context of a disabled person's life project. This study delineates the formal frameworks of the documents and the way they are exploited in order to allow the optimal reorganization of the way information is entered.

A methodological approach was used to analyze the problems related to this technical documentation. A terminological study was first implemented to search for relevant themes. It was then followed by a linguistic analysis of the discourse that was conveyed by the texts, and by an exploration of the links between the intra-sentence (intra-phrases), the intra-paragraph and the inter-paragraphs. The approach was centered on cognitive reference, in which the documentary environment

Corresponding Author
Dr. Mabrouka El Hachani, Elico, Université Jean Moulin, Lyon, France,
E-mail : mabrouka.el-hachani@univ-lyon3.fr

conveys information and communication operations. It consists in extracting information from a set of heterogeneous technical documents. Such heterogeneity stems from the composite nature of the data (framework, texts, acronyms, symbols, etc.) which must be analyzed in order to offer recommendations to improve the structure (form, order, etc.) of MDPH documents.

2. STATE OF THE ART

2.1. Structuring technical documents as working documents

Otlet (1934) and Briet (1951) feature among the founders of document theory. Such thinkers were later reviewed by researchers in the late 1990s, such as Buckland (1997), who reflected on the nature of documents. Lund and Buckland (2008), Lund (2009) and Bachimont (2009) followed as they interrogated the transformations of the document in the age of digitization. In 2015, André Tricot defined a document in the following way, based on previous works by Buckland and Briet:

"*A document is an object that may or may not contain inscriptions, and which was conceived as a document and is perceived as such: it bears communicative and mnesic intentions which are recognized by the users of the document* (p .17) " (translated from French: Un document est un objet qui porte des inscriptions ou non, qui a été conçu comme un document et qui est perçu comme tel: il porte une intention communicative et une intention mnésique qui sont reconnues comme telles par les usagers du document (p.17)

Other researchers, such as Maurel, Mas, (2015), have tried to identify the characteristics of documents in organizations. He states:

"*The types of documents can therefore be characterized by their information structure (form and content) and by working practices shared by organizational partners. They are rooted in a context that stimulates their creation, their use and their preservation, thus providing a basis for mutual understanding among members of a given organization. The concept of the document type brings a new dimension to the typology of documents, in that it approaches it within a broader context and from different angles*. (p. 3)". (translated from French : « Les genres de documents sont donc caractérisés par une structure d'information (forme et contenu) et par des pratiques de travail que partagent des acteurs organisationnels. Ils sont ainsi ancrés dans un contexte qui motive leur création, leur utilisation et leur conservation, et qui fournit une base de compréhension commune entre les membres de cette organisation. La notion de genre de documents apporte une nouvelle dimension à la typologie des documents, en ce qu'elle l'aborde dans un contexte plus large et sous des angles différents » (Maurel, Mas, 2015: 3).

The working document or the document type therefore reinforces a specific organizational reality. The field in which the working document exists is filled with other considerations, the latter of which allow us to gain perspective on the stakes that are at play in the documentary world and in informational and communicational transactions (Maurel, Mas, (2015)).

In the case of this research, we focused on the specific arena of the medico-social field. Verdier and Flory (2009) explain that "*For a long time, medical information was, in the worst of cases, limited to a paper medical record. In the best of cases, it was structured in relational formalism. Today, medical information is one of the keys to quality medical care*". (translated from French: Longtemps cantonnée à un traditionnel « dossier médical » en papier, dans le pire cas, ou structurée dans un formalisme relationnel dans le meilleur cas, l'information médicale est aujourd'hui une des clés favorisant une médecine de qualité) (Verdier, Flory, 2009).

The development of structured documents in the 1990s and the 2000s led to health information being strategically repositioned in medical organizational structures (Verdier, Flory, 2009). The long history of patient records meant that these records could not really be implemented on a large scale due to technical and legal issues related to the protection of health data. The health sector has therefore made considerable progress on issues related to the management of health information. The medico-social sector, however, has just barely started the process with its "user" files. An initiative set up by an association called "ObServeur", ("The observatory of the needs of people with disabilities") explains the value of centralizing information in a clear and lasting way both for the proper follow-up of users with disabilities and for those whose situation changes with time and health status. Due to the wide spectrum of disabilities and the variability of difficulties encountered by people in all aspects of their lives, the Piveteau report (2014) found that a number of disabled users did not find solutions for compensation, assistance, accommodation or social support,

despite the enforcement of the 2005 law for equality and despite the creation of a dedicated agency for people with disabilities known as the *Maison Départementale des Personnes en situation de Handicap – MDPH*. The purpose of such structures is to collect the people's applications for help and compensation. The Piveteau report warns that the situation is critical. Response times are too long and can sometimes be inappropriate, as the needs of the population are not fully taken into account, particularly in the application forms. These forms, in fact, require individuals to fill an empty frame without considering the difficulties of expression people with disabilities may have.

It is in this context that we wished to study a collection of three types of forms from three regions of France (Isère, Rhône, Calvados). These forms are viewed as being the working documents of the agents who collect the information. These documents then become the memory of the situation of the people who, in turn, reply. Such forms are an official notification of help. They are therefore vital documents in the lives of people with disabilities.

2.2. Textual and argumentative analytical models in technical documents

In this state of the art, which focuses on content analysis and on extracting knowledge from documents, we examined specialized texts that contained form-type spaces and procedures, in an effort to observe the document's technical organization and procedural content. However, linguistic and logical methods had already provided theoretical steps for content analysis.

At its origin, textual analysis focused on documents that could be referred to as "technical" in so far as they contained presentation rules and a specialized discourse (administrative, institutional, scientific, political, etc.). In his work, Pêcheux (Pêcheux, 1969) dealt with documents such as parliamentary speeches, trade union texts and others. According to him, in Pêcheux's sense, discourse analysis is a multidisciplinary (qualitative and / or quantitative) approach that studies the content of discourse. This approach is concerned with organizing the oral and written discourses that are under study. Pêcheux was inspired by the work of Roman Jakobson, especially regarding the functions of language. Jakobson distinguishes six functions in language:

1.) the referential or representative function, where the statement gives the state of things (also called semiotic or symbolic); 2.) the expressive function, in which the subject expresses his own attitude towards what he is talking about; 3.) the conative function, where the statement aims to act on the recipient; 4.) the phatic function, where the utterance reveals the links and maintains the contacts between the speaker and the recipient; 5.) the metalinguistic or meta-communicative function, which refers to the linguistic code itself; 6.) the poetic function, where the utterance is endowed with a value as such, a value that brings creative power.

The discourse also calls upon the phatic function, in which the utterance reveals links and maintains contacts between the speaker and the recipient; and *the meta-communicative function*, which refers to the linguistic code itself as understood by Jakobson, and which leads to verbal interactions. This approach gave rise to a new pragmatic analysis of interactions, thus allowing us to examine modern-day forms of discourses.

2.3. A basic approach to an argumentative analysis in statements

Breakthroughs in logical analysis came from linguists such as Bally, and logicians such as Quine, Russell and Frege, who treated problems of representation (Larouk, 1993) with predicative relations. Predication can be separated into theme and predicate thanks to a certain relation of order. Lyons suggests the terms 'topical' and 'commentary'. "Expressive" and "referential" functions are thus found in the works of Charles Bally, who theorized a stylistics of discourse by observing this textual arrangement. A document therefore bears linguistic inscriptions that convey acts of discourse. An act of discourse is an act of expression and an act of representation as Charles Bally specified by focusing on enunciation. A predicate is what is affirmed about a referent as designated by the subject. Bally defines the predicative relation (page 101) in the following terms:

"*Every utterance logically includes two terms, the thing that is spoken of and what is said about it. What is said about it is the statement or predicate (in the broad sense). The term, which is the purpose's occasion, is the theme or the subject (in the broad sense)*".

(translated from French: Toute énonciation comprend logiquement deux termes, la chose dont on parle et ce qu'on en dit; ce qu'on en dit est le propos ou prédicat (au sens large), le terme, qui est l'occasion du propos, est le thème ou sujet (dans le sens large)).

Language thus provides various types of predicative relationships, as in this verbal statement:

<1> My disability rights [lower] /
Theme [predicate] = Term + [quote] =
Theme + [rhetoric]
A + B = Topic + [comment].

We find that the predicative structure is always binary:

{P = [ATerme + Bpredicate]} with
{Phrase = A [My disability rights] + B[drop]}

The relation theme/predicate makes it possible to "locate the dynamic aspect of the information contained in the enunciation". Therefore, the relative predicate enriches the subject.

Questions were raised regarding the elements that describe a technical document, based on observations made on textual documents provided by the MDPH: more specifically, what are the salient features that represent the intra-textual discourse, which is itself targeted by linguistic content. The work of indexing starts from the textual data in its original form in order to end with a representative form of meaning, summarized by Michel Le Guern's proposition (Le Guern, 1984: 2): *"The descriptor is not a word of the language that belongs to the lexicon (language), but it is an updated word. Such updating entails the construction of the syntagma. The descriptor is not a word of language but rather a syntagma of discourse* ". (translated from French : Le descripteur n'est pas le mot de la langue en tant qu'élément du lexique (langue), mais le mot actualisé. Cette actualisation passe par la construction du syntagme. Le descripteur n'est pas mot de langue mais syntagme du discours).

In the sense of Le Guern, the content of the document is represented by the list of extracted Nominal Syntagmas (SN) or Noun phrases (NP) which refer to extra-linguistic discourse. Thus, the SNs are found in the following example:

<2> / The economic policy of ***France*** must respect the recommendations of ***Europe***/
<21> / France / <23> / The economic policy of France /
<22> / Europe / <24> / Recommendations of Europe

The "simple" referential terms represented by NP = <**France, Europe**> are, to a certain extent, items of knowledge that are extracted from the textual document in a terminological way. The entire list $<2_1>$, $<2_2>$, $<2_3>$, $<2_4>$ creates the corpus's referential environment.

Michel LeGuern integrated C. S. Peirce's semiotic contribution to his theoretical approach in order to understand the referential mechanism [pp. 23-24].

"*The word in language, unlike its occurrences in discourse, has no extra-linguistic reference: the sign / object relation, in Pierce's sense, broadly corresponds to the Saussurian signifier / signified relation; the signified aspects are also a part of the language's structure. In order for the descriptor to fulfill its function, which is to relate an object - an extralinguistic entity - to a document that will provide information on this object, the descriptor must be an index sign.* (translated from French: Le descripteur n'est pas le mot de la langue en tant qu'élément du lexique (langue), mais le mot actualisé. Cette actualisation passe par la construction du syntagme. Le descripteur n'est pas mot de langue mais syntagme du discours). According to Le Guern, this operation makes it possible for predicative properties of textual structures to be updated by relating the properties with the objects of extra-linguistic reality in which the discourse environment is contained. The desired linguistic property is therefore the part of the discourse that bears reference to extra-linguistic reality, and the Nominal Syntagma (Noun Phrase) is the smallest part of the discourse with such a property.

3. WHAT TYPES OF STUDIES FOR SPECIALIZED DOCUMENTS?

3.1. Characteristics of the corpus

Our corpus consists of technical documents produced by the administration of social affairs (Rhône, Calvados, Isère) and intended for an audience of people with disabilities. The latter individuals have motor, physical, auditory, visual, and / or psychic impairments. In order to improve the users' social status and to expedite their requests, analyzing the content of the documents becomes necessary in an ef-

fort to suggest a simpler process to access digital administrative information. We note that the MDPH technical documents are composed of **linguistic data** and **graphic data** (images, frames, initials, symbols, etc.). Data is contingent on the producers of the documents in paper form and is intended for aid applicants. Mixed structuration is observed in textual and/or iconographic blocks. These documents are composed of linguistic signs (titles, legends, summaries, acronyms, etc.) and iconographic signs (figures, tables, etc.). This bimodal information is sometimes numbered. These documents are designed and intended for the general public. They are consulted and interpreted within the context of form-filling transactions in order to have access to state aid.

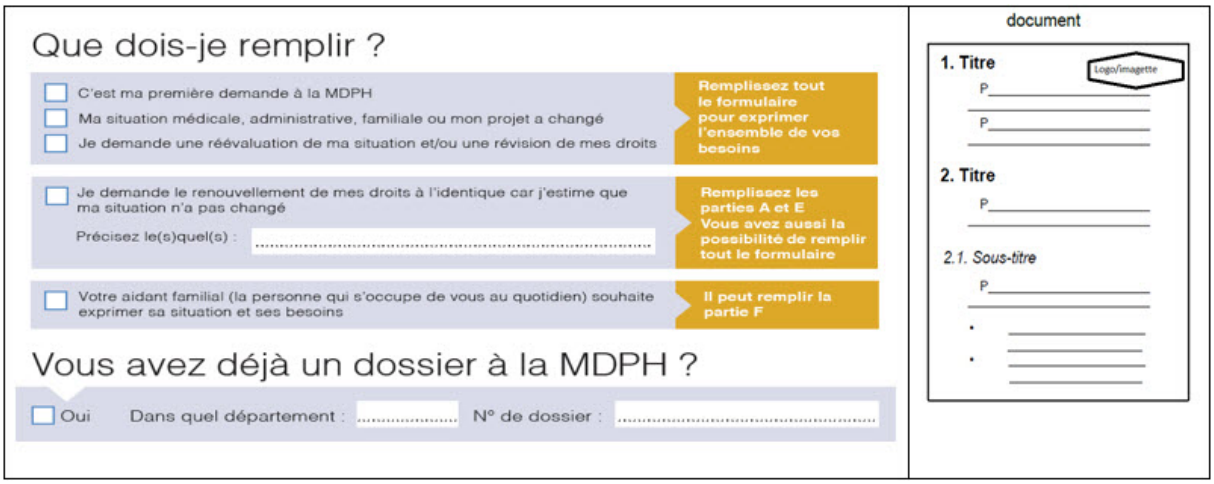

Figure 1. Example of a fragment of the technical corpus (Block with title)

Thus, this corpus is made up of statements formed through sequences of discourse that are produced by the administration, via documents for requests that are formulated by the disabled users. These textual documents reveal informational situations that highlight ties with the exclusion or inclusion of a specific status. Referential links serve to classify disabled persons in targeted categories, such as the following propositions:

<3> / If the person concerned is under 18 years of age, his / her parents are invited to answer for him/her./

We found that our documents presented a structuring of the zones (*text blocks in the form of consecutive paragraphs*) with an indication of the territory location (*region/department/tow/commune/*), but also through other logical and linguistic elements intra/inter-document.

We are interested in the medium as well as the content in the aim perspective of reorganizing the linearity of information to facilitate access to the semantics of the questions and expressions that are conveyed in these working documents (institutional or administrative).

3.2. Towards a thematic and logico-cognitive analysis of the contents

According to the framework of the MDPH documents, we describe the work we undertook to delineate the formal frameworks of the documents and their exploitation in order to reorganize information entries. To design a computer tool, we started with the corpus of technical documents, which respects a certain homogeneity of content that is linked to the producers of institutional and administrative documents. We attempted to define the notion of linguistic content as related to the discourse that is used in technical documents. We explored the concept of textual enunciation which refers to referential objects. This information communication analysis calls upon the references of discourse and is based on the semiotics of the document. We asked the following question, paying particular attention to textual data in technical documents: *What theme is spoken of and how is it delimited in relation to cognitive elements?*

3.2.1. A thematic analysis of block titles

The terminology aims to locate the rel-

evant information that is contained in a text of the technical genre. The overall meaning of utterances often results from the meaning of the terminological units in the utterances, while entering into a process of constructing meaning throughout the enunciation (and thus of texts).

<4> / The MDPH, This is the Local Agency for persons with disabilities. It studies your situation to meet the needs related to your disability /

The desired linguistic property is therefore the part of the discourse that bears reference to extra-linguistic reality. We can show that the Noun Phrase (NP) is the smallest part of the discourse in this introductory paragraph.

<4$_1$>/The MDPH / <4$_3$>/ the Departmental House of Persons with Disabilities /
<4$_2$> / your situation / <4$_4$>/your handicap /

<5> / You already had a file at the MDPH / or <5> / You already had a folder at the MDPH /

<4$_1$> / The MDPH / <4$_3$> / a folder ; /a file/

The discourse updates meaning that is stabilized and allows the dynamic construction of new meanings. The different relations between thought and language that occur in enunciation lead to a progressive construction of meaning. However, this progressive construction of meaning in the statement relativizes the role of linguistic categories and categories of thought, since the relations between thought and language can be formulated in terms of an exploration of the utterance. The subject is therefore the referential construct elaborated by the producer (in this case, the administrator) on the basis of recurring textual elements inscribed in the text (the theme: what we are talking about) followed by a descriptive function in the discourse.

3.2.2. Method for describing the thematic base of block titles: An inventory of title themes

In our corpus, a document links a producer (administrator, author), and an applicant (consumer, disabled) via two elements that are a discourse (an argumentative and iconographic content) and a medium (paper). For the formalization of the database architecture, we begin with the salient parts of the technical document that evoke referential objects. Titles are viewed as prominent traces that require prioritization. This extraction makes it possible to make the inventory of the themes (SN) in the communication of the information.

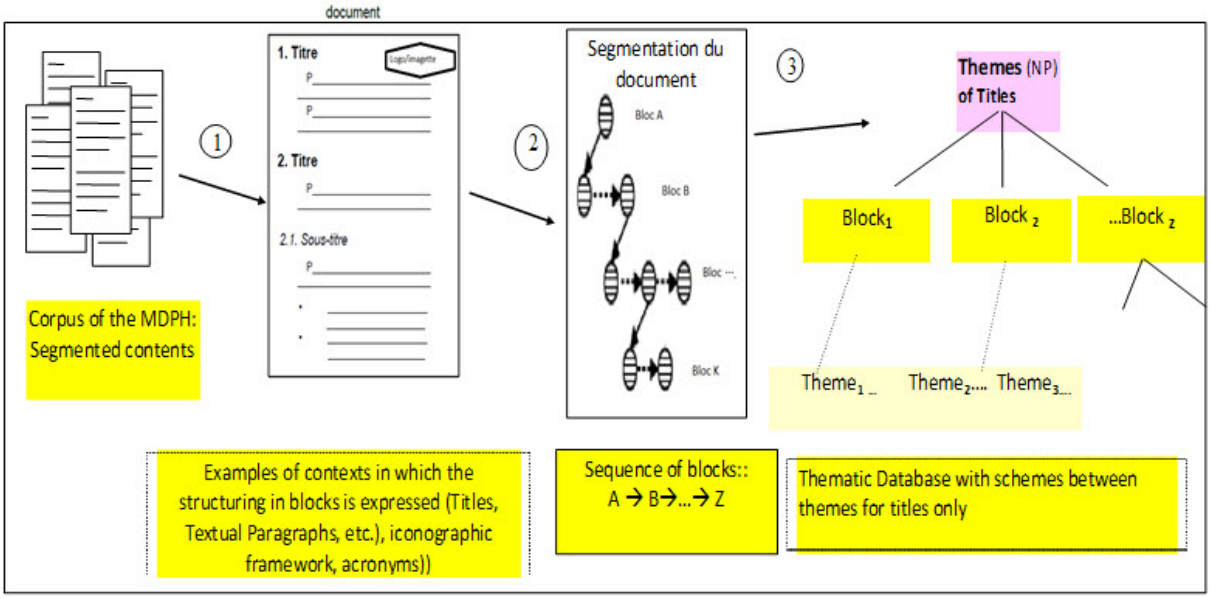

Figure 2. Content description method for the creation of a thematic base (SN) with inclusive diagrams of themes.

i. The textual data in the technical documents take the form of a list of statements (1).

ii. The study of these propositions allows us to observe block structures with frames for the titles and paragraphs with specialized content (2).

iii. The identification of topics aggregates these referential NPs to conceive a thematic base (3).

3.2.3. Access path to the content of a help form

We observed that an MDPH document connects a producer (administrator, author), with an applicant (person with a disability) via two elements that are a discourse (argumentative and iconographic content) and a medium (paper). The communicational function of documents and description situations can be found in this space. This fits well within the context of situation theory, since all of the information is supported by a situation such as territorial localization (urban / suburban), targeted state funding (state / department / metropolitan), the age to determine the recipient's orientation (specialized institutions, hospitals, schools, high schools, universities, etc.). All these signs characterize the type of discourse.

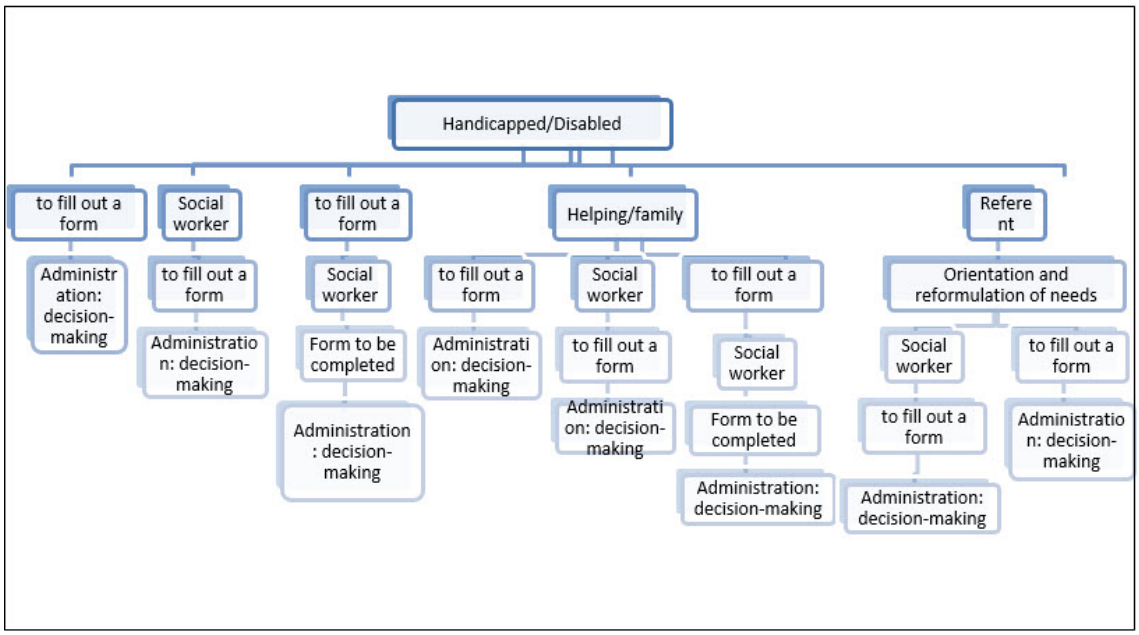

Figure 3. The formalization of an applicant's information activities: access routes to the content of a help document, Help System for Entering Information (HSEI)

The tree structure diagram is a summary of our recommendations based on the results from our previous studies. It reproduces the procedures needed to accompany a worker in his search for a suitable and optimized path. We are immediately able to recognize the effects of such a tree diagram for programming. This diagram refines the process of data entry for any requests for assistance that are solicited by the disabled persons, the caregivers, the referents and the social assistants.

4. CONCLUSION

The MDPH encounters difficulties in handling the users' requests for help and disability compensation. One of the main difficulties lies in understanding the administrative form itself, in view of the diverse situations of users and the inability for some people to express their needs and wishes, depending on their situation and their disability.

Our analysis of technical documents consisted in extracting salient elements and suggesting a way to reorganize these administrative forms so that they may be adapted and made into digital versions. This seems to be a prerequisite to improve the situations of these people. A dynamic document model would therefore need to be imagined for more interaction with the applicant. The Help System for Entering Information (HSEI) data capturing process shows the importance of support when gathering information on the needs of individuals.

Our analytical framework allowed us to identify associated themes (titles and intra-discourses), and to realize that the aggregation with the intra-stated and inter-propositional referential themes led to the logical-cognitive referential schemes of the discourse. The inter-proposal themes made it possible to fine-tune a document's information content (co-referencing, implication, causality, etc.) through its composite structure. In order to identify specificities in texts with a view to create a tree thematic construction, we suggested a knowledge representation model to guide the discursive analysis. This took the form of axes that structured a block or of crossed themes that allowed intra-documentary navigation be-

tween text blocks.

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Conflict of interests

The authors declare no conflict of interest.

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EVALUATION OF COGNITIVE FUNCTIONS, PERSONALITY AND REGULATORY SPHERE IN MINORS WITH DEVIANT AND DELINQUENT BEHAVIOR WITHIN THE AUTHORITY OF THE PSYCHOLOGICAL, MEDICAL AND EDUCATIONAL COMMITTEE

Dr. Varvara V. Delibalt, Moscow State University of Psychology and Education, Moscow, Russia,
E-mail: delibalt@yandex.ru
Dr. Artyom V. Degtyaryov, Moscow State University of Psychology and Education, Moscow, Russia,
E-mail: art_milk@mail.ru
Dr. Elena G. Dozortseva, Moscow State University of Psychology and Education, Serbsky National Medical Research Centre for Psychiatry and Narcology, Moscow, Russia,
E-mail: edozortseva@mail.ru
Dr. Rimma V. Chirkina, Moscow State University of Psychology and Education, Moscow, Russia,
E-mail: rimmach@bk.ru
Dr. Nikolay V. Dvoryanchikov, Moscow State University of Psychology and Education, Moscow, Russia,
E-mail: dvorian@gmail.com
Dr. Vladimir A. Pimonov, Moscow State University of Psychology and Education, Moscow, Russia,
E-mail: p_vlad70@mail.ru
Dr. Mikhail G. Debolsky, Moscow State University of Psychology and Education, Moscow, Russia,
E-mail: mdebolsky@mail.ru
Dr. Dmitry A. Malkin, Moscow State University of Psychology and Education, Moscow, Russia,
E-mail: dampsy@rambler.ru

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ABSTRACT

Education of children and adolescents with special needs due to health problems requires particular forms, conditions and assistance by pedagogues and psychologists. A psychological, medical and educational committee (PMEC) appoints a certain program of special education based on the complex evaluation of the psychic state and (dis)abilities of the child. In 2013, inclusion of children and adolescents with deviant behavior in the competence of PMEC became a new challenge for their traditional activities. Development of recommendations for special educational programs aiming at deviant behavior prevention differs greatly from their original tasks, requires comprehensive psychological evaluation, better psychodiagnostic skills and knowledge of various ways of subsequent work with children. The problems arising and ways of their solution are discussed in the article.

1. INTRODUCTION

In Russia, starting from 1920s different experts occupied themselves with defining typology and structure of divergent child development in order to determine the appropriate educational pathway. These expert circles varied depending on the concept which prevailed among scientists as well as officials at the head of education and medicine. But it

Corresponding Author
Dr. N. V. Dvoryanchikov, Moscow State University of Psychology and Education, Moscow, Russia, E-mail: dvorian@gmail.com

was always clear that «Disturbance in mental development of children must be viewed integrally and systematically. Hence, results of psychological and educational diagnosis must be coupled with data obtained by professionals in different areas» (Semago M. M., Semago N. Ya., 2014). Beginning with 1949, standards of medical and educational committees determined the committees' membership and provisions for referral of children to specialized schools depending on deviations in their development. The choice of an educational institution was based on the medical model and the prevailing principle of a nosological diagnosis.

In the 1990s the educational system of the Russian Federation started to employ psychologists and some new institutions appeared to help children who needed psychological, educational, medical and social aid - Centers for psychological, medical and social support. Because of that, medical and educational committees were changed to psychological, medical and educational committees (PMECs) and started to function on the basis of centers for psychological, medical and social support. Psychological diagnostic techniques became instruments for evaluating child's condition.

The 2000s marked conceptual changes in the activity of PMECs in addition to some organizational and substantial ones. Nowadays examination of a child doesn't result in diagnostics, identifying an appropriate educational institution type or general recommendations for choosing a suitable educational institution. Instead, it results in a collective decision and complex recommendations for the child's further education, development and correction combined with a description of particular educational circumstances, specific activity directions for all professionals involved in complex support given to the child in the educational environment (Semago M. M., Semago N. Ya., 2014).

In 2012, for the first time the notion of a «student with disabilities» was introduced into the Russian legislation, describing a person with defects in their bodily and/or psychological development (as confirmed by a PMEC) and impeding their education without specially organized setting.

A PMEC ascertains the existence of disabilities and the need for specially organized conditions for education and upbringing. In the Federal formal educational standard, it is suggested that educational pathways, programs and settings for students with disabilities are to be adjusted to their capabilities on the basis of complex assessment of personal, meta-subject and subject results of mastering of adapted primary education programs, the conclusion of a PMEC and parents' opinion.

Nowadays the range of problems with which children and adolescents happen to be examined by PMEC has widened. Apart from deviations in development of sensory system, intelligence, speech, locomotor system, autistic disorders, PMEC deals with school and social adjustment problems.

One of the most important goals of state policy in the interests of children is implementation of children's rights, as stated by the Constitution of the Russian Federation. At the same time implementing the constitutional right for getting (special) education shouldn't lead to segregation and infringement on other child rights. This idea was reflected as the main principle of the state policy and legal regulation of interrelations in educational sphere. Thus, the law on education determines the principle of the educational system adjustment to one's level of training, specifics of development, abilities and interests. The implementation of this principle necessitates taking an individual approach to students, including steps to offer psychological, educational, medical and social assistance to children, having difficulties in mastering general educational programs, personal development and social adjustment, notably underage students pronounced (in cases provided by criminal procedural law) to be suspects, accused or defendants on criminal cases.

Provision of such assistance is assigned (by the law «On Education in the Russian Federation») to the centers for psychological, educational, medical and social support. Additionally, duties to carry out complex psychological, medical and educational examination of children for the purpose of timely detection of physical and/or mental development and/or behavioral deviations of children are entrusted to PMECs. Moreover, the committee not only performs examination, but also writes recommendations to provide children with psychological, medical and educational assistance and organize their education and upbringing, as well as confirms, improves or corrects recommendations given previously. It should be noted that such activity is a specifically Russian practice, because there is a specific interdisciplinary team of experts including a psychologist, a psychiatrist, a speech therapist, a specialist in defectology and a social pedagogue in the committee.

Carrying out examinations of children

and adolescents with deviant behavior and making appropriate recommendations is currently a new task for a PMEC. Development of recommendations for special educational programs aiming at deviant behavior prevention differs greatly from their original tasks, requires comprehensive psychological evaluation, better psychodiagnostic skills and knowledge in various ways of subsequent work with children.

The notion of deviant behavior should be subdivided into two forms differing in severity and intensity. The first is deviant behavior in its proper sense, that is, violating generally accepted age norms and requirements (truancy at school, leaving home and vagrancy, taking psychoactive drugs, aggressive behavior, precocious sexual experience etc.), but it is not penal. The second, a more serious one, includes delinquent behavior which breaks of a criminal statute. However, due to different circumstances minors are not held responsible for a criminal offense, and correctional and educational measures are taken by educational facilities. In both cases differentiated recommendations for working with underage children are necessary. Hence, the PMEC has to perform two kinds of examinations depending on the category of children and adolescents with deviant behavior:

1. Minors with deviant behavior;
2. Minors with delinquent behavior, that is, conflicting with the law.

It is necessary to differentiate the activity of a psychological, medical and educational committee and a complex forensic psychological and psychiatric expert examination. A forensic expertise is performed in the cases when the legal investigation and trial need (in addition to the results of a clinical study) information about clinical condition, mental development, personality traits of charged juvenile offenders to decide about their sanity and the degree of their responsibility. It is this evaluation that is carried out in the health care system expert institutions (Makushkin E. V., Badmayeva V. D., Dozortseva E. G., Oshevsky D. S., Chibisova I. A., 2014). PMEC deals with problems related to complex assistance and education organization and pertains to the educational system.

Mild cases of deviant behavior can be corrected within the authority of general educational institutions. For children and adolescents with more serious behavioral problems two types of educational institutions exist in Russia – open and closed specialized teaching and education facilities (schools).

Students aged 8-18 who need special pedagogical approach are admitted to open schools on the basis of decisions passed by the commission on minors and their rights, resolutions of the psychological, medical and educational committee with the consent given by their parents or other legitimate representatives, as well as by the minors themselves (if reached the age of 14). The question if a minor needs any special pedagogical approach is within the authority of a PMEC, whose resolution is taken into account by the commission on minors and their rights when deciding if they are to be allowed to a specialized publicly held school.

Minors aged 11-18 who need special educational setting and pedagogical approach are admitted to close educational facilities on the basis of findings of the court or its verdict if they

1) are excluded from criminal liability due to the fact that by the moment they had committed a socially dangerous act they hadn't reached the age of criminal responsibility (16 or 14 for some serious offenses);

2) did reach the age of criminal responsibility, but because of their mental underdevelopment (not related to a mental disorder), at the time of performing a socially dangerous act they weren't fully aware of the real nature and social danger of their (non-)actions or were unable to control them (this condition should be stated by forensic psychiatric-psychological expertise);

3) are convicted of severe or medium severe offenses and indemnified by the court in accordance with the procedure established by the Criminal Code (provision 92 the Criminal Code of the Russian Federation).

The PMEC is given a completely new task of complex and thorough examination of children and adolescents with deviant behavior, as well as those being in conflict with the law. This necessitates special methodological support for using diagnostic tools, development of the committee's activity model, specific organizational procedures and interaction between different institutions (the court, prosecution service, investigation and other bodies) while taking into account the examined minors' legally significant context, age and their clinical specificity.

2. METHODOLOGICAL SUBSTANTIATION

To single out the criteria for diagnostic evaluation of minors with deviant and delinquent behavior it is necessary to define these concepts more precisely. In deviantology the term «divergent (deviant) behavior» connotes a persistent behavior of a personality diverging from the most important social norms, and incompatible with common social values, rules, behavioral stereotypes, expectations, established attitudes, vividly detrimental to the society and the personality itself, endangering interpersonal well-being and is accompanied by social maladjustment (Zmanovskaya E. V., 2003). Additionally, such behavior is observed to increase in puberty and become less prominent after the age of 18 (Schneider L. B., 2007).

In different psychological classifications various criteria of deviant behavior are singled out. The type of violated norm, psychological goals of the behavior and its motivation, implications and the inflicted damage as well as individual and stylistic behavior characteristics can serve as examples. The identified distinctive features of deviant behavior are as follows (Zmanovskaya E. V., 2003):

1. Incompatible with generally accepted and officially established social norms.
2. Negatively judged by other people.
3. Harmful to the personality itself and the surrounding.
4. Predominantly and persistently recurring (frequent or long-lasting).
5. Considered within medical norm.
6. Accompanied by various manifestations of social maladjustment.
7. It has a pronounced individual, age and gender specific peculiarity. Deviant behavior varies in manifestation in different periods of one's life.

In law deviant behavior is understood as everything that contravenes currently established legal norms and is threatened by punishment. The principal criterion for legal treatment of an individual's actions is the degree of their danger to the society. According to the character and extent of their risk to the society, actions are subdivided into felonies, administrative, civil and juridical infractions, disciplinary cases. Hence, legal assessment of deviant behavior describes delinquent behavior. In other words, delinquent (antisocial) behavior is one that contravenes legal norms, threatening public order and the well-being of people around. It is these actions or non-actions that are criminalized by the law.

Deviant and delinquent behavior are accompanied by low life standards, lowered criticism towards one's actions, cognitive distortions (in perception and understanding of what is going on), increasingly negative self-feeling and emotional deterioration.

The term «deviant behavior» can be used for children from 5 years of age and older, in the strict sense – not below 9 years.

In childhood (5-12 years) the following forms of deviant behavior are prevalent: violence against younger children and children of the same age, cruelty against animals, stealing, petty offense, vandalizing of property, running away from home and vagrancy, truancy at school, violent behavior, scandal and backbiting, lying, racketeering (begging money).

In adolescents (over 13 years) the following forms of deviant behavior are predominant: hooliganism, thievery, robbery, vandalism, physical violence, drug trade, running away from home and vagrancy, truancy at school or abandoning of education, lying, violent behavior, promiscuity, graffiti (writing obscenities and drawing on walls), subcultural deviations (slang, putting on scars, tattoos). Adolescent deviant behavior is characterized by the importance of age group values.

As observed by many authors, in adults (over 18 years) delinquent behavior mainly appears in the form of law violation, leading to criminal and civil responsibility and a corresponding punishment (Zmanovskaya E. V., 2003).

To understand the specifics of deviant and delinquent behavior development, various determining factors are studied. The majority of researchers agree in the opinion that it is impossible to talk about the role of only one factor in deviant behavior genesis, most often formation of behavioral disorders is a matter of different factors.

In the American psychology an attempt was made to describe some general development scheme which includes the time parameter and 4 contexts, in which development unfolds (Wenar C., Kerig P., 2007). The time parameter characterizes the dynamics of psychological changes, as the child grows, and is illustrative for understanding the stages of development which are marked by qualitative changes and behavior reorganization, and also characterizes the most important life events, happening at various ages. The four contexts in which development unfolds and which have an effect on the behavior, include the following components: organic (brain functioning,

the overall temperament), intrapersonal (cognitive abilities, emotions, personality characteristics), interpersonal (relationship with the immediate environment) and transpersonal (culture, social class). For each of the contexts there are corresponding risk factors (that is, conditions and circumstances increasing likelihood of deviant development), vulnerability (that is, susceptibility to various risks), preventing factors (that is, factors which are conducive to normal development) and preventing mechanisms (that is, mechanisms which describe the activity of the protective factors).

Summarizing various psychological theories (psychoanalytic, cognitive, behavioral) of normative psychological development, it is possible to single out variables playing vital role in the well-being of a child, which can also be markers or indicators of deviant development: attachment, initiative, self-control, moral development, cognitive development, anxiety and defense mechanisms, gender identity, aggression, relationship with children of the same age and sociability, labor activities and vocational self-determination (Wenar C., Kerig P., 2007; Zmanovskaya E. V., 2003; Zmanovskaya E. V., Rybnikov V. Yu., 2010).

For diagnostics of peculiarities in psychological development of children with deviant and delinquent behavior the category of «psychological age» is pivotal. In L. S. Vygotsky's cultural-historical psychology, psychological age is understood to mean a unit of analysis of psychological development. The concept of psychological age comprises social situation of development, leading (In L. S. Vygotsky's and his followers' concept, "leading" activity designates a general activity specific for a certain age period (e.g. play is the leading activity for preschool age period, learning – for primary school period etc.) activity, new formations and age crisis.

Within the context of the cultural-historical theory two approaches for understanding of deviant behavior are notable. The first approach prioritizes disruptions to the social situation of development. Abnormalities in the system «the child and their immediate environment» complicate the child's relationship, cooperation with other people and lead to social and psychological maladjustment, that is, disturbances in other systems of relationships (Tikhomirova A. B., Moskvichov V. V., Lapshin Yu.G. et al., 2006; Zaretskii V. K., Smirnova N. S., Zaretskii Yu.V., Evlashkina N. M., Kholmogorova A. B., 2011; Delibalt V. V., Bogdanovich N. V., 2017). In the second approach what is emphasized is deformations in the meaning content and in the conditions where the leading activity proceeds (Lishin O. V., Lishina A. K., 2009; Delibalt V. V., Bogdanovich N. V., 2017). In this approach deviant behavior is seen as a disturbance in semantic regulation.

In a number of medical works deviant and delinquent behavior is seen not only as problem behavior, but also as a behavioral disorder. For example, in DSM-IV classification behavioral disorders mean a recurring and persistent pattern under which other people's rights or social norms and standards are violated. Also, four types of behavioral problems are abstracted: aggression towards others, property destruction, lying or stealing, serious infringement of rules (Wenar C., Kerig P., 2007).

However, it is important to note, that behavioral disorders differ from problem behavior. The latter can be a part of normal development or come as a result of adaptation to the adverse environment. Moreover, deviant and delinquent behavior can manifest itself both in relation to normal mental development and go together with abnormal mental development (dysontogenesis). Medical classification of behavioral disorders is based on the psychopathological and age criteria. According to them, behavioral disorders are singled out, which corresponds to medical diagnostic criteria, that is, they reach the extent of a mental disease. A number of cases related to disturbed development, emotional-volitional cessation of behavior control, and underdevelopment of one's ability to predict and control one's actions can trigger and intensify aggressive, deviant and delinquent behavior (Makushkin E. V., 2009).

In the Russian clinical and psychological practice the following kinds of disturbed development are abstracted: arrested, disharmonious, developmental retardation, distorted, deficiency, dissociated and defected development (Makushkin E. V., 2009).

In expert judgement about dysontogenetic psychological and behavioral disorders in minors with divergent behavior it is necessary to consider following parameters: 1) deficiency (lack in development or significant decrease) in the level of intellectual, cognitive performance; 2) distortion in perception of a criminal situation (a tendency to follow the leader, amenability – in the cases of collective delicts); 3) limited (impaired) self-reflection; 4) decrease (or notable disruption) in volitional control over one's behavior; 5) inconsistency of motivation (behavioral com-

ponent disorder); 6) diminished control over one's actions (to the extent of impulsiveness); 7) (in)ability to overcome one's drives; 8) incompleteness of one's critique and prediction; 9) decreased capacity of adjustment (in the family, at school, one's reference group, social environment, including criminal subculture) (Makushkin E. V., 2009).

It is possible to refer critique, adequacy and learnability to differential diagnostic criteria for selecting typological variants of developmental deviations. Practice showed that the entire triad works in all situations when analyzing psychological development of a child - both relatively normative and deviant (Semago M. M., Semago N. Ya., 2011).

If behavioral disorders appear in relation to severe mental illnesses, then they cannot be analyzed apart from the clinical presentations of these illnesses.

Hence, in the course of diagnostic examination of minors with deviant and delinquent behavior it is necessary to assess the specificity of one's social situation of development and the leading activity, correlate cognitive functions, peculiarity in personal and regulatory spheres and in behavior with one's psychological age.

3. PRELIMINARY ANALYSIS AND APPROBATION OF THE EXAMINATION PROCEDURE

At the stage of formulation of examination procedure and the committee activity model, a preliminary analysis was performed on the data of juvenile criminals' personal records. They are students of specialized closely held teaching and educational facilities (=schools), assigned chiefly under the ruling and verdict of the court. 230 personal records from 17 regions of the Russian Federation dated 2016-2017 have been studied. Before the actual analysis was carried out, the following parameter set for personal records analysis was determined:

- The students' age.
- Reasons for being referred to the school (the character of the deed).
- Education (present/absent, what type thereof, if present).
- Level of health (presence and content of medical records, if any), concomitant diseases (present/no data), availability of the PMEC opinion record (available/unavailable), availability of any recommendations from the psychological, medical and educational committee (available/unavailable, recommendations details).
- Family status (two-parent/broken family, the minor is under trusteeship/has the status of an orphan/is without parental care (has lived in an orphanage)), family characteristics (availability of data, family specifics).
- Symptoms of deviant behavior.
- Psychological characteristics (availability, legal case materials), psychological examination opinion record (availability, content).
- Social environment (groups the student belonged to and his/her own status; friends, their social status, bad habits, delinquency, negative influence).
- Criminal debut (at what age one's first crime was committed; if it is not the first crime, what the age was at the date of committing a delict (according to the criminal case data)).
- Prognosis ((in)favorable/positive if assistance is provided).

Personal records analysis has shown age composition of juvenile delinquents ranging from 11-12 to 17 years. Predominantly, they committed habitual illegal acts of little to moderate severity.

Education. Students in the sample group are pupils of 5^{th} - 9^{th} grades. Out of 230 children: 40% repeated a year in school, 9% of the respondents have vocational training, 17% are doing a specialized educational course for children with learning disabilities. Over 80% show lack of motivation and negative attitude towards education, habitually miss classes, ignore doing homework.

Level of health, availability of the psychological, medical and educational committee's opinion record. Almost all of the respondents have their health status as «healthy» and have no concomitant diseases (except 8% of the respondents with chronic somatic diseases). PMEC opinions are present not solely in the personal records of the students with learning disabilities doing a specialized educational course, but also in 75% of children doing the general educational course. Recommendations found in most PMEC opinion records appear to be very brief in size and perfunctory in character.

Family status. 26% of the students are brought up in two-parent families, 20% live in

broken families. In the remaining cases there were annulments, or the child has a status of an orphan, 68% of families belong to the category of socially endangered or low-income families.

Symptoms of deviant/delinquent behavior. The following general properties of deviant behavior were found: drinking alcohol (47%), drug addiction (11%), smoking (100%), physical strength demonstration (22%), thievery (47%), leaving home (19%) and vagrancy (7%), pronounced aggression (67%), toxicomania (13%), misconduct, ignoring educators' remarks (84%).

Psychological characteristics are only contained in forensic documents, where availability and degree of detail varies greatly. Examination of case papers has shown that psychological characteristics are written in a highly non-uniform manner. They describe specifics of adolescent's social interaction. The respondents show fits of anger, tend to follow somebody's lead, are hyperreactive, prone to conflict, impulsive, temperamental, aggressive. They are very often qualified as egocentric, emotionally unstable and immature. About 69% of the students have disorders of attention, assiduity and emotional-volitional regulation.

Social environment is also described in some case papers. Quite frequently (over 50%) case papers contain information that the children have other children of the same age or older as their friends, namely those with drug and alcohol addiction, previous conviction or registered in police departments for minors. Some are negative leaders themselves (32%) and have no close friends.

Criminal debut is mostly specific to the age of 12-13 years, more than 70% of the children have already been registered in police departments for minors, prior their last delict and only 30% of the students had no previously recorded criminal wrongdoings.

The respondents received mostly unfavorable prognoses (as follows from case papers, prognostic risks are a motivational factor for decisions about referral of a child to a specialized closed teaching and educational facility).

In the personal records of 11 adolescents there is information about their behavior, learning activity, psychological traits which were indicative of a probable pathology (pathological development of character, low level of intelligence (observed with no diagnosis), inappropriate behavior etc).

The facts mentioned above show the necessity for examining minors by psychological, medical and educational committees. They allow defining a concrete direction and spheres of complex evaluation, which is necessary for development of a model of PMEC work with minors with deviant behavior.

As a result of the analysis made on the personal record data of students from specialized closed teaching and educational facilities an approbation program was developed for examination procedure and the committee activity model.

Currently in the work of psychological, medical and educational committees with minors having behavioral disorders a traditional, stating the present situation model in outpatient setting is used to provide them with a one-time examination visit. Within this model the committee is given certain documents and the committee diagnostic session takes place for an hour. This is followed by writing the committee's opinion and recommendations. As part of the project being developed a task is given, to work out a committee activity model, set out reasons for the examination procedure and make diagnostic tools.

The aim of minors' examination procedure testing is to optimize PMEC work with children having behavioral disorder of varying severity and to create special educational setting for them).

The approbation program goals are as follows: 1) go through the procedures currently in use by committees and commissions in different regional institutions with the view of 2) identifying most common difficulties experienced by them and 3) introduce them to guidelines related to work with minors having deviant and delinquent behavior; 4) test the examination procedure and the committee activity model (in no less than 20 runs) and also 5) motivate and inspire members of the committees and commissions to embrace new developments in psychology relevant to the work of PMECs.

The diagnostic and counseling centers for children and adolescents in Kaliningrad and Saratov regions served as testing grounds due to the PMECs functioning in them.

4. THE COMMITTEE ACTIVITY MODEL; AN INSTRUMENT FOR STRUCTURED ASSESSMENT OF SOCIAL SITUATION OF DEVELOPMENT; EXAMINATION PROCEDURE

Specialists in various areas take part in the work of the committee – a psychologist (clinical psychologist), a social pedagogue, a psychiatrist (neuropsychiatrist), a defectologist, a logopedist. The participation of these specialists allows to give a maximum detailed presentation and work out recommendations for an individual minor's assistance program. As a matter of fact, all consecutive practical work with a minor is organized on the basis of PMEC conclusion and recommendations.

The authors have developed the committee's «Expert activity model» containing a number of steps.

In the first step the PMEC social pedagogue goes through and analyses the materials possibly including different documents which describe the minor's social situation of development, teachers' reference, previously made psychological conclusions, medical documents, the documents written by the commission on minors, the police departments for minors, and the decision, ruling or verdict of the court (if available). In studying the documents, the social pedagogue uses the method for structured assessment of the social situation of the minor's development which has been worked out by the authors as part of the project. After that, the social pedagogue gives the report to the other committee members, on the basis of which a set of methods appropriate for each specific situation is selected.

In the second step the minor is examined by the psychologist together with the psychiatrist. This step includes clinical conversation with the minor, joint psychological and experimental examination and observation of the minor. If the committee works in special close teaching and educational facilities, such examination can be carried out for several days.

In the third step the minor is examined by the logopedist and the defectologist.

In the fourth step the committee specialists perform joint analysis of the examination results, compare the data with the materials studied in the first step, after which a detailed opinion is worked out containing conclusions and recommendations.

The PMEC's structured assessment of social situation of development (with the presence of a minor having deviant behavior) reflects the now existent in psychiatry and psychology holistic, multifactor, biological, psychological and social approach to the problems connected with deviant behavior in adolescence (Holmogorova A.B., 2010). This approach considers psychological, social and biological contexts. The instrument of structured assessment, developed by the authors also considers the legal context.

Each of the aforementioned contexts comprises a wide range of relevant factors which can either be preconditions, or factors that prevent deviant behavior development in a particular minor, and therefore they can be personality resources.

As stated before, deviant behavior is understood as a person's persistent behavior that contravenes the most important social norms, including provisions of administrative (deviant behavior) and criminal (delinquent behavior) law, has seriously detrimental effect on the society and the personality itself, and is also accompanied by its social maladjustment (Dozortseva E. G., 2004; Dozortseva E. G., Badmayeva V. D., Oshevsky D. S., Alexandrova N. A., 2011; Zmanovskaya E. V., Rybnikkov V. Yu., 2010).

Coming together as an integral system and interacting, all the contexts make up a specific social situation of development, in which the minor is found at the given stage of his/her life. (Aron I. S., 2013; Karabanova O. A., 2007; Sultanova A. S., Ivanova I. A., 2011).

It is this particular social situation of development that PMEC specialists consider. Even with a small number of biological, psychological, social and legal preconditions, they must take each of them into account when working out a final conclusion on every particular case. Such an analysis in the framework of PMEC's activity is costly in terms of time and effort. An unfavorable condition of the committee's work is the time limitation of the minor's examination (up to 60 minutes), which is insufficient for profound diagnostics.

In this connection the committee has to make use of methods and techniques which will, on the one hand, help reveal all the factors and, on the other hand, they won't take much time in order to structure a large amount of information obtained about the social situation of a particular minor's development.

One of such methods can be the proposed «Structured assessment of social situation of development for minors with behavioral disorders» coming as a form to be filled in

and intended for qualitative analysis of legal, biological, psychological and social factors. It is first filled in by the PMEC social pedagogue, based on the provided materials, and then added to by other committee specialists.

The psychological factors are predominant in this model. They ultimately determine the minor's behavior, and so the PMEC members must place emphasis on these factors in the course of diagnosing and deciding on any conclusions. These include the minor's personal, cognitive and behavioral traits. The precise psychological factors that can be found in minors with deviant behavior in the course of PMEC activity include uncritical attitude to deviant and antisocial forms of behavior, stressful experiences, negative feelings towards those around him, low self-esteem, suggestibility, accentuated character traits, an inclination to protest and negativism, lack of interest to socially positive activities etc.

Among biological (clinical) factors, detected by psychologists there are mainly consequences of organic cerebral affection, dysontogenesis manifestations of different kind and origin and others.

The micro- and macrosocial factors of deviant behavior formation are of particular importance: a problem, broken and destructive family, dysfunctional and asocial groups of children of the same age, susceptibility to influence of fashion, media (above all, the internet), etc.

The social status of minors with deviant behavior is connected with the factors which can be designated as legal. They pertain to the minor's past illegal acts of various severity, from mild to serious.

The proposed structured assessment of social situation of development form can be filled both before seeing the minor in person on the basis of the materials provided for PMEC and immediately in the course of the diagnostics process.

During the work of the committee special attention should be paid to multidimensional assessment, including socio-psychological analysis of the social situation of development, desocializing influences, social and clinical analysis of the principal psychic dysontogenesis, in case it is present (inhibited, disharmonic, asynchronous) accompanied by singling out its basic mechanism that generates it (deprivational, conflict, stress and identification related), and also including clinical and psychological analysis of manifestations of personality abnormal development and mental condition.

The psychological and diagnostic work plays an important role not only for teaching and educational process, but also for delinquency prevention and protection of rights of children. During psychodiagnostics it is important to identify factors of deviant behavior and resources for positive development, including risk factors of deviant behavior formation, preventing mechanisms, unimpaired facets of the personality to rely on in the process of practical work with minors in an educational facility. These characteristics can serve as a basis for the recommendatory part of the conclusion. Above all, it is important to look for the signs indicative of the ability to voluntarily regulate one's actions: cognitive functions, regulatory characteristics of activity during examination, personality characteristics and its degree of maturity.

These indicators entail a psychological and pathopsychological examination carried out by the specialists of the committee, as well as diagnostics of personal and psychological characteristics, personal meanings sphere, legal awareness, self-control etc.

The main principle of psychological diagnostics is an integral qualitative analysis of the data which are obtained in the course of study of the materials the committee is provided with, the information about the clinical conversation with the minor, the minor's behavior during the examination, comparison between the results of each method in isolation and the entire examination.

Psychological and diagnostic examination is a standardized and, at the same time, flexible procedure, during which minors' intellectual and personality characteristics are studied and evaluated. In the course of the minor's intellectual capabilities analysis what is carried out is pathopsychological study of perception, memory, attention, reasoning (operational and logical), learnability, general knowledge and practical orientation. To describe each of the mentioned spheres, 1-2 techniques are used. It has to be borne in mind, however, that the pathopsychological techniques are multi-aspect functional tests and give information about different spheres of psychical activity, complementing each other. Some of the most informative techniques act as principal ones and are used in all the studies (for example, memorizing 10 words, «Pictograms», «Classification»), others act as supplementary ones, allowing to modify and personalize the examination according to a particular minor's specifics (Rubinstein S. Ya., 2010). The examination of the adolescent's individual, psychological

and personality characteristics is performed in a similar way, in which with the help of questionnaires, projective and semi-projective techniques one needs to find out features of the adolescent's temperament and character (in particular, suggestibility, conformity, aggression), and also characteristics of self-concept, general social attitudes and attitudes to people from his/her surrounding, motivation. On average, the psychological and diagnostic instruments include 10-15 techniques. At the same time, direct conversation with a minor and observation are equally important sources of information as the techniques mentioned above. In all the spheres acknowledgment of deficiency must entail assessment of minor's unimpaired functions and traits as well as his/her personal resources.

The data (results) of experimental and psychological examination are prepared as the psychologist's opinion, are used in working out the committee's conclusions, decisions substantiation and recommended personalized work with the minor.

In the committee's conclusion each of the specialists presents their own part, after having agreed it with the results of the other committee members and taking into account the data of the structured assessment of social situation of the minor's development. The committee conclusion plays an important role not only in deciding about the educational pathway of the minor but also in the course of resolving complex life and legally significant situations in which children and adolescents are caught (in the latter case at the stages of pre-trial, trial and post-trial), and in the process of working out an individually appropriate assistance program. It is noteworthy that during examination of children with disabilities the committee provides a list of recommendations related to the educational program characteristics and educational process support. The list of recommendations with respect to minors with deviant and delinquent behavior must be extended by bringing in all the resources and social services of the preventive system. Only a comprehensive multi-system approach allows to level the risk factors and ensure normative setting for development of children and adolescents.

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Conflict of interests

The authors declare no conflict of interest.

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CAN INFOGRAPHICS FACILITATE THE LEARNING OF INDIVIDUALS WITH MATHEMATICAL LEARNING DIFFICULTIES?

Dr. Basak Baglama, Department of Special Education, Atatürk Education Faculty, Near East University, North Cyprus, Mersin 10 Turkey
E-mail: basak.baglama@neu.edu.tr
Dr. Yucehan Yucesoy, Department of Teaching Arts, Atatürk Education Faculty, Near East University, North Cyprus, Mersin 10 Turkey
E-mail: yucehan.yucesoy@neu.edu.tr
Dr. Huseyin Uzunboylu, Department of Educational Sciences, Atatürk Education Faculty, Near East University, Mersin 10 Turkey
E-mail: huseyin.uzunboylu@neu.edu.tr
Dr. Deniz Özcan, Near East University, Ataturk Faculty of Education, Near East University, Mersin 10 Turkey
E-mail: deniz.ozcan@neu.edu.tr

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ABSTRACT

Visualization of data has recently gained great importance in education and use of infographics is regarded as an important tool in teaching mathematics since it presents information in a clear and abstract way. Therefore, use of infographics for helping individuals with mathematical learning difficulties has become an important research question. This study aims to provide an overview on the use of infographics in teaching mathematics to individuals with mathematical learning difficulties. This is a qualitative study in which document analysis was used the collect the data. Results provided information about the definition of infographics, effectiveness of using infographics in education and facilitative role of infographics in enhancing learning of individuals with mathematical learning difficulties, namely dyscalculia. Results were discussed with relevant literature and recommendations for further research and practices were also presented.

1. INTRODUCTION

Visualization is an effective method for learners to understand complicated knowledge in learning-teaching process (Keller and Tergan, 2005). Accordingly, data visualization is a strategy to make the data visible, available and clear for learner to structure, organize, evaluate, annotate knowledge and establish communication. Through the data visualization, learner has the opportunity of making data more accessible, understandable, improvable and manageable (Tong and Bakan, 2016). Graphic organizers, draft drawings, pictograms, concept maps and simulations come into prominence in data visualization. Reading and constituting visual data have become a necessity for individuals based on the increase in visual data and digital tools. According to Saban (2002), when teachers support teaching process with images and graphics, they can reach more students. This kind of strategy includes visualizing concepts and knowledge with graphical symbols. Ware and Bobrow (2005) indicated that it is important to represent complex data with internal representative

Corresponding Author
Dr. Huseyin Uzunboylu, Atatürk Education Faculty, Near East University, Mersin 10 Turkey
E-mail: huseyin.uzunboylu@neu.edu.tr

such as mental imaging and external representatives including real objects, printed materials, video, graphics, movie and animation.

Learners frequently experience difficulties in learning conceptual knowledge and understanding multifaceted external knowledge (Chen and McGrath, 2005). In learning environments, it is aimed to facilitate and improve performance of learners through visualizing the data with various methods, techniques and strategies of technology. Nowadays, educational environments are changed and supported by various tools through technological advances. Teaching process is carried out with instructional activities and materials which transform information. Educational environments constituted with technology have led instructional activities to be carried out through computer and the internet. In recent years, digital worlds are formed and every domain of life has begun to benefit from various technologies.

One of the ways of presenting the data is visuals. Visuals are crucial in organizing the data and viewing a specific situation. For this reason, it is really important to visualize the data and use visuals in teaching environments. One of the visuals used in presenting the data is graphics (Bulduk, 2016). Graphics enables to visualize the data for comparing the data with an existing one. Furthermore, today's learning approach has revealed an effective way for presenting single dimensional data presented by classical graphics. This way is enabled by infographics and infographics as new materials is used to locate data in a desired context within certain information flow. Therefore, excessive amount of information can be presented with too little explanation. Infographics involves many components such as images, graphics, charts, texts and flowcharts. Based on its construct, infographics presents the data in a logical sequence and it emerges as an alternative structure for narrative texts about a specific subject through this feature. Infographics involves many components used in data visualization and it enables to present the data in different visual formats. It is seen that infographics has become one of the trends in today's learning approach (Williams, 2002).

There are various ways to present data. According to Weinschenk (2012), stories help learners to understand the data and establish cause and effect relationship and infographics enables to use the data through visualizing and presenting the data as a story. Transforming information and establishing communication is quicker and easier through infographics since brain analyzes the data composed of images at once but it is longer to understand a text (Smiciklas, 2011).

Infographics are defined as visualization of data in a way that audience can learn complicated data easily and consume rapidly. Data involve images, motion and audio to turn into a meaning. At this point, it is important for the data to be accurate and definite. Flexible structures, enabling to visualize the data and having alternative forms are some advantages of infographics (Schroeder, 2004). The innovative aspect of infographics is the use of various components in presenting information and understanding of constructing the content (Dick, 2013). In addition, there are various software applications developed for constructing infographics including Adobe Photoshop, Illustrator, and Corel Draw. In order to prepare an effective infographics, it is required to organize the data and flow well. In this way, clear and understandable infographics which presents necessary information in an effective way are prepared. Infographics can be presented to serve for different instructional objectives. It is easy to remind existing knowledge, show relationship between concepts, explain processes and events, present lecture content and summarize the information through infographics (Meeusah and Tangkijviwat, 2013).

It can be considered that use of visual design principals made infographics more attractive. Visual design and presentation of the data are two important factors for constituting infographics in an effective way. For this reason; finding, analyzing and using the data gain more importance. Instructional models are important in preparing infographics. According to Davis and Quinn (2013), there are several steps considered when preparing infographics and these steps are provided in Figure 1. As it can be seen from the figure, the first step is to determine the objective. It is important to identify a specific objective for preparing infographics. The second step is to determine the type of infographics to use. In the third step, it is aimed to prepare infographics in a way that learners would understand easily. Lastly, it is important to make decision on which of infographics would be used in presenting the data. This step is crucial since choosing the right components would make the content easier to understand and learn.

Figure 1. Preparation steps for infographics, Davis and Quinn (2013)

Through the use of infographics, individuals can learn information in an organized way and therefore a basis for schemas can be constituted in individuals' minds. Infographics are digital graphics and its use in education increase day by day. Infographics can attract attention easily, it is catchy and clear. It is a way of presenting data visually through graphics. Main structure of an infographic involves a title, text, a body and font and it is aimed to transform the data with a robust and clear narrative text. Considering these features of infographics which can be used to facilitate learning, this study aims to provide a comprehensive overview on the use of infographics in education, its implementations and reflections in teaching mathematics and how to use infographics for individuals with mathematical learning difficulties to facilitate their learning in mathematics.

2. MATERIALS AND METHODS

Research model, data collection and data analysis of the present study are provided in this section.

2.1. Research model

This study is based on a comprehensive literature review which aims to generate a perspective on the facilitative role of infographics for individuals with special needs. In line with the aim of the, document analysis as a qualitative research method was used. Document analysis includes the detailed examination of written materials which includes information about phenomenon or phenomena targeted to be analyzed and identification of certain categories from the analysis of the documents (Yildirim and Simsek, 2013). Documents are crucial resources in qualitative research design. Bowen (2009) emphasized that document analysis method is the analysis of published, written materials about a phenomenon. Accordingly, a detailed analysis of information in published documents is considered for a systematic examination and review in the present study.

2.2. Data collection and analysis of the data

Published materials in academic journals and books about infographics were examined in this study through a comprehensive literature review. Accordingly, relevant materials especially articles and books were identified by the researchers. All selected materials were read and interpreted by each researcher separately. Then, all materials and interpretations were brought together to obtain common categories and researchers evaluated these categories together. Lastly, these categories were analyzed in detail in order to constitute a framework for important dimensions based on the aim of the study.

After collecting the relevant documents from various different resources involving especially books and academic journals, theoretical and practical inferences were made from texts from the documents in line with the aim of the present study. In data analysis process, data were interpreted in a comprehensive way by categorizing the data as defining infographics, efficient use of infographics in general education and settings and reflections and discussion of implications of using infographics for facilitating learning of individuals with special needs. Lastly, documents were brought together in order to constitute a meaningful whole and results of the study were obtained in this way.

3. RESULTS

3.1. Effectiveness of using infographics in education

The word "infographic" includes two words; "info" and "graphic" and it is the short form of "information graphic." Infographics is visualization method for presenting complicated information in an effective way and it is mainly about visually presenting and

representing data. Recently, infographics has gained great importance based on the continuous increasing in the amount of information and rapid advancement in the social media (Borucu, 2015). In addition, Rajamanickam (2005) mentioned about certain principles for designing infographics. These principles involve organizing information, making information visible, forming a content, making it simple, adding multiple emphasis, showing cause and effect relationship and constituting integrated graphics.

In additon to the effective use of infographics in graphic design and visual communication (Brumberger, Lauer and Northcut, 2013), the use of infographics as a tool in education has become a recent trend. Accordingly; Shafipoor, Sarayloo and Shafipoor (2016) stated that the use of educational technologies in teaching has many benefits for both students and teachers and use of infographics help learners to realize remarkable amount of information at once and keep the information in their minds for a long period of time. In addition, Ciftci (2016) examined the effect of using infographics on student achievement and attitudes towards geography lessons and showed that infographics is an effective way in improving student achievement in geography lessons and triggering positive attitudes towards the lecture. Nevertheless, the effective use of infographics has been found to be beneficial in other areas or levels of education including higher education (Taguchi and Ackerman, 2014), foreign language teaching (Pisarenko and Bondarev, 2016), science education (Davidson, 2014), visual communication design education (Dur, 2014), teaching mathematics (Sudakov, Bellsky, Usenyuk and Polyakova, 2015), creating awareness on environmental issues (Tuncali, 2016) and anatomy education (Ozdamli, Kocakoyun, Sahin and Akdag, 2016). Matrix (2014) also indicated that infographics is an important component for constituting pedagogical approach in drawing on visual materials, it increases social engagement, critical thinking and writing. An infographic for summarizing the functions of infographics are given in Figure 2.

Figure 2. What is an infographic? Retrieved from: https://visual.ly/community/infographic/how/what-infographic

Furthermore, Kibar and Akkoyunlu (2017) revealed that students can be motivated to generate their own content through visualizing the content and in order to achieve this, they can use infographics. On the other hand, individuals with special needs require help and support in learning many concepts and skills in terms of both academic and social aspects. When the literature is examined, it is seen that the use of new technologies in special education has increased and it has been shown that it is efficient to integrate technology in special education (Liu, Wu and Chen, 2013). Therefore, it can be inferred that use of infographics for individuals with special needs might be a beneficial way for enhancing their learning and infographics might be a good method for this enhancement.

3.2. Mathematical learning difficulties: dyscalculia

Before 1965's, learning difficulties did not exist in special education books, however; it frequently exists now (Dogru, 2012). Learning difficulties are primarily related with various deficits in comprehension, organization, learning outcome, achievement and using verbal and non-verbal knowledge. Learning difficulties show variability in terms of the severity of symptoms from mild, moderate and

severe. Furthermore, learning difficulties can be described based on the difficulties in using or acquiring several skills including:

• Verbal language (listening, speaking and understanding)
• Reading (reading comprehension and interpretation)
• Written language (relying on the orthographic rules, written expressions) and
• Mathematics (calculation, problem solving)

In addition to these skills, individuals with learning difficulties might experience difficulties in establishing or maintaining social relationships. Commonly observed characteristics of learning difficulties are attention deficit and hyperactivity, normal or higher level of intelligence level, coordination difficulties, impulsivity, difficulties in academic skills, sensory difficulties in terms of visual, auditory, kinesthetic, tactile and spatial perceptions. Selcuk (2002) categorized and summarized the possible problems of children with learning difficulties and these are demonstrated in Table 1.

Table 1. Possible problems of children with learning difficulties, Selcuk (2002)

Problem areas	Problems
General	Attention deficit, hyperactivity, lack of coordination and balance, not being able to complete homework, being competent in one area and having difficulties in other areas
Mathematics	Not being able to remember mathematical concepts, difficulties in problem solving, mixing values in addition operation
Reading	Not being able to concentrate in reading, not being able read fluently and follow the line in the text
Writing	Writing very slowly, writing the letters in a wrong way

As it can be seen from Table 1, individuals with learning difficulties might experience difficulties in certain domains including general, mathematics, reading and writing. Furthermore, since individuals with learning difficulties experience difficulties primarily in academic skills such as reading, writing and mathematical skills, they are more likely to be identified and diagnosed when they start to school. Considering these difficulties, diagnosis of mathematical learning difficulty has dramatically increased today. Mathematical learning difficulty is also referred to as dyscalculia which also specifies the terms as a disorder affecting mathematical competence of the individual while learning or implementing basic mathematical concepts and operations (Akin and Sezer, 2010).

Children and adolescents with mathematical learning difficulty might experience difficulties in learning numbers, counting numbers, making mathematical operations with fingers, difficulties in reading clock, solving mathematical problems, knowing right and left sides, continuing writing on a straight line and difficulties in mathematical algorithms (American Psychiatric Association, 2013; Asfuroglu and Fidan, 2016) and the prevalence of mathematical learning difficulties is between 5% and 8% among school-aged children (Hakkarainen, Holopainen and Savolainen, 2013). There are various teaching approaches for children with mathematical learning difficulties as in special education and one of the most important way of enhancing their teaching is to teach them various learning strategies. In addition, it is generally known that use of visuals in teaching mathematics enhances learning since it makes abstract mathematical concepts or skills more concrete (Isik and Konyalioglu, 2005).

3.3. Use of visuals to enhance learning mathematics in individuals with mathematical learning difficulties

Individuals can easily learn concrete things and it would be better to benefit from concrete visual materials in teaching (Yolcu and Kurtulus, 2010). Accordingly, it would be appropriate to include activities for students to improve their visualization skills and lead them to thinking visually (Yilmaz and Argun, 2013) in order to increase their achievement and develop positive attitudes towards mathematics (Kog and Baser, 2012) and this might be achieved through using visual technologies in teaching (Uzunboylu and Tugun, 2016). In addition, visualization in mathematics is the process of shaping mages in individuals' minds through paper and pencils or technological tools and using visuals to explore and understand mathematics. From the beginning of the process of learning a subject in mathematics to the end of the process, understanding of the subject and ensuring permanence and Kog and Baser (2011) showed that visualization in mathematics have a positive impact on learned helplessness and abstract thinking in mathematics.

Primary aim of teaching mathematics is to transform mathematical knowledge to students and develop mathematical thinking

skills among students (Bozkurt and Akalin, 2010). It is stated that visualization process might involve envisioning an object or an event or transforming a structure through an interactive visual tool to the physical world. In fact, it is obvious that use of visualization in mathematics education can positively affect students in terms of cognitive and sensory aspects. For this reason, it is also important to use visualization in teaching mathematics to individuals with mathematical learning difficulties since it makes mathematical concepts more concrete and it can appeal to more than one sense at once. It is also known that visualization attracts attention, increases motivation and helps students to organize information (Presmeg, 2014). These are the main points in which individuals with mathematical learning difficulties need support and therefore it can be inferred that use of visualization should be frequently used to enhance learning of individuals with mathematical learning difficulties.

3.4. Use of infographics for individuals with mathematical learning difficulties

Through the use of infographics; instructional purposes, understanding the subjects, reinforcement and learning are achieved through based on visual methods. Figure 3 shows an example for infographics which can facilitate certain subjects of mathematics with infographics. As it can be seen from Figure 3, addition and subtraction, shapes, numbers and place value subjects can be visualized and presented with infographics. In this way, individuals with mathematics learning difficulties are able to keep information in their minds, understand the subject and organize complex information.

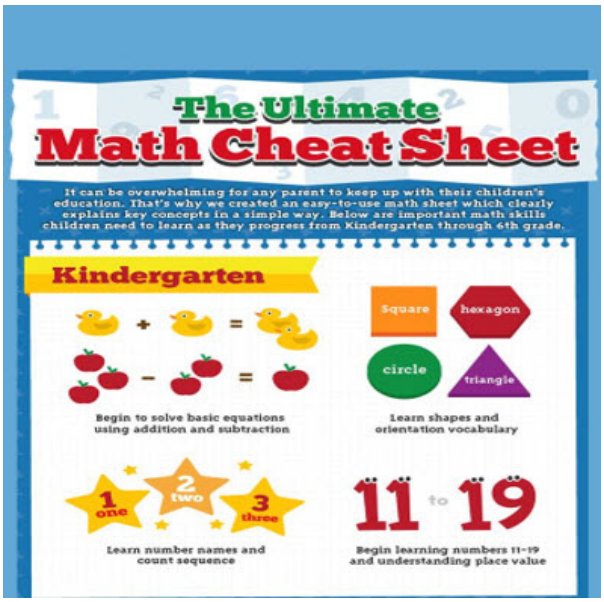

Figure 3. An infographics for teaching mathematics. Retrieved from: http://elearninginfographics.com/the-ultimate-math-cheat-sheet-infographic/

4. DISCUSSION

Mathematics has a facilitative role in both individuals with special needs and individuals with typical development. In this regard, it is necessary for individuals with special needs to acquire mathematical skills. Mathematics is important for individuals to reason, think critically, solve problems, it contributes to improve mental skills of individuals and use these skills in their daily lives (Virtop, 2016). Some children have difficulties in mathematics and these difficulties might occur based on the structure of mathematics, teaching method and individual differences among students (Karabulut, Yikmis, Ozak and Karabulut, 2015) and it is known that these individual differences are often manifested as mathematical learning difficulties, namely dyscalculia.

Visualization basically involves making abstract thinking more concrete or picturizing information and therefore it can be said that it can make invisible things more visible. Visual components provide opportunity for this and they make concepts get rid of being abstract and they give meaning to processes. Visual components have very important functions including providing and supporting information, attracting attention, summarizing the content of the subject, showing the relationships between concepts and phenomenon and making complex subjects more clear (Dursun and Esgi, 2008). Visualization in mathematics education

can be supported with infographics. Since the use of diagrams and graphics in mathematics is known to be beneficial, infographics can also be used to faciliatate learning. Teachers can explain mathematical subjects with infographics. Aim of infographic design is to explain a concept or an idea in the most appropriate way for the individual. In general, readability and clarity are the most important criteria for infographics. Nowadays, teachers are expected to have necessary knowledge and skills for integrating technological innovations (Stemberger and Cencic, 2016) and infographics in education (Islamoglu, Ay, Ilic, Mercimek, Donmez, Kuzu and Odabasi, 2015).

It is known that use of interactive graphical visuals is beneficial in special education and Takacs (2005) also mentioned that interactive computer graphics are used to increase learning efficiency. When infographics is used in mathematics, mathematical concepts are presented in a clear way and students can understand easily. For students, mathematics becomes attractive and enjoyable. From a theoretical perspective, information processing model speculates that learning is achieved when the learner pays attention to the external stimuli, records and sends it to short-term memory, then organizes it with existing information and send it to long-term memory. According to Gulten, Ergin and Avci (2009) use of information processing model as the basis in teaching enhances learning in mathematics. When it is considered that paying attention and organizing information are crucial components of infographics and their importance in mathematics, it can be inferred that information processing model as a theoretical perspective helps to understand the importance of using attractive and clear stimuli in teaching mathematics.

In a recent study by Singh and Jain (2017), it is mentioned that using infographics in teaching mathematics to students with dyscalculia increases students' interest, motivation and achievement when compared to using traditional methods in teaching mathematics and the researchers recommended that effective infographics should be used to make students with dyscalculia curious to learn mathematics since they can focus on the figures, diagrams and images in infographics and therefore they begin to analyze the images and learn.

5. CONCLUSSION AND RECOMMENDATIONS

Rapid advances and innovations in technology bring new opportunities to use in education and infographics is one of these opportunities since it includes data visualization which is beneficial in enhancing learning of individuals. In the field of mathematics education, the importance of technology is understood for many years and infographics design has begun to be used recently. In conclusion, the present study provided a comprehensive overview on what is infographics, the effectiveness of using infographics in education and discussed the possible facilitative role of infographics in enhancing the learning of individuals with mathematical learning difficulties.

In the light of the results obtained from the study, the following recommendations for further research and practices are provided:

- It would be better to increase the use of infographics as a strategy for individuals with mathematical learning difficulties to enhance their learning.
- Special education teacher training programs should include more lectures on using visual technologies involving infographics.
- Seminars, conferences and in-service trainings might be organized for special education teachers to increase their skills on integrating infographics into education.
- Further research might conduct experimental or quantitative studies in order to reveal the effectiveness of teaching practices supported with infographics for individuals with mathematical learning difficulties.
- Families should become more aware on using visuals for their children with mathematical learning difficulties to support their education.

Conflict of interests

The authors declare no conflict of interest.

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DEVELOPMENT OF TRANSVERSAL COMPETENCES IN SCHOOL EDUCATION (A DIDACTIC INTERPRETATION)

Dr. Nikolay Tsankov, Faculty of Pedagogy
South-West University „Neofit Rilski“ – Blagoevgrad, Bulgaria
E-mail: ntzankov@swu.bg

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ABSTRACT

The contemporary socio-cultural and educational situation points the attention to the analysis and construction of opportunities for the formation and development of transversal competences in school education. It is expedient therefore that within the process of education in all school subjects and throughout all ages and cognitive activities the decisions for the design of a suitable educational environment should be systematized and specified in such a way as to guarantee that knowledge and skills can be continuously regrouped in accordance with context. In other words, these skills and the knowledge they are based on, should form the foundation of transversal competences that can be applied regardless of age and activities. The design of invariant technologies for the development of transversal competences is also related to the coordination of a variety of approaches, principles and conditions of education in such a manner as to provide effectiveness when these technologies are specifically applied as variants. This creates a necessity for a didactic interpretation of the means of development of transversal competences. Additionally, it poses a necessity to improve teachers' special preparation and qualification to design educational environment that can guarantee the achievement of transversal competences as an educational outcome. The present research offers opportunities to realize this goal in an integrative and integrating process rather than as an isolated endevour on part of the teachers or as an unorganized effort on part of the students. This in turn poses some new requirements to the system of school education as a whole.

1. INTRODUCTION

Transversal competences as an opportunity to orient the goals of education towards the personality and make it relevant in terms of the individuality of learners are an expected educational outcome and a key factor for the cultivation of all other specific competences. One of the most important tasks of education is to form and develop competences, especially transversal ones, which are basic and guarantee that individuals can handle their future roles. They are the foundation of all other special abilities and skills (Merdzhanova, 2005: 61). This requires a continuous search for new methods and skills to facilitate the development of students in such a way as to bring systematicity and durability of knowledge in the form of transfering of skills and competences to new situations. The solution to these didactic tasks requires a complex approach which arguably lies in the design of the school educational environment. This can guarantee the formation and development of transversal competences and the preparation of teachers to perform this task.

While searching for ways to reach such educational results and to formulate the criteria for their evaluation, a new methodology of contemporary education is being constructed, which is applied within the competence-based approach. Its nature reflects new realities, such as social needs, economic priorities and dominant trends in the globalizing world. This is why the goals of contemporary education are also associated not so much with the acquisition of knowledge, skills and habits in

Corresponding Author
Dr. Nikolay Tsankov, Faculty of Pedagogy, South-West University „Neofit Rilski“ – Blagoevgrad, Bulgaria
E-mail: ntzankov@swu.bg

a specific area, but with the development of human values and with the formation of an integral (interdisciplinary) perception of reality – real and virtual, together with the respective abilities. In this sense, the competence-based approach is grounded in the modern paradigm for the development of interdisciplinary science and technology and in an education that integrates their achievements.

2. COMPETENCE, COMPETENCY, TRANSVERSAL COMPETENCES - CONTEXTS OF UNDERSTANDING

Terms are invented to reflect the phenomena and the subjects they signify. We simply use them to designate entities. This applies to the term *competence*, which has had long evolutional development since it was introduced in the XX century. This is why the **phenomenon competence** has been known long before there was any definition for it. From the distant past there have been spiritually elevated people, often with encyclopedic knowledge, who reached great heights in a variety of activities – art, science, technology. Now competence emerges in more specific, mostly professional activities. This type of competence far exceeds the understanding of expertise, experience, education and skill.

Very often emphasis is placed on the conceptual pair *competence/competency*, aiming at their identification and meaningful distinction, as well as their further differentiation into different types and varieties. A number of studies and analyses highlight literacy and competence as key concepts in modern education, with competence in education science being a basic construct, often analyzed as an integral personality quality, as a system of competencies structured in a particular way that integrates knowledge and skills in a specific context and enables a person to adequately manifest their practical skills demonstrating attitude to oneself, to others and to the activity and its results (Tsankov, 2012: 44). There are two main approaches to clarifying the relation *competence/competency*: (1) their consideration in the context of normative (objective) and subjective (personal) determination, and (2) as a conceptual-event pair.

The comparative semantic analysis shows lexical differences between the concepts *competence* and *competency*, which, according to a variety of authors, differ in their meaning and content: "Competencies are manifested through the respective action in the context of a certain practical activity based on the aqcuisition of a complex of knowledge, skills, experience and legal prerogatives of a person within a limited area (...), while competence, as a concept, is wider in meaning and richer in content. It is associated with a personality quality, characteristic feature, a basic trait of the individuality and demonstrates completeness, the outcome of an action or activity" (Naydenova, 2004: 65). The concept competence is thus related to the ability for functional performance in a professional environment by demonstrating behaviour that meets its requirements (Burke, 1989). Despite its limitations, the above definition gives grounds to explore *competence* as a type of behaviour which makes it possible to appreciate not what the subject knows, but how, when and whether this knowledge is applied to prictice in a specific activity or context through the relevant skills and relations. For this reason competence is analyzed as an opportunity to perform an activity in a potential manner, which is manifested and demonstrated in and through professional, educational or other kind of activities exerted with the help of the respective competencies, standards and requirements. In this sense, "competency is always bound with the operationalization of subjective manifestation, while competence can be considered in its potential detachment from direct practical experience" (Velikova, 2003: 16). To a certain extent, this position is in accordance with P. Radev's view that competence is one of the constructs of educational sciences which is "hypothetical in essence; a product of theoretical research and the human ability for abstraction; a concept; a category", which is manifested in the reality of education through the event "competency" defined as "what really happens; productive acts and actions; referents of the constructs; a part of reality" (Radev, 2005: 130).

Regardless of the variety of clarifications concerning the two concepts, there is still no unanimity of opinions in the interpretation of their content, which, according to some authors is unacceptable for purely technological reasons (Prange, 1995: 147), because these concepts are considered from diststinct positions – theoretical, phenomenological, constructivist, holistic, etc. Still, certain researchers use selectively either one or the other concept, while others apply them synonymously. G. Selevko attempts to reveal their semantic nuances based on the

dictionary approach by adopting the view that competence is the more general concept and defines it as "the ability of a person to handle the respective competency, including their individual attitude towards that competency and the object of the activity it is engaged in" (Selevko, 2004: 139-140). There is also a more generalized interpretation of "competence as a generic concept (...), representing a complex system of competencies, considered as a type of concept (...) to denote the strategic educational goal" (Naidenova, 2004: 71).

Competence implies at least a minimal attempt to apply the relevant competency. Therefore, the notion of competency refers to the outcome of education - preparedness, adaptability, achievability of objectives, and competence is most often understood as an integral personality quality, manifesting itself as a general ability and willingness to work based on knowledge and experience which are acquired in the process of education and socialization and are oriented towards independent and successful participation in the activity" (Selevko, 2004: 139-140). The more pragmatic views of competence are related to its consideration as the ability of the person (the student) to carry out an activity that is personally or socially significant as a "complex skill" or "complex ability" (Zimnaya, 2006: 139). Starting from the complex nature of competence, J. Raven believes that its higher order development in students requires that they should be motivated for its application in performing an interesting activity: "In order to facilitate this process, the teacher is obliged to determine the propensities, interests and competence of his students and to observe the changes while they gain experience" (Raven, 1999: 65). As a psychological and pedagogical category, the concept competency is difficult to distinguish because it encompasses a "complex of generalized modes of action, of productive performance of the activity, and the ability of a person to realize their competence in practice" (Temyatkina, 2006: 7).

A. V. Hutorskoy, on the other hand defines the concept competency as "a complex of qualities necessary for one's functioning in a specific area of an activity, while competence is the handling of the respective competencies, i.e., a personality quality which has already been applied or a set of qualities and minimum experience in the performance of an activity in a perticular sphere" (Hutorskoy, 2003: 58).

The discussion above demonstrates both overlaps and differences in researchers' opinions concerning the content of the two concepts. The present paper will not consider in detail these differences because their nature is predominantly formal. Moreover, pedagogical practice specifies competencies in terms of their content through educational requirements– the standards at all the levels of studying school subjects. What is considered here of greater importance is the differentiation between the concepts competency and competence in order to avoid their synonymous or interchangeable usage. The following claim suggests a solution which is, to a certain extent, acceptable: "The first (competence) is more normative and 'detached' from the personality, while the second (competence) is considered to be an integral quality, close to intelligence (...) Given the undeniably personalized nature of the competence approach, it can be concluded that its essence is formed on the basis of the meaningfully distinctive and conceptually revealing term competence" (Genkova, 2007: 439). The above clarifications underscore the understanding that the competence of a student/person represents an individual integrative personality quality manifested in the manner of organization and application of knowledge and skills. This quality facilitates effective behaviour and decisions in a variety of situations. This more or less didactic interpretation can be complemented from a psychological perspective when regarded as "a capacity in the form of ability or skill of the individual to cope effectively in their environment; a quality of a person to apply a set of behaviour models which affects selectively and successfully their material and social surrounding in view of their needs, goals and intentions" (Desev, 1999: 160). This interpretation of competence as a psychological phenomenon shows that it is connected with all subsystems of the personality, with its development as a whole, and with the results of its self-perfection. The complex phenomenon and concept *competence* (designated by a singular collective noun) comprises all the components of the personality system related to the formation and development of the individual as a result of communication and performance in a variety of surroundings – family, school, society, etc. It is to be manifested differently in everyone and depends on the nature of the Self, on one's individual proclivities, interests, motives and the environment which forms them. Certain good practices and educational experience can be used as a basis for the design of procedures for the development of competences in students. This, however, poses the question about their types and specific

manifestations. It is clear that competence has its forms, which need to be explored and developed in accord with the educational and professional competencies expected by society.

In V. Delibaltova's view competence is a personality characteristic which cannot be operationalized by reiteration into separate fragmented "discrete" bits of knowledge and skills. Rather it should be evaluated in context on the basis of the effective performance of a task or activity, not as the achievement of a standard that has been set (Delibaltova, 2003: 12).

Before defining and presenting the key features of the concepts *competence* and *competency* and substantiating their content on the basis of the approach that treats them as a conceptual-event pair, it is necessary to define the terms *concept* and *event*.

The science of education defines as concepts all categories (constructs) which have a hypothetical nature and are products of logical thinking and theorizing used to describe, explain and conceptualize a problem. Different categories fall into the group of these constructs or concepts: intellect, goal orientation, knowledge, skill, competence, ability, motives, etc. This gives grounds for the definition of the concept of *competence* as an integral personality characteristic manifested as a series of events (as part of reality) in which the individuals are involved through their *competencies*.

In general, the event does not last long, it is something that happens as a specific change which can be established and registered. Clarifying the essence of the concept of "situation" and "event", J. Lyons acknowledged that the "situation" could be both static and dynamic. The static situation (state) is homogeneous, prolonged and does not change during the period of its existence, while the dynamic situation is subject to change, characterized by different temporal contours and is not always homogeneous. According to the author, depending on the duration of the dynamic situation, two main types are formed - a process, if it runs over a wide interval of time, and an event, if the situation is momentary (Lyons, 1977: 483). A debate about the essence of the concept of *event* occurs in the field of cognitive linguistics, where it is referred to as a "cognitive phenomenon of varying degrees of complexity" (Langacker, 1987: 100).

In defining the nature of the concept *event*, L. Talmy introduces the notion of "frame of the event" as "a set of conceptual elements and the relationships that hold between them that are invoked in the mind together or mutually, fall into or form the framework of the event, while elements that are conceptualized as random - regardless of whether they are weakly addressed or not addressed at all - remain outside the framework of the event"(Talmy, 2000: 259).

The difficulties in distinguishing the two concepts necessitate their unification into the conceptual-event pair *competence/competency*, which came into use in the 1990s, when not only researchers, but also experts from various international organizations, as well as educational practice itself became interested in their classification, formation and development. Nevertheless, as a paradigm for modern education, most authors accept the notion of *competence*, and it is manifested in reality as an educational, professional and life variety, as expertise, professionalism and skill.

Applied to the conceptual pair under consideration, the discussion above gives grounds to conclude that *competencies* (integrated into a specific situation and context of knowledge and skills) are event referents of the concept *competence* as an integral personality property. Competency is actualized and subjectively manifested competence. Thus competency is primarily subjective and personal, while competence - an objective and normative characteristic of human activity. Competence is not limited to cognitive elements (including the application of theories, concepts, or implicit knowledge), but it also comprises functional aspects (social or organizational skills) and ethic values (Radev, 2013: 178).

Based on the systematized views on competence and competency made by N. Tsankov, Y. Merdzhanova summarizes that that *competence* is mainly related to "potential capabilities", "effectively performed activity", "emotional aspects giving meaning to the activity", while" *competency*" has a more pragmatic aspect as " a practical realization of *competence* ", as an awareness "how to implement a connection between knowledge and situation". The etymology of the two terms refers to the authentic meaning of competence as "appropriate, relevant, capable, meaningful" and of competency as "accountable, matching, capable" (Tsankov, 2012; Merzdhanova, 2014).

From the above analysis some conclusive remarks can be made about the notions of competence and competency as elements of a conceptual-event pair: (1) competence is an integral personality quality, a system of com-

petencies structured in a particular way which integrates knowledge and skills and the attitude of the individual to him/herself, to others and to the activity and its results; (2) transversal competences develop in specific contexts and offer opportunities for adequate practical realization of the individual. This conclusion is also confirmed by Y. Merdzhanova's summarized views on the essence of competence, namely that it is a system of rational, affective and pragmatic capabilities that guarantee successful behavior in a certain situation that can be segmented into behavioral patterns and formed in education (Merdzhanova, 2005: 62-63).

As regards their role in education, competencies are formulated as goals and are officially included in educational standards as educational outcomes, while competence is a personality quality of the students (value orientations, knowledge, skills, habits and abilities), predicated on their functional experience in a socially or individually significant sphere hence in their future careers. Y. Merdzhanova offers an adaptive, integrative and holistic model of competences in which the cognitive ones are associated with the development of knowledge, the functional ones – with the acquisition of skills, the social ones – with interpersonal relations and behavioral patterns, and metacompetences are fundamental with respect to the others and have an integrating effect, transforming them into transversal competences that can be applied irrespective of age, activities and context. A differentiation can be made between metacompetences and core competences, based on the argument that with core competences it is not their fundamental nature that is important, but the universality of their application. They are applied through different situations (trans-situational) and can be transposed in view of the current needs. This, however, does not contradict the possibility for them to be formed and developed as transversal (Merdzhanova, 2014: 12).

Within the implementation of the competence-based approach in education, different types of competencies are identified and analyzed: **key** competencies (relevant to general educational content and basic in nature, universal and transferable to different educational, professional and life situations); **basic** competencies (reflecting the specific nature of a particular professional activity), **functional** competencies (a set of activity characteristics reflecting a set of functions specific to a given job), **educational** competencies (a set of conceptual orientations, knowledge, skills, habits, and experience in the student's activity in relation to a certain set of objects of reality necessary for the realization of personal and socially significant productive activity): **general subject** competencies (related to a certain range of subjects and educational fields) and **subject competencies** (having a specific description and a potential to be formed within a given subject).

Key competences, i.e. competences which have been ivested with personality relevance through education, are a system of knowledge, skills, attitudes and relationships that help learners and job seekers to achieve personal realization by enhancing their choices, increasing their adaptability to the dynamics of living and working conditions by making people more social, mobile, competitive and motivated. This makes key competences crucial for the development of individuals, their competitive advantage and their opportunities for adaptation and social inclusion.

In the negotiation of the tenets of the theory of transversal competences, the conclusion grows increasingly popular that it is necessary to provide conditions for the building of skills that override the constraints of school subjects in the formation of a general system of knowledge, skills and behavior that have informational, methodological, social, personal and communicative character and guarantee the formation of capabilities to confront and resolve complex life situations, which are, in fact, the authentic situations faced by the person.

The term *transversal* does not refer to the common elements of the individual competences in a certain school subject. Rather, it addresses the additional content of these competences (over and above the content related to any specific school subject) which can be used in other areas. It is precisely this portability and flexibility of key competences that make them "an invaluable tool for successful action in a rapidly changing environment", in which purely school subject competences have a limited range of efficiency. But here a problem arises because "any competence is in its essence limited and related to a certain object, hence - it refers to a specific area" (Ray, 1996: 26).

Looking for a way out of this inherently controversial situation, Y. Merdzhanova considers competence not only as a function but also as an intention, i.e. as a point of view, an approach or style, making it possible and necessary "to be formed pedagogically and to be transmitted through ages and activities.

This is the meaning that each individual attributes to the situations in which he operates through his narrow competencies" (Merdzhanova, 2002: 100). Together with the transversal competences of students, a number of specific competences are formed at the level of school subjects, but their description, systematization and hierarchical arrangement are a matter of other, more specific methodological studies. Such studies may reveal a greater specificity of the application of basic transversal competences, such as the information, the communication, the cognitive competences, and others. With respect to communication as a phenomenon, M. Levunlieva argues that "it is in the context of communication that human relations come to be realized, negotiated and sustained", (…) which is "vital for the maintenance of a healthy social environment" (Levunlieva 2012: 173). Thus communication competence stands out as one of the most important competences, along with the above mentioned basic transversal competences, and serves as a foundation for the formation of a functionally adequate individual.

Distinguishing between two aspects of competence, as a function and as an intention, Y. Merdzhanova emphasizes that competence as intention can be developed with pedagogical means and has to be passed on through ages and activities. She defines four basic transversal competences: autonomy and responsibility, communication competence, organizational and methodological competence, cognitive competence for information processing. (Merdzhanova, 2005: 62).

The characterization and classification of transversal competences include (La définitionet la sélection des compétencesclés.http://www.oecd.org/dataoecd/36/55/35693273.pdf (24.04.2017).): (1) *multidimensional*, involving different processes and intellectual abilities - analytical, critical, communicative, etc.; (2) *multifunctional*, whose mastering allows students to solve various problems in everyday, professional and private life and whose acquisition is an instrument to solve tasks in different situations; (3) *cross-disciplinary and interdisciplinary*, which are applicable in different situations within and outside the school context; (4) *competences* related to the *overall development*: abstract thinking, self-reflection, self-standing, individual stand, critical thinking, etc. The very essence of transversal competences as described above requires the search for methodological approaches to the design of the educational environment which guarantees their formation and development in school education.

3. APPROACHES AND PRINCIPLES FOR THE DEVELOPMENT OF TRANSVERSAL COMPETENCES

The vision for the need of active participation of the student in the cognitive activity is not new. Contemporary conditions, however, call for its transformation into a basic philosophy of life and a main path for personal development corresponding to the continuous changes and innovations characterizing the development of the society in the 21st century that affect the modern human. This transformation requires a reconsideration of personal development and of the educational paradigm as a whole and is related to the formation of a new consciousness and value orientation in everyone. This requires: 1) redefining the goals of education; 2) paying special attention to students' needs and learning motives; 3) introducing adaptive teaching strategies; 4) designing a dynamic environment which supports learning – flexible, mobile, guaranteeing interaction and cooperation; 5) reaching a new level of monitoring and evaluating learning outcomes.

Forced by the dynamic changes in social practice, education constantly reforms to which end it uses a specific approach or a combination of approaches, such as the algorithmic one, the heuristic one, the task-based one, the learner-oriented one, etc. An approach that stands out within the set of integrative, learner-oriented, task-based ones, as they produce significant and up-to-date results and have an innovative and conceptual focus, is the competence-based approach, which has acquired popularity in the European Union, the USA, Russia and other countries.

At the core of the design of the educational environment for the formation and development of transversal competences lie the constructivist paradigm, the educational approaches (competence-based, personality-oriented and activity-oriented), the basic principles of education and the conditions that guarantee a new level of the product of education.

The constructivist paradigm is fundamental to the development of transversal competences, and it is based on the possibility to induce cognitive situations related to the purposeful and systematic application of methods

which facilitate the realization of the cognitive experience, the knowledge of the pupils and their skills to apply them in a specific context according to conditions conducive to their subjective expression and active cognitive activity. The constructivist paradigm is related to the view that „the learning process is built starting from the instructor's personality, his/her uniqueness, exceptionality and individuality" (Ivanov, 2004: 32).

Therefore, in the development of transversal competences through the application of different approaches the student is an active subject in the cognitive activity realizing his/her potential and capabilities.

The essence of the constructivist theory of learning can be summarized as follows: knowledge is constructed, not transmitted; new knowledge is built on the basis of prior knowledge; the initial idea is local rather than global; building knowledge as a set of structures requires targeted activities. Thus constructivism is focused on the process of the search for knowledge and on its formation.

Knowledge is not received as a ready-made product but is formed in learners in the process of self-discovery and the transformation of information on the basis of their experience and prior knowledge. The conceptual core of constructivist learning is therefore the activity of students to learn by interacting with each other, with the teacher, and through „doing," discovering and exploring (Tafrova-Grigorova, 2016: 76).

Drawing on the constructivist studies, D. Dimova makes the following conclusions: 1) learning, regardless of the area in which it arises (cognitive, affective or psychomotor), always involves the process of individual transformation; people learn by 'embedding', integrating new knowledge and experience into existing cognitive structures; 2) learning and the context of learning are deeply interrelated; the knowledge and their meaning imparted from the outside are internalized through their refraction through the prism of individual experience in a practical context; 3) learning is always dialogical, whether it is done directly (by interacting with others) or by interacting with products created by others; 4) social interactions are an essential component of cognitive personality development; 5) the construction of metacognitive abilities (reflection on one's own way of thinking) should be incorporated as an essential and irrevocable part of the learning process. This implies the use of learning methods that direct students' attention to the process of their own learning through reflection and analysis (Dimova, 2013: 26).

Student-centered learning, in which the student is an active participant, is the basis of constructivist strategies according to which learners independently discover and transform new information, by continuously verifying it with old, familiar rules, also subject to revision with respect to the cognitive situation. According to the constructivist learning theory, students must construct knowledge in their own consciousness so as to internalize and absorb it and this requires subject-oriented learning directed primarily towards developing the personality of the students, their ability to solve tasks, as well as their cognitive autonomy, motivation and acts in real situations and conditions. Such situations require not only integrative knowledge, but also relevant competencies and types of competence.

As a major problem for modern education, the system's orientation to memory and reproduction is emphasized, which in turn fails to provoke thinking, autonomy and skill formation. This has been a serious challenge for all educational systems over the past decades, since in the dynamically developing modern world a considerable amount of "ready-made" knowledge is not of particular value and is insufficient for a successful social realization. Such knowledge does not provide an opportunity for creative thinking and decision-making in practical situations.

In today's world of information overload, the school is not the only and, in many cases, it is not even the primary source of information for students. This also predetermines the new role of teachers - turning them from monopolists of knowledge into mediators between information chaos and organized knowledge. In this process new core ideas for modernizing education are being formed: emphasis on skills and competences; free handling of different sources of information; ability for critical and creative thinking; opportunity to transfer knowledge to new situations. Educational standards in secondary schools predetermine the change in teaching and learning, thus rethinking and redirecting the role of the main actors in the learning process - both the teacher and the student. At the same time, for their successful realization, it is necessary to apply such educational approaches and training methods which make the student an active partner in the educational process.

The exploration of the opportunities for the development of transversal competences

guides the search for approaches related not only to perception but also to the development of technological schemata and models for the realization of knowledge in the form of skills and habits which are bound to become competencies. It is not enough for these competencies to be learner-oriented. Rather, they need to develop within the subject-oriented educational environment in which the student has a central role. This requires that education should provide:

- development of the student‘s personality as a subject (not as an object) of education;
- active and independent task solution;
- stimulation to student’s autonomy and inner motivation by bringing them into contact with the real problems;
- integrative knowledge;
- a teacher who organizes, inspires and achieves the necessary discipline through a rational organization of the cognitive activity of the student.

Creative, educated individuals are needed in all spheres of modern life: politics and business, education, and all professional skills - all of them must have creative thinking. In modern schools the creative development of the personality, the development of culture and intellect is a continuous process, depending on the work of the teachers and the activity of the students. The learning opportunities provided by all school subjects should be updated and used in such a way as to develop their areas related to the activation of students’ creative thinking as a basis of their personal development. The ideas for the modernization of education and the introduction of innovative approaches in the learning process are usually limited to:

- students’ ability to handle fluently different sources of information;
- acquiring skills and competencies that guarantee subsequent self-development;
- use of modern information technologies;
- development of active, critical thinking and civic position.

The personality-based approach is directly related to the orientation of education towards its core value - the personality of the student. The organization of personality-based education requires an analysis and interpretation of the following findings (Zeer, 1999: 167):

• developing the personality of the learner is a major goal of learner-oriented education;

• the whole educational process is tailored to the personal components and the specifics of the teenagers;

• the personality of both the educator and the student in the educational process is subjective;

• the main motives for education are the combined self-development and self-regulation of both the teacher and the student;

• ensuring competence through the formation of lasting knowledge, skills and habits, ability to make independent decisions in unusual situations;

• inclusion in the educational process of the pupil’s personal experience;

• development of autonomy, responsibility and self-reflection.

Such an approach to the formation and development of transversal competences is in harmony with the understanding of a personality-oriented type of didactic technology through the creation of an individual educational trajectory based the following: 1) the right to choose and express one’s individual meaning and purpose in each subject or lesson; 2) the right to personal treatment and understanding of the fundamental concepts and categories; 3) the right to draw up individual educational programs; 4) the right to choose an individual rate of education, forms and methods for solving educational tasks, ways of control, reflection and self-assessment of the activity on the basis of the knowledge about one’s individual peculiarities; 5) individual selection of the subjects studied, creative laboratories focused on such types of classes that are in accordance with the basic school curricula; 6) opportunities for a more profound interpretation and handling of the study content of the course for those who are interested in that; 7) individual choice of additional themes and creative activities on school subjects; 8) the right to an individual picture of the world and individually motivated views on any educational field (Hutorskoy, 2001: 276-287).

In learner-oriented education, learning is a student activity discreetly managed by the teacher. The ultimate goal of learning is initially determined by the teacher in several variants. Each student chooses and rephrases a specific goal. Since the goals of the students are different, teachers find themselves in a situation of uncertainty, in which specific rela-

tions regulating the activity of all the subjects (including the activity of the teacher) must be established (Vassilev, Dimova, Kolarova-Kancheva, 2005: 71). The personality-based approach is thus seen as a „special kind of pedagogical process (with specific goals, content, technology) oriented towards the development and self-development of the individual's personal qualities" (Ivanov, 2004: 35). In this context, the development of transversal competences is linked to the vision of the student as a subject acquiring their competence in a cognitive process transforming the teacher from a source of knowledge into supervisor of independent active cognitive activities, creating situations based on cognitive tasks. Thus the teacher participates in their solution as a competent consultant and assistant in case of difficulties.

This can be successfully realized in the course of the formation and development of skills through a personality - oriented technology for enhancing the cognitive autonomy and development of the students' thinking specified as: 1) ability to autonomously transfer the acquired knowledge and modes of action into new situations; 2) ability to see new problems in familiar conditions or ability to see the new feature of a familiar object; 3) ability to visualize the structure of the object to be studied; 4) ability to see alternative solutions; 6) ability to create original solutions, although other ways are known (Petrov, Atanasova, 2001: 277-280).

The educational process related to the formation and development of transversal competences becomes functional for the personality when there are: motivations (accepting and justifying the activity of systematic and purposeful formation and development of transversal competences); ability to react to external influences and internal impulses of behavior or to see hidden contradictions of reality; criticism of external values and norms leading to a construction of one's own system of meanings; formation of a personal picture of the world; provision for autonomy of behaviour and creative nature of any individually significan activity; self-realization and level of functionong that is commensurate with personality preferences.

Another approach focused on personality development through active reasoning and purposeful solution of cognitive tasks is the **activity-based** approach. According to this approach, it is of the utmost importance that a science presents itself to the learners not only as a system of knowledge that has already been built, but also as a system of characteristic problems and tasks, as well as possible ways for their solution. At the core of the activity-based approach, purposeful action is identified as the most important development factor. The activity-based approach focuses on the unity of reasoning and functioning where the latter forms the basis on which the former is built and, depending on the activity. The activity-based approach focuses on: subjective educational interaction, managing the transition from learning activity to activity in life, balancing between cognitive activities in education and self-managed activities, creative focus, and formation of needs for creative and non-standard performance. In view of the principles of this approach and the positions argued in the present study, transversal competences can be defined as opportunities for manifestation of students' aspiration and ability to realize their potential (their knowledge, skills, experience, attitude and personal qualities) in successful creative (productive) activity. Transversal competences are formed, developed and manifested in the course of this activity because, as opposed to generalized universal knowledge, they have a profound, practical and dynamic character.

This is in line with the persuasion that activity-based learning has three goals: 1) reactivating acquired knowledge; 2) determining required knowledge; 3) building new knowledge in the course of the activity through awareness of needs. In this perspective, learning through systems of cognitive educational tasks must first of all focus on the cognitive work of the learner so that the relevant transversal competences are built in the process of their implementation. Teaching is effective when it corresponds to the level and skill of learners and follows their improvement, gradually transforming into unobtrusive support which runs parallel with the development of students' autonomy. The learner is the subject and the main actor in the process of education and transforms it into a social space for learning and interaction. Ensuring autonomous learning is in line with the understanding that knowledge is not transmitted directly by perceiving passively during teaching but is built through an active dynamic process in which input information is subjected to transformations depending on the students' prior knowledge and their personal learning style.

As a result of the change in the traditional scientific paradigm, learning is interpreted as an active process of individual construction and acquisition of new knowledge based

on continuous and dynamic interactions in the educational context. The direct participants in the learning process do not only acquire knowledge, but also intensively process and interpret information coming from outside and possess meta-cognitive skills for individual control and self-regulation (Tsvetkova, 2001: 8). The more learning skills the students develop, the greater their opportunities become to play the role of co-workers (partners) of the teacher and to be active participants in interactive learning (Gyurova, Bozhilova, Valkanova, Dermendzhieva, 2006: 83).

The topicality of the problem of cognitive interests is associated with the establishment of a new system of values and a learner-centered education that focuses on the learning process as a central one. According to David Kolb's conception (1984), learning takes place in a cycle called the " cycle of learning" consisting of: experience, reflection, conceptualization and application. It is assumed that without these four successive characteristics the learning process cannot be complete. Different people also have different learning styles, according to Kolb. For some, the process starts with the solution of a task; for others this is a matter of thinking and searching for correct theories. Still others are inclined to plan their activities first (Kolb, 1984). Changes in the educational space are prompted by the influence of social development. It is a generally accepted fact that in modern didactics there is theory of active learning underlying constructivism. This theory is based on the need to develop the creative activity and the autonomy of the personality. The development of students' creativity helps them to acquire new methods of knowledge. By solving these problems, education must prepare the future citizens of the world to self-replenishtheir knowledge, to be able to see and correct their shortcomings, to organize their work in the process of continuing education and lifelong learning.

The approaches discussed above, namely the competence-based, as a central one, supplemented by the personality-oriented and the activity-based approach and realized in different combinations, lie at the basis of the present research, together with the ones related to the study of the mechanisms of information processing in the course of learning through educational cognitive activities. These prerequisites to fully optimize the learning process are essential for its exploration, which is itself also related to learning strategies and the methods to improve them.

The basic principles underpinning the development of transversal competences are essentially related to the basic principles of constructivism in education sciences. Constructivism is not a new concept, and its roots can be found in philosophy and anthropology through I. Kant's understanding that rather than receive information passively, people actively and selectively assimilate knowledge by making their own interpretation of reality. Today this understanding has undergone different metamorphoses and has been enriched and developed for various research purposes. Analyzing the philosophy of individual constructivism in education, Pl. Radev points out that "learning is organized as a process of reality modeling actions", in which the pupil progressively forms abstract schemes of these actions building these into his or her learning behavior (Radev, 2005: 123). From the positions of constructivism the author outlines the following principles of education (Radev, 2005: 346):

- Principle of contextuality and situability;
- Principle of stimulating the student's own organization, reorganization, integration and reintegration of knowledge;
- Principle of ensuring the student's own active construction and reproduction of knowledge and experience;
- Principle of self-construction of knowledge based on previous knowledge and experience;
- Principle of interactive orientation of students to tasks and problem solving;
- Principle of integrating research and implementation into learning;
- Principle of a culture-based and differentiated approach to learning.

At the core of constructivism is the idea that the basic functioning of the student's knowledge occurs in situations and "that they [situations] are what establishes the relationship between teaching and learning attributing specific value to students' knowledge, which turns it into situational". It is "the situation that presupposes the use of knowledge, it reorients it towards natural development through training, it provides a point of intersection between developing knowledge and existing knowledge" (Radev, 2005: 306).

This is what V. Gyuviiska uses as grounds to recommend "reconceptualizing the process of learning as an occurrence of being, which will make it possible to recover the students' thought continuum and will invest learning with the authenticity of happening

[occurrence]" (Gyuviiska, 2012: 270).

In the process of teaching, it is not a matter of priority for the teacher to present truths that are considered to be undeniable, but rather to create conditions that will stimulate the students' thinking, i.e. cognitive situations. It is not enough for teachers to be well acquainted with the content included in the curricula, but they must also have an inventory of pedagogical situations in which learners can use the knowledge they have to construct, the skills underlying modeling as an activity. What is more, these situations must be so constucted so as to provoke students' interest in order to stimulate the adaptation of their attitude towards the activity of cognitive modeling and its results.

On the basis of the principles of constructivism and the clarifications made so far, the following principles are suggested for the development of a competence for cognitive modeling in education viewed here as a type of transversal competence (Table 1).

Table 1. General characteristics of the principles for development of competence for cognitive modeling in education

Main principles	Characteristics
Dynamicity and activeness	Requires such an organization of educational activity which excludes passive learning and orients the process to independent activities for the acquisition and formation of relevant skills and the development of competence for cognitive modeling in education.
Durability and continuity	It presupposes continuity between all levels of education, as well as in training, through its organizational forms, content, methodological units and technology in the course of the formation and development of competence for cognitive modeling. It ensures the continuity of the application of cognitive modeling through a permanent transfer to new situations of advanced competence and practical experience through relevant skills and competences.
Comprehensiveness and complexity	It requires that the student should: 1) form a generalized, comprehensive view of nature, society, and the self building a subjective "model of the world"; 2) disclose and implement integrative links at the theoretical, thematic and subject level. It provides complexity and versatility in the study of objects, processes and phenomena of reality by using a combination of models.
Psychological and pedagogical comfort	It requires the avoidance of stress factors and situations in the educational process and predicates the creation of a benevolent atmosphere in class and school based on the ideas of pedagogical cooperation. It forms a new style of communication which compensates and counteracts: 1) teachers' lack of attention; 2) the disregard of the personality of the students; 3) their isolation and low self-esteem. It orients education to the formation of a value system that is not predetermined by prohibitions and punishments but is built in the process of meaningful communication and motivation of the students by directing them towards positive behavioral patterns and attitudes for competence-oriented education.
Symbiotic relation between visualization and modelling	The model method is viewed as a realization per se of the principle of visualization. It is related to the unraveling of the hidden essence of objects, processes and phenomena. The model, as a means of visualization and a 'perceptual prompt' within the activity of modelling, serves as a basis for abstract theoretical thinking. The symbiotic relation visualization/modeling as an application of perceptual and image elements is important both to the development of human cognition and to the process of education. The realization of this principle leads to an increase of the sensory experience of the students, to the formation and development of the perception, the imagery, the spatial thinking and imagination, the formation of observation, the creation of conditions for active perception. This helps the assimilation of theoretical knowledge (conceptual basis, regularities, construction of operational models, etc.) and in general the successful participation in the cognitive activity. This principle plays an important role in the setting and solving of cognitive tasks with an increasing level of difficulty throughout the transition of different cognitive levels.The implementation of the principle of visualization and modeling in education develops students' comprehension abilities as a basis for their dynamic cognitive activity.
Creativity and variation	This principle suggests: 1) maximum orientation to problem solving and creativity in the course of the cognitive modeling; 2) transfer of competence in new situations and through new activities, as well as in the educational activity as a whole. Students are also supposed to: 1) acquire their own experience of constructing and solving problems and tasks; 2) form an ability to develop variants and to choose the optimal option according to given criteria.
Situational constructivist principle	The actions underlying cognitive modeling in education are realized on the basis of structured content. This activity only makes sense if it leads to the acquisition and consolidation of new knowledge on the basis of the independent design, reconstruction, transposition and modification of students' earlier knowledge and skills. This requires the creating of conditions for mastering new knowledge based on the activation of previous knowledge concerning models and modeling and for the building of skills in the course of deciphering the new cognitive situation. Part of these conditions is to ensure the dynamics of the contexts of situations so that new knowledge is applied in a new ъдхнейш, different from the original one, which leads to the activation of reflection on cognitive modeling in education as a method used in different situations.

4. CONDITIONS FOR THE DEVELOPMENT OF TRANSVERSAL COMPETENCES

The development of students' transversal competences is directly related to the use of the cognitive abilities for learning and interpreting knowledge developed to the level of skills. This process requires conditions for providing the problem orientation, autonomy and creativity in its course. Continuous transitions from the concrete to the abstract and the abstract to the new concrete are realized in training. The acquisition of a knowledge system for the specific and the general is a cognitive process, characterized by the continuous design of models, through which students encode, recode and decode information in the course of the incessant transition from the concrete to the abstract and vice versa. This necessitates the deliberate application of logical methods - analysis, synthesis, induction, deduction in combination with the model method as one of the conditions for the development of transversal competences.

The cognitive activity in education is based on the means and resources of a certain subject matter, which should be chosen to provide the „decomposition", i.e. the unfolding of thought processes in the solution of educational cognitive tasks and problems. The cognitive tasks are central to the development of the skills underlying transversal competences. That is why the learning process itself is interpreted as a process of solving cognitive tasks. This layout is also the basis of the model of constructivist situational training, as a sequence of learning situations, based on the solution of educational cognitive tasks, followed by tasks of higher difficulty. This requires the development of a system of cognitive educational tasks for the formation and development of relevant transversal competences. Thus, the following groups of tasks have been designed for the development of the competence for cognitive modeling in education: 1) modeling tasks; 2) tasks for recoding information from one type of model to another; 3) classification tasks for modeling defining relations; 4) tasks for comparison and modeling of abstractions; 5) generalization tasks for modeling gunus-species relations; 6) evaluation tasks and tasks for modeling causal relations (Tsankov, 2012: 331-332).

On this basis, the next condition, related to the need to create cognitive situations, enabling the development of transversal competences, can be derived. This poses a new requirement related to the structuring of the cognitive information in such a way as to contribute to the establishment of meaning in the acquisition of the educational content.

When analyzing the conditions for the development of transversal competences, account should be taken of the peculiarities of the constructivist concept of the role of the environment. Learning tasks have contextual meaning, i.e, they relate to real problems. The learning environment should present the natural complexity of reality so as to create a condition for assessing the effectiveness and necessity of cognitive activities. All this requires the observance of conditions typical for constructivism and summarized by I. Ivanov (Ivanov, 2004: 155) as follows:

- students should be encouraged to ask questions, make hypotheses and check their correctness;
- students' ideas and experience should be challenged to induce an inner cognitive conflict or hesitation;
- students' mistakes should be seen as positive opportunities for provoking thinking and understanding;
- the environment should provide sufficient opportunities for dialogue, activity and reflection.

This means that the teacher has to:

- engage the students in acquiring experience which contradicts their prior concepts and knowledge;
- allow for students' answers, initiatives and interests to determine the course of the class;
- encourage questions, reasoning and discussion;
- use cognitive terminology of the type "classify", "analyze", "design" when setting tasks;
- stimulate and accept students' autonomy and initiative without losing control of the situation;
- use raw data and primary sources, along with the didactic (interactive, adapted) materials;
- stimulate the use of alternative sources of information;
- encourage students to look for a cause-and-effect explanation of situations and to predict their outcome;
- stimulate self-analysis, argumentation and development (change) of opinions and ideas;
- stimulate learning outside the classroom and the school and help stu-

dents identify with the problems they solve (Ivanov, 2004: 156).

The above analysis gives grounds for the conditions for the development of transversal competences and the requirements for the relevant environment to be considered synergistically as an integration between the material (means of learning), the socio-psychological (socio-psychological climate, comfort, creativity and teamwork), the psychological (interests, Incentives, readiness for action and preparedness) and the pedagogical (effectiveness, adaptability and performance) conditions in the context of the activity.

Learning, like any human activity, is a complex system whose structure includes interconnected elements that reflect its genesis and development potential. The structure of the cognitive activity includes as its elements needs, motives, goals, tasks, actions, operations, situations and conditions. This approach to the problem of developing transversal competences is inseparably connected to the realization of the main stages of the overall process.

5. A PROJECT FOR THE DEVELOPMENT OF TRANSVERSAL COMPETENCES (ON THE EXAMPLE OF THE COMPETENCE FOR COGNITIVE MODELING IN EDUCATION)

Building on the conclusion made for competence as a construct and modeling as a cognitive activity, the competence for cognitive modeling in education should be seen as an integral personality quality, including a system of knowledge, skills (integrated in specific contexts - competencies), and relationships.

Its formation as a predominantly motivated, transversal (portable), strategic rather than functional quality of the personality, the competence for cognitive modeling in education should include:

in a meaningful aspect - knowledge about:

- models and modeling;
- modeling of genus-species relations;
- modeling of causal relations;
- modeling of dependencies and abstractions;
- modeling in experiments;
- modeling processes and phenomena from objective reality in order to explain them;

in an active aspect – skills for:

- investigating objects and revealing their essential features;
- systematizing and summarizing essential information for the object under investigation in a mental, verbal, visual or other form;
- design of models;
- selection of models (selection of the most appropriate model for the situation);
- practical and/or theoretical verification of models;
- coding, decoding and recoding information in and through models;
- transfer of knowledge obtained for the model to knowledge of the subject being studied.

in a personal aspect - the attitude of pupils to cognitive modeling in education:

- as an activity;
- in terms of the results of that activity;
- as a strategy for effective learning (Tsankov, 2013: 33).

In this case **knowledge** is a „collection of information“ on models and modeling, as well as the possibilities for their application in education; **skills** are „integrative qualities of the personality, acting as a coordinated and integrated series of actions, operations and procedures for achieving certain goals, solving problems and problems“ (Radev, 2005: 160), directly related to the realization of the modeling and the utilization of different types of models; the **attitude** is the students' opinions on the activity and its results, based on the motivation for achievement and interest as the main components of the proclivity for a certain behavior.

Hence, we should consider the competence for cognitive modeling in education as a system of knowledge, skills (competencies or knowledge and skills integrated in a specific context) and relations. When we talk about knowledge, we need to keep in mind not only factual knowledge - the main thing students need to know about modeling and modeling, but also conceptual knowledge (the relationship between knowledge, systematized as elements of larger structures allowing them to function together), as well as procedural and metacognitive knowledge. What procedural knowledge includes is the ways to use

cognitive modeling, as well as the criteria for using skills, algorithms, methods, techniques and procedures. Metacognitive knowledge is related to knowledge in general, as well as to the actual knowledge of the particular student. It is knowledge of the cognitive tasks, including contextual and conditional knowledge, used in various cognitive situations for modeling which facilitate the reflection of one's own cognitive abilities for modeling. Importantly, what students can master is knowledge related to the modeling patterns that are used in the planning and realization of the cognitive task. And when this knowledge becomes an up-to-date modeling process whose subjects are the students themselves, then we can speak about skills. Both knowledge of modeling and models, as well as the skills underlying the competence for cognitive modeling and its practical expression, require systematic and purposeful learning and action, because without knowledge skills cannot be developed.

This requires that, within the framework of the technology for the development of competence for cognitive modeling, knowledge should not be mastered by pupils as an end in itself but as a component of a unified process which realizes the link between knowledge of models and modeling, the development of modeling skills, and the formation of student attitudes towards the activity and its outcomes. On the example of the project for the development of the competence for cognitive modeling as a transversal one (Tsankov, 2010: 34), it is appropriate to seek opportunities to justify basic methodological approaches (Merdzhanova, 2014: 12) as portable and relevant for all educational methods, because the results of their application in education, namely transversal competences, are crucial for personality development.

The above analysis of the essence of students' transversal competences takes into account complex integral personality qualities structured through and interrelated with the goal and result orientation of teaching (and, in a wider context, of education), which establishes conditions for their development as a prerequisite for the improvement of students' cognitive activity and autonomy and for the enhancement of other key competences.

Since competence, as a complex and significant personal construct, influences the overall development and manifestation of the personality, a systemic and holistic approach is needed to develop it. This requires that the transversal competences should be structured and operationalized as a system of competencies that integrate knowledge and skills applicable to a context that overrides separate school subjects and emphasizes students'attitude to the activity and its results. In this sense, the integrity of the learning process, with its suitable and relevant content, procedural aspect (forms, methods, approaches and means) and motivational side (opportunities for motivation and stimulation of interest), allows for the development of transversal competences to their full degree.

This can serve as a foundation for a search for basic methodological approaches to the formation and development of transversal competences on the example of the proposed logical matrix by Y. Merdzhenova - Table 2 (Merdzhanova, 2014: 14).

Table 2. Logical matrix of basic methodological approaches for transversal competences

Global cultural idea	Pedagogical concept	Personality competence
Belonging to the genus	Genealogical approach to man	Genealogical competence
Human values	Axiological approach to man	Axiological competence
Synergism	Multi-sensory approach to man	Multi-sensory competence
Interculturalism	Interdisciplinary approach to human knowledge	Interdisciplinary competence
Holographic/Three-dimensional existence	Approach of the dynamic modeling	Prognostic competence
Differentiation and specialization	Expert approach	Expert competence
Globalization	Regional and historical approach to man	Integrating competence

This requires that modern research in the field of education seek opportunities to: 1) develop a conceptualized and operationalized transversal model that allows to distinguish and identify the core competencies (knowledge and skills integrated into specific contexts) whose systematic and purposeful development should be subject to approbation and verification; 2) design a project and didactic invariant technology for the formation of transversal competence in the education of students at all degrees and stages that will be approbated and applied extensively in the training on different subjects in order to prove its applicability and portability through different activities and ages.

It is expedient to systematise and specify the opportunities for the formation and development of transversal competences within the curriculum of all subjects as well as the expected results at the level of the educational documentation. The systematic and goal-oriented implementation of basic methodological approaches and technologies for the development of transversal competences is also related to the observance of specific didactic principles and conditions in order to ensure the necessary efficiency. This necessitates the special training and qualification of teachers.

All of this is a basis for expanding the research curriculum with regard to: 1) the relation curriculum - transversal competences because it is interesting how they integrate into curricula due to their interdisciplinary status; 2) the design of the educational environment in modern schools; 3) the expectations from students and teachers; 4) the transformation of the professional training of modern teachers; 5) the ways to form the professional profile of the teacher as an expert, consultant, mediator and moderator in the course of the formation and development of students' transversal competences.

Conflict of interests

The author declare no conflict of interest.

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COGNITIVE SCIENCE: FROM MULTIDISCIPLINARITY TO INTERDISCIPLINARITY

Dr. Marina Bogdanova, Southern Federal University, Rostov on Don, Russian Federation
E-mail: maraleks27@mail.ru

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ABSTRACT

Cognitive science is a network of interrelated scientific disciplines engaged in researching human cognition and its brain mechanisms. The birth of cognitive science has been the result of numerous integrated processes. Cognitive science is made up of experimental psychology cognition, philosophy consciousness, neuroscience, cognitive anthropology, linguistics, computer science and artificial intelligence. In recent years, a number of other research areas have been added to the body of cognitive science. Among researchers there have been discussions about whether cognitive science is a separate research area or it consists of a series of specialized areas. In fact, the point at issue is whether cognitive science is still a multidisciplinary project or already an interdisciplinary one. P. Thagard believes that cognitive science has reached the level of interdisciplinarity and explains the advances in this area through the metaphor of "trading zones". The success elements of cognitive science are: fruitful unification of scientific interests of cognitive science founders; organizational structure of the scientific community – universities, where a special interdisciplinary intellectual environment has been created; a large number of joint research projects supported by governments and business; integrated use of scientific methods and fundamental ideas. D. Sperber and J. Miller prefer to talk not about a unified cognitive science but cognitive sciences, i.e., the commonwealth of sciences working together on the study of a single object - human cognition, however, the extent of their interactive communication is still small. Thus, we should speak about multidisciplinarity rather than genuine interdisciplinarity of the joint research of separate sciences.

1. INTRODUCTION

Cognitive science is a network of interrelated scientific disciplines engaged in research on human cognition and its brain mechanisms. The subject of cognitive science is various aspects of human cognition and thinking, which, because of its complexity and multidimensional scope, cannot be studied within a single discipline: the laws of perception, mechanisms of processing, storage and reproduction of information, their connection with the human brain and the possibility of realizing information processing in other media; research in the field of artificial intelligence, the role of language in cognition, problems of understanding and interpreting different kinds of texts, the role of evolutionary mechanisms in thinking, the specificity of particular types and styles of thinking.

Questions of cognitive science are themes of the conceptual organizations of human thinking. Do all members of humanity share the same conceptual systems? Is their age, abilities, experience, language, national culture and environment different? The achievements of the sciences dealing with cognition and thinking show the existence of different points of view on these issues and, accordingly, necessitate a comprehensive study of the phenomenon of cognition.

It can be argued that cognitive science has not just become one of the newest trends, but an independent field of theoretical knowledge and practices giving rise to new original ideas and approaches.

Corresponding Author
Dr. Marina Bogdanova, Southern Federal University, Russia Federation
E-mail: maraleks27@mail.ru

2. WORLD CENTERS OF COGNITIVE SCIENCE

Today, a rapidly developing community of cognitive scientists has been working, specialized journals are issued, labs are open and cognitive programs are available in more than 80 universities of the world, most of which are based in American universities (Berkeley, San Diego, Massachusetts, Harvard, Arizona, etc.), but the number of European and Asian programs have also been increasing steadily (Cambridge, Oxford, Tokyo, Singapore, Sofia, etc.).

In Russia, such studies are underway in several centers in Moscow, St. Petersburg and other regions: Kurchatov, the Institute of psychology RAS, Institute of human brain RAS, Institute of Linguistics RAS, Moscow State University named after M. V. Lomonosov, Moscow State Linguistic University, laboratory under the direction of T. V. Chernigovskaya, St. Petersburg State University, Center for cognitive programs and technologies of the RSUH. Among the regional centres Tambov State University named after G. R. Derzhavin should be particularly mentioned, laboratory of cognitive sciences at the Institute of Information technoligies of Kazan state University, cognitive center in Irkutsk, the centers for cognitive studies in Kaliningrad, Yekaterinburg, Pyatigorsk, Voronezh, Barnaul, Tyumen and others.

3. THE BIRTH AND STAGES OF DEVELOPMENT OF COGNITIVE SCIENCE

The birth of cognitive science was the result of many interrelated processes: historical, political, economic and scientific itself. Scientific assumptions are considered to be the advances in understanding the nature of cognitive processes: the creation of computational models of mind in mathematical studies (A. Turing, C. Shannon), modelling the mind in the works of neurophysiologists, based on the principles of cognitive processing of information in neural networks (W. McCulloch, W. Pitts, K. Lashley); the achievements of cybernetics, which developed the information theory and the computer model for understanding computing systems (N. Wiener); the development of discursive psychology and narratology (J. Bruner, J. Brockmeier and R. Harre), and others.

Early formation of the cognitive paradigm applies to the 50-60s of the XX century. Some authors even mention the exact date of the emergence of the cognitive sciences – 11 September 1956. On that day Massachusetts institute of technology held a symposium on informatics, which heard three reports defining cognitive science a field of interdisciplinary research: the report on a cell model of human memory by an experimental psychologist G. Miller . The report made by the representatives of the computer science A. A. Newell and H. Simon which was the first to announce the computer metaphor of the brain has become a basic theoretical concept in cognitive sciences. And the report of N. Chomsky, who formulated his research program, which was to explain the human ability to master a language.

G. Miller, noting the epochal events, occurred on this forum, remembers: “I left the symposium with a firm conviction, more intuitive than rational, that experimental human psychology, theoretical linguistics and computer modelling of cognitive processes is part of an even larger whole, and in the future we will see consistent development and coordination of their joint work. I had been heading for cognitive science for twenty years before I learned its name” (Falkman, 2014, p.21).

Cognitive science of the first generation relied on the “computer” metaphor of the mind which meant that the mind was considered in a similar way to computing devices and primarily to a computer. The upmost idea was that human consciousness worked the same way as a computer program. The foundations for the development of computational models of the mind were laid by mathematicians A. Turing, C. Shannon, neurophysiologists W. McCulloch, W. Pitts, and K. Lashley.

The second stage in the development of cognitive sciences began in the 70s with the work of cognitive psychologists: J. Brunner, U. Neisser, G. Lakoff, M. Johnson, and others. The essence of the “second cognitive revolution” was to return science to a person after “a long cold winter of objectivism” (Bruner, J. S., 1990, p. 1).

In his works G. Lakoff insists on the importance of the bodily organization of a man in the processes of thinking organization. Human thought is determined by the nature of the organism, ensuring its (thought) functioning, and all those factors that contribute to the accumulation, interpretation and relevant experience. Such factors are considered by G. Lakoff as genetic inheritance, the environment

and the way of his existence in it: "Human reason is not an instantiation of transcendental reason; it grows out of the nature of the organism and all that contributes to its individual and collective experience: its genetic inheritance, the nature of the environment it lives in, the way it functions in that environment, the nature of its social functioning, and the like." (Lakoff, 2008, p. 6).

In cognitive science, the assertion gathering the majority support says that it is impossible to understand the human mind, cognitive functions of the human intellect if the mind is abstracted from the body, its physicality, due to the evolutionary abilities of perceiving the world through sense organs (eyes, ears, nose, tongue, hands), from the organism involved in a certain situation, ecological environment.

Thus, the main vector in the development of cognitive science of the second generation is its turn from the abstract "systems of information processing" back to the person, as a creature endowed with a physical body, emotional and volitional sphere, belonging to the society and interacting with people.

At the present stage of cognitive science development which is called the neural network or connectionism determination of consciousness and cognition is associated with a regulatory part of the culture in the work of consciousness and human cognition. The cognitive system is seen as a triangle with two equal sides whose vertices are the brain, the body and the external environment (culture). A supporter of this approach to understanding consciousness is D. Dennett, characterizing consciousness as a complex phenomenon that cannot be reduced to anatomy or neurophysiology of the brain, but which is formed at the junction created "shimmering" of natural and cultural. "Human consciousness is to a very large extent is a product of not only natural selection but also cultural evolution." (Dennett, D. C., 1991:2, p. 202).

Using the idea of cultural genes, borrowed from books by R. Dawkins "The Selfish Gene", D. Dennett talks about equal determinism of consciousness nature and culture. If the vectors of genes are organisms, the carriers of a cultural code are pictures, books, sayings, various inventions.

4. NEW PROMISING RESEARCH DIRECTIONS

Thus, the concept of "cognitive science" is not limited to the study of cognition in the classical epistemological sense. Most of cognitive science studies are applied in nature, there are new promising research directions. For example, among the psychological sciences they are: cognitive psychology of emotions, studying the relationship of cognition and emotion; social cognitive science, which studies all aspects of knowledge of an individual that is part of the community. There are cognitive psychophysiology and cognitive neuroscience.

Recently, there has been a number of new areas, amounting to a substantial body of cognitive science, having access into practice: cognitive aesthetics and neuroaesthetics, cognitive genetics, cognitive poetics, neuroethology, cognitive economics and neuroeconomics. For example, the focus of the study of cognitive neuroeconomics is the problems of the influence of brain processes on consumer behavior. Developments carried out under these research projects can help to answer the questions about how to create conditions for promoting this or that consumer choice, which design to choose for a particular product, etc.

The newest and a very popular area of research – "necromage"- is a research direction at the crossroads the psychology of attention, neuroscience and the practice of professional illusionists. This direction deals with the study of limits and errors of human perception, studying not only circus tricks and activities of professional pickpockets, but also road accidents, wrong medical diagnosis and many other professional and consumer errors. Research programs are also implemented by cognitive jurisprudence, dealing with detecting the interaction between the brain processes and offending behavior.

Finally, "cultural neuroscience" is booming; the area deals with the study of the structural and functional brain plasticity in the development of various forms of cultural practices (for example, literacy, numeracy, occupations, sports, etc.), on the one hand, and the study of brain and genetic correlates of stylistic peculiarities of the knowledge of the representatives of different cultures, on the other hand.

5. DISCUSSION

Despite all the achievements of cognitive scientists, among researchers, there have been discussions about whether the cognitive science is a separate research area or consists of a number of specialized areas in which each

science retains its autonomy. In fact, the matter is whether the cognitive science is a multidisciplinary or already an interdisciplinary one.

Since the 1980s, cognitive science has been considered as the developed interdisciplinary education. However, what is the degree of interdisciplinarity? What are the real relationships between the separate cognitive disciplines and how to compare their contribution to overall cognitive thing? Has the dream of the founders of cognitive science fulfilled concerning its real interdisciplinarity?

In order to understand the severity of the debate unfolded on the status of cognitive science, it is necessary to reveal the essence of the concept «interdisciplinarity» and «multidisciplinary». Interdisciplinarity is used in cases when different disciplines interact with each other to form a new discipline (thus, for example, biochemistry or biophysics were formed), or when theoretal concepts or research technologies of one disciplinary field penetrate into the other, being used there for resolving disciplinary issues.

Multidisciplinary can be considered as a study, when any object (such as thinking) is studied simultaneously from different perspectives by several independent scientific disciplines. Each discipline uses its own methodology, theoretical assumptions, contributes to the "common fund" of knowledge about an object. Interdisciplinarity involves rather cooperation in various areas of knowledge, using general concepts than overall research field.

Paul Thagard, the Director of the program in cognitive science at Waterloo University (Canada), believes that cognitive science has reached the level of interdisciplinarity, and explains the success in this area through the metaphor of "trading zones" borrowed from anthropology. P. Thagard has developed a success formula of cognitive science. Success elements of cognitive science are: the fruitful unification of scientific interests of the founders of cognitive science, who wanted to overcome the barriers of disciplinarity; the organizational structure of the scientific community – universities, with their departments, centers, and programs where special interdisciplinary intellectual environment is created; a large number of joint research projects, supported by the governments and businesses; the integrated use of scientific methods; the fundamental ideas adopted by the representatives of different sciences: the notion of representation, computation and brain-like computing device.

D. Sperber, G. Miller prefer to talk not about a unified cognitive science but cognitive sciences, i.e., the commonwealth of sciences working together to study one object – the human cognition, herewith, the degree of their interaction is still small. On the basis of their research conducted there is a conclusion that the dominant position in the cognitive science is occupied by two out of the six disciplines - psychology and computer science, the others make a very modest contribution to the development of cognitive science as a whole. To make breakthrough achievements possible among other things specialists must have an idea what their team members deal with.

Thus, we should speak more about multidisciplinary nature, than about the true interdisciplinarity of their joint research. D. Sperber, in this regard, proposed the term "cosmetic interdisciplinarity", denoting by this term those projects that are multidisciplinary in nature.

Back in the mid 80-s of the last century H. Gardner wrote: "currently the representatives of the cognitive science come into this area of research from a number of specialized areas, namely: philosophy, psychology, artificial intelligence, linguistics, anthropology, or neuroscience. But I hope that one day the boundaries between these areas would be weakened and can be completely erased, and there will be a single unified cognitive science" (Federova, 2014, p. 28).

And finally, again to demonstrate the difficulty of interdisciplinary cooperation, it should bring the ten stages on the path to scientists' approval by Swedish zoologist D. Solander (Federova, 2014, p. 26-27), who with a humorous undertone talks about this problem. At the first stage, which D. Solander calls "everyone sings the old songs" the representatives of different sciences deal exclusively with their problems, looking down on colleagues from other areas. At the second stage, called "everyone on the other side is an idiot" scientists from different disciplines are beginning to glance at each other, while noticing nothing but flaws and, as a result, many interdisciplinary projects at this stage end. If, nevertheless, future colleagues manage to reach the third stage – "retreating into abstractions", it is easier to agree on abstract issues, but as soon as they move on to specific issues – business comes to a standstill. At the fourth stage – "the definition sickness" they realize the problem of necessity to develop a language for interdisciplinary collaboration, they create a kind of jargon, incomprehensible to others. The fifth

stage, "jumping into tussocks" is the beginning of fruitful discussions on selected topics, but it is reminiscent of "jumping over bumps" when the overall picture cannot be created. At the sixth stage, called "the glass bead game", the intellectuals come to an agreement through overcoming difficulties and trade-offs. The seventh stage – "the great failure" – a failure, a stage of disappointment, a sense of the futility of further cooperation.

Most projects end at this stage. However, at the eighth stage – "what happens to me?", when it would seem that cooperation has not happened and interdisciplinary project has failed, there comes an understanding that not everything is so bad and pessimistic estimations are exaggerated. At the penultimate ninth stage, which is called "getting to know the enemy", scientists are not only interested in the specific areas of a related science, but show interest in the depth of its spheres: structure, methodology, tasks. The tenth stage – "the real beginning" is the beginning of a real process of interaction among scientists of different disciplines, the beginning of a real interdisciplinary integration.

6. CONCLUSION

Thus, having developed in front of us, cognitive science is an isolated situation of interdisciplinary interaction of sciences, within which scientific approaches, theories, models and empirical material freely circulate without strict linking to relevant sectors of a science, whereby it is possible to achieve integrated, holistic knowledge, provide a systematic analysis of problems, an effective way in the practical field and a rich communicative environment for scientists and researchers.

Conflict of interests

The author declare no conflict of interest.

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