THE CONCEPT OF STUDENTS' COGNITIVE ACTIVITY IN THE PEDAGOGICAL WORK

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What does it mean when we say that "student is active" or "student is not active" in the pedagogical process? This paper points out that the main aim of learning in school is acquiring one specific type of knowledge, scientific knowledge, and knowledge from different science areas. Scientific knowledge represents an organised and regulated system of concepts, definitions, descriptions and regulations that can be achieved by the intensive curiosity, directed observation and focus. In other words, scientific knowledge can be obtained through cognitive activity, mental processes and thinking through symbols. The paper considers the possibility of organising the teaching process that will enhance the construction of new scientific concepts on the basis of the existing, spontaneously acquired concepts that will further bring a child into a cognitive conflict followed by a cognitive activity. The paper deals with the almost ignored emotional component of the learning process and its influence on the cognitive activity. To explain all this we will bring up some achievements of modern neuroscience and the defined concept of the cognitive dysfunction.

Keywords: Cognitive activity, cognitive dysfunction, the teaching and learning process

The concept of the cognitive activity of the students

In the inclination to explain what is concretely understood in this context under the term of the cognitive activity, it is necessary to firstly explain that the basic goal of school studying is acquiring one completely concrete kind of knowledge, the knowledge from different scientific fields. That is the knowledge that differs from the knowledge acquired in the immediate contact with reality and through the direct experience and the contact with concrete objects from reality. Scientific knowledge represents an organized and regulated system of concepts, definitions and laws to which we come in a completely special way, through scientific research. This type of knowledge is gained on the mental level, through thought and through the use of symbols. The cognitive activity that happens on the level of consciousness of the scientist who is preoccupied with some problem can be described as intensive curiosity, direction of attention and thought engagement (Fawcet & Garton, 2005). A child, for example, has the knowledge of rain and snow from its immediate, personal experience. Does that necessarily mean that the child will be able to tell us what is rain and what is snow, which are the qualities of one and other idea, to explain differences between rain and snow etc. In order that the child could talk this

way about rain and snow it has to go further from its immediate experience, to raise it to a higher, mental level. On the mental level, snow and rain are presented through symbols (mental pictures, verbal symbols). Thinking about snow and rain, completely concrete appearances from its experience, dealing with their representatives (presentations and verbal symbols) at the mental plan, the child becomes active in a way that is necessary to be successful in school conditions. If it stays at the level of its immediate experience, the child has no chance to achieve academic, school success, so to rise to the abstract, mental level. So the activity that is required for school learning is the mental activity, whose goal is creating scientific ideas (Feldman, 2003). And something else: each school subject represents a special scientific field. Each scientific field requires a special kind of intellectual engagement. To be active in a pedagogical process means, first of all, mental engagement, the effort of a child to realize scientific problems, to think about them, to realize connections and relations, to classify, define, set hypotheses, check, generalize etc. Different subjects (mathematics, biology, physics etc) demand special kind of mental activity. The activity is, as it is said, subjective. The subjectivity of the activity points to the connection of mental activity with the nature of the content of that activity (Nesselroade, 2010).

So, we come to the point in our activity analysis when we can decide that the primary goal of pedagogical process is instigating thought activity of a child, and, when it is necessary, to consider one more question. It is the question of real possibilities of school to instigate thought activity of a child. Can each child learn in school (or preschool) in this way and to acquire all the expected school programs? Where are the sources of this kind of child activity? Are the sources in the child itself (its personality, intelligence), in its social surrounding, teacher personality, contents of the subject or concept of the education. It is familiar to us that there are pedagogical workers who reduce the problem of activity or inactivity of the students only to the problem of "interest" or "the lack of interest" of students. Such pedagogical workers, of course, are faced with the failures and frustrations in their work. *What is the real answer to these questions*?

The possibilities of school for instigating cognitive students' activity

School as an institution, in the context of this theme, has a goal to deal with, instigate and make situations in an organized way in which a child will be activated to think, so, in which it will be engaged in thought. The child comes in touch with the structured knowledge system alone in school, with the system of scientific ideas from different fields (subjects). Those knowledge and idea systems demand, as it is accented, a certain form of thinking activity (subjectivity of activity). In other words, the child in school comes in interaction with those subjects, systems of knowledge which can not be adopted by the immediate experience (as is the game, walking in the rain or snowballing), but only by a special form of activity, thinking activity. Through the thinking activity is achieved not only term and knowledge adoption, but the thinking and the personality in general is developed. In that way, as it was already accented, the activity of learning instigates the intellectual and every other child development (Liu & Tsai, 2005). The central path of the child development from the preschool age and more is organized and institutionalized "school" learning. The learning happens in the institutional conditions, in preschool and school institutions, which are

experience bearers. The central position in such organized pedagogical work and this special form of culture, the school culture, belongs to the dual pedagogical worker-child relationship.

The pedagogical worker teaches, the child learns. However, are all kinds of pedagogical work the source of the activity of students? If we follow the thoughts of Vygotsky, the purpose of the cognitive development during the primary education is made of the process of development and formation of scientific terms (Vygotsky, 1988; Howard-Jones & Martin, 2002). In that process the role of the formative factor belongs to the systematic and institutional, school education. Although Vygotsky (1988) did not deal with the influence of the quality of the educational process on the process of adoption of scientific terms, he pointed out two key principles which concern with the organization of education. These are:

(1) The education should be organized so that it enables the students to develop scientific terms and not to adopt them as the final knowledge. In the educational process it is necessary to use confrontation between the child's spontaneous terms and scientific terms, i.e. realizing (cognitive) conflict.
(2) The educational contents, scientific knowledge should be presented through social interaction or system cooperation between the adult-pedagogical worker and the child in the zone of proximal development and through interaction between the peers.

Let us go back to the sources of child's activities. Therefore, the child's activity in the context of organizing the pedagogical work has its the source:

- in planned pedagogical use of differences and disharmony between immediate experience of a child and scientific knowledge, in their confrontation and integrity (cognitive conflict).
- in great potentials of each school subject to activate a completely specific form of activity (without that school subject that kind of thinking activity would never be activated)
- in the great potential of school subjects to activate different kinds of interactions around their contents (cooperation, confrontation, exchange etc).

On these principles was in the 80s of the last century developed the whole educational approach which is connected to the name Posner, known in the literature as "the theory of the change of the idea". The basic principle which this theory represented is the principle of respecting children's ideas, their spontaneously acquired terms, the idea that the construction new terms is only possible based on already existing terms.

The basic critic that can be directed (and which was given) to the henchmen of the theories of cognitive conflict is overemphasizing the cognitive aspect of child's development and ignoring almost completely the emotional components of the process of learning.

The influence of emotions on the cognitive activity of a child

What *happens with the cognitive abilities of the students when they feel intensive fear, anxiety, worry or boredom*? How do these states influence the mental activity? The answer is known for all of us: we are almost unable to learn when we are tired, exhausted, anxious, worried, scared, preoccupied with worries. In all situations, therefore, when we are strongly emotionally engaged, we are less able to focus, learn and think clearly. Today it is scientifically proved what everyone who went to school knows (it is strange

how some persons forget that): anxiety, fear and boredom are inhibitory factors for learning and the as the atmosphere is more convenient, the feelings are more pleasant and the relationship with the pedagogical worker will be better and, the learning will be better also. It seems as if the emotional and cognitive processes exclude each other. And they do, in a certain way.

How is that? - The feeling of social endangerment, the fear of a bad mark, the fear to be stupid in front of everybody, the fear of mocking, boredom, dissatisfaction, tenseness, anger and every other emotional state has its neurophysiological base. It means that in those states are activated completely specific brain structures, which with that activation and also the secretion of certain hormones all that together activate the organism to accomplish a certain behavior. Fear, for example, activates the organism to run, boredom to turning off and leaving the situation, shame to retreat etc., which harms the activity of the brain mechanisms necessary for learning (Wakeman, 2006). The student who in a pedagogical situation feels shame, fear or boredom is the student whose nervous system is activated to avoidance and leaving that pedagogical situation. Since the student most often knows that he can not leave that situation, he makes effort to restrain and control himself and persist in the situation which he often experiences as emotionally unpleasant and hard. Staying in the situation which he wants to leave strengthens the emotional experience which exhausts and completely distracts learning.

The neurobiological base of the described mechanism of event-fear-control-exhaustion, represent already mentioned neurophysiological mechanisms which are activated in the mentioned pedagogical situations: for example, when one feels fear, certain neurobiological "programs" are activated, which in the case of danger prepare the organism for running from the dangerous situation. A brain structure known as amygdale is in charge of giving emotional value to a certain stimulus and it blocks the executive parts of the cortex which parts are slower in activation and are in charge for thinking and planning. When they are blocked the responsibility is turned to the "lower" parts of the brain which are in charge for the automated actions and which are faster. Therefore, "higher" parts of the brain give the primacy to the "lower" parts of the brain and that is one of the reasons why in that situation a person can not think the way he can in normal emotional state. And that is not all. At the same time parts of the brain that run the hormonal system activation starts the secretion of certain hormones (Barrett & Wager, 2006). Hypocampus, the brain structure which is in the midbrain and which plays a very important role in learning (the damage of the hypocampus turns off the ability to learn) because it enables, among other things, the connection of the new with what we already know. The accumulation of the information in the long-term memory is very sensitive to hormones. While they distract the work of hypocampus, these hormones at the same time stimulate the work of some other brain structures during which the attention focuses on the factor which instigates the emotion and not on the adoption of new information.

The neurobiological mechanisms activated with negative emotions bind the abilities of planning, implementation of intentions, directing attention, learning, retaining information. Under the influence of emotions "one goes into the state which neuroscience calls cognitive dysfunction. The stronger the emotion, the weaker is the cognitive efficiency. The more we are preoccupied with fear, worry, resentment or sorrow, the levels of activation of the prefrontal cortex lower, why it is harder and harder for us to think. In the same way boredom reduces the efficiency of the brain, while the

thoughts wander, they lose focus and the motivation tails away (Damasio, 2002). And so the child will, instead of remembering what the educator or the teacher was talking about, remember that it was upset "because the teacher yelled" or scared under the threat that it will go to the corner or that it will be mocked because it does not know…or it will remember how terrible it was bored because it did not know what to do with itself and how the time till the break prolonged till forever.

Completely at the opposite, pleasant feelings like happiness, pleasure, joy and similar activate "higher" prefrontal regions of the brain and instigate cognitive functions. The same effect can also have unpleasant feelings if they do not cross a certain level that is if they are moderate (anger, tremor, expectation and similar). When something that is a challenge for the child happens, the attention is focused, the child is involved… he looks, listens, thinks… and by doing that he learns. How does that happen? Neurobiological mechanisms are the same, but the pleasant emotions set neurobiological mechanisms to an optimal working level (optimal secretion of hormones and optimal level of activity of neuronal systems) and the child is able to learn. If the child, contrary to that, is exposed to, for example, threat, the feeling of awkwardness grows and with that the secretion of hormones the more the stress grows, the intellectual efficiency falls. If in the pedagogical situation nothing provocative for the child happens, if the children only sit without expectations that anyone will ask them anything, passively and excluded, the organism secretes very low level of hormones and the activation of nervous structures is too low. This is connected with disinterest and boredom, and with that, with the disability to learn (Davidson, 2002). All the investigations from this field confirm that the mood of the children in classes is closely connected with their learning. If nothing attracts their attention in the class, if they are bored, if they are not satisfied, if they are scared they will acquire very little of that content of which they talked in the class or they will turn their attention off completely. The same is true for the pedagogical workers. If they are under the influence of the negative feelings for any reason it will significantly decrease their pedagogical efficiency. The investigations show that the pedagogical workers who are in bad mood, not only that they show the bad mood, but they judge badly their examinees and students and they are mostly focused to their weaknesses.

It is also important to accentuate that the children and the pedagogical workers differ according to the level of stress they can handle to stay cognitively active. To be clearer it can be said in this way: people differ according to the "point of cracking". Some children can be very scared, but in front of the board or at the test their cognitive abilities will remain in good function , not weakened. Those children can make themselves listen even the most boring lecture and learn the most boring contents. In addition to this, some pedagogical workers can, for example, "leave their problems in front of the classroom doors". However, unfortunately, there are very few of them. There are much more teachers especially children whose cognitive abilities get worse even in reaction to very weak emotions.

The concept of the teaching, pedagogical interaction and the activity of a child

The concept of the teaching determines the nature of the pedagogical interaction, and the pedagogical interaction the nature of the activity of the examinee - student. The forms and the quality of that interactive process (in this context we use the term "pedagogical interaction") depend on many factors. The forms of pedagogical interaction depend firstly on what type of knowledge or ability is in question i.e. what is learnt, on the culture someone belongs to and what is the concept of education and teaching like in the country, but also on the personality of the pedagogical worker, etc.

Various educational teaching concepts basically differ only according to the type of the interaction of the pedagogical worker - examinee - student. In other words, the nature of the interaction also determines the nature of then educational teaching concept and the nature of the activity of the child in that process.

There us a traditional concept, which is: the concept that dominates in our country and in the world. This concept can be seen in the so called traditional school which is made like that by a certain model of "interaction". The term "interaction" is put here in quotations because what happens in the classroom or a preschool institution can in no way be called desired pedagogical interaction (although it is an interaction).

What happens in reality within that traditional concept is just an attempt of transmission (transfer) of knowledge from the pedagogical worker to the child. The pedagogical worker is due to find a way to transfer knowledge, most often in a complete form and he does that most often in a way that he talks about something or "teaches". The general characteristic of this kind of work is the lack of pedagogical interaction in the full sense of this word or at least the lack of that kind of interaction that would be useful in a developmental sense and in the sense of education and teaching. In this work there are attempts of education but there is not worry, emotional exchange, support, no engagement in the direction of motivation, no reaction or even the perception of the psychic absence of the children. There is not much care about the children and there is no real possibility for the children to influence and take part in the creating of that which is performed in front of them or with them.

In all those situations and always when the quality of an interaction is void, serious consequences for the efficiency of the process will appear. Concretely said, all forms of "pedagogy without a child" or reduction of the process of learning to the presentation of information by the teacher represent the form of pathology of the school as an institution (Ivić et al., 2001). This model of the pedagogical practice is characterized by:

- information move just in one direction, from the pedagogical worker towards the examinee student and the student has almost none or has minimal chances to influence the teacher and the process of teaching,
- the central place in this process belongs to the pedagogical worker,
- the teaching dominates, "the lecture", "the talk about something" the most important is that "the program is realized", which means that the pedagogical workers have done their job "since they have told everything which was planned in the curriculum",
- the pedagogical worker and the examinee or the student almost do not touch in any moment nor the segment of the work simply said: the teacher does his and the student does his.

So, this practice voids everything that is interaction. About the activity of the examinees- students, it can be said that not enough care is taken about that. In most cases is enough to provide the necessary silence and "not to disturb the teaching" with anything and what those children really do during that time while the pedagogical worker "teaches" few persons really deal with. In those conditions most children experience what they learn and what they should learn as a foreign body, something completely somebody else's, which they must "insert" in their head in a way if they want to get a certain mark and to "finish school". The mark which is achieved "without choosing the means" becomes the only goal. That violent "inserting in head" is followed with the feeling of torture which some children stoically stand and some avoid at any price. It is also important to accentuate that this kind of school learning does not enhances the optimal development of a child.

Maybe it is good to remind once more in this context that the goal of education is individual growth and that this growth is connected to learning, therefore, activity. The essence of the education is, therefore, instigation, challenging, motivating the child activity. Only those acts which instigate the child to activity (in the sense about which was talked) can be successful. Those instigations must be, of course, harmonized with the nature of the child, his characteristics and abilities.

For those reasons contemporary tendencies in the pedagogical work accentuate more and more the interaction approach to education and teaching. The pedagogical interaction in the real sense of the word is understood as the basis of the pedagogical work. That kind of approach puts in the mere center of the pedagogical activity the inter-realationship of pedagogical worker examinee. In that sense, the quality of the pedagogical work is determined by the *quality of the interpersonal* relationship pedagogical worker examinee and the quality of their interactions. The education is *„a meeting between the child and the grown up man and the quality of that meeting represents the formative factor of the development of personality*" (Bruner, Goodnow & Austin, 1967; Feldman, 2003).

This kind of approach concretely puts the examinee student in the position of a subject, and the educational teaching process should involve the alternation of the roles, in spite of the fact that the pedagogical worker has the role of the organizer of the pedagogical work. So the teacher, as the leader of the pedagogical process consciously and purposefully puts the examinee student in the role of the subject instigating him to think, solve problems, learn, take responsibility, come in communicating situations with others, develop social skills, etc. The teacher (educator) in this work also consciously and purposefully, brings children in the situation to come to in interactions with other children in the group or with the group as a whole.

Method

The research aimed to study how teaching organized in the form 1.) teacher-child interaction, and 2.) child-child interaction, affected the acquisition of new words, i.e. discrimination of similarly sounding words.

The research involved 25 children aged 5-6 and attending the pre-school institution "Pionir" in Jagodina, where the research was carried out. A qualitative (explorative) experiment was applied in several stages:

In the first phase of the activity the children are asked questions: What is cancer, what is ditch, what is step? What does it mean when we say "I, cancer" and what does it mean when we say "ditch"? ; What does it mean when we say "who cancer?", and what does it mean when we say "step"? and similar.

Most of the children do not discriminate these words, nor do they know the meaning of the word "ditch". Children who could discriminate these words did not take part in further research stages.

They talked with the children in this part of the activity, toys and drawings, masks, shadows of the fox and cancer are seen, moving of the cancer and skipping of the ditch are demonstrated.

In the second phase of the activity the children were divided into two groups: group A and group B.

In group A: the educator reads the story to the children The fox and the cancer skip the ditch (the educator reads loud and clear, with pauses and a special intonation of the words that are accentuated in the text).

> *The fox was hungry so she went slowly, STEP[1] by step (KORAK by KORAK). She came to a DITCH (JARAK) full of water and she hardly skipped it. Only then she saw that there is a CANCER (RAK) in the water.*
> *"Hi, cancer, eight legged", the fox greeted him.*
> *"Hi, fox, friend!", the cancer greeted her back and he makes a few steps backwards and she comes forward four legged nicely, on four legs, four-legged, and not eight **legged** like he.*
> *The cancer saw that the fox skips the ditch hardly and STEP(KORAK) by step so he suggested her to compete in skipping the ditch and he said: "I am not the CANCER (JA RAK) if I do not skip this DITCH (JARAK) farther than you! Eat me immediately if you skip the ditch farther than me!"*
> *The fox accepted, she turned to skip the ditch and the cancer attaches to the fox's tail with his two legged pin. When the fox skipped the ditch she turned to see where the cancer was, he released her tail and he said behind her:"Where are you, fox? I have waited for you here for a long time!"*
> *The fox was ashamed, she bowed her head and left.*

In group B: the telling of the text was made with dramatization the next way: the child 1- narrator, the child 2- fox, the child 3- cancer. The educator joined the activity only when it was needed and to help the children to manage during the dramatization. The children talked among themselves and asked each other questions.

In the third phase the ability of discrimination of the accentuated words was examined at both groups of the children.

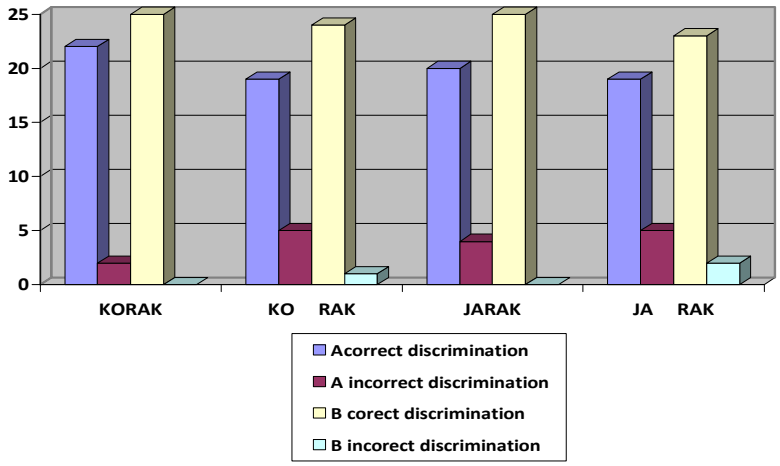
Data processing. The software used was the package for statistical analysis of data - SPSS 17.0.

[1] In the Serbian language the word KORAK (eng. STEP) sounds very similar to the pronunciation of the comparasion KO RAK (with the meaning „like cancer"); the pronunciation of the word JARAK (eng. DITCH) sounds very similar to the pronunciation of the words JA RAK (with the meaning „ J am cancer").

Results

Results indicate that children in Group A and children in Group B made progress in words discrimination (Graph 1)

Comparative study of achievement differences between Group A and Group B.



The analysis of difference significance shows that there is a high difference between the number of children who correctly discriminated the words and the number of children who failed to discriminate the words in Group A ($F=1.126$; $p< 0.001$) and in Group B ($F=1.113$; $p<0.001$)

Table No. 1 shows distribution of children in Group A and Group B in relation to discrimination of the given words. Group B was more successful, but there were no statistically significant differences between groups in word discrimination ($p>0.005$).

Distribution of children in Group A and Group B in relation to discrimination of the given words

	KOPAK	KO PAK	JAPAK	JA PAK
A correct	23	20	21	20
A incorrect	2	5	4	5
B correct	25	24	25	23
B incorrect	0	1	0	2

Upon interaction with their peers, all children in Group B managed to discriminate the words KORAK and JARAK. Only one child could not discriminate the words KO RAK and two children could not discriminate the words JA RAK. A bigger number of children in Group A, having interacted with the teacher, could not discriminate the given words.

Discussion and conclusion

The results confirm that in real pedagogical interaction education- teaching runs through the activity of the child in fullness of the interpersonal relationships, it is based on cooperation and it promotes the personality of the pedagogical worker and the examinee- student. In this kind of work there is real cooperation between the two beings, who not only learn and think, but feel and have their desires, wants, characteristics and limitations. Establishing interaction with the pedagogical worker, other children, group of children, people outside school on which pedagogical worker refers them so as to make some task, necessarily activates comprehensive activity of the child, therefore enables achieving real developmental goals i.e. the influence on the development of all aspects of personality, especially the development of cognitive competencies, emotional competencies and social competencies (Gillies, 2003). Cognitive competencies are basically mind, rational or intellectual abilities which include the acceptance, retaining and processing information, therefore abilities which enable learning, analyzing, evaluation of information and reaching conclusions. The traditional teaching, as it is familiar, instigates memory and reproduction of the remembered, but it does not go any farther than that. The learning and memory is necessary, of course, but it is not the only needed. All kinds of cognitive competencies are instigated and strengthened with pedagogical interaction: learning how to learn, separation of the important from the unimportant, independent problem-solving, creating new ideas, training for individual work etc. The emotional competencies consist of all that was in the modern literature under the term emotional intelligence. The traditional school does not deal with the emotional intelligence of the child much, or, better to say, the emotional aspect of the personality of the child (if it deals with it at all). As the emotions influence learning and the cognitive processes in general and as the emotional competencies are crucially important in the life of every man, the pedagogical interaction respects, supports and strengthens all forms of emotional competencies: the consciousness of their own emotions, the knowledge what we feel and why, the consciousness of our own powers and weaknesses, emotional expressiveness (the ability to express emotions, the choice of the emotional expression), the control of emotional expression, empathy and altruism, recognizing the emotions of others etc. (Fawcet & Garton, 2005). The traditional school, as it is known, bases its activities on the transmission of knowledge and insist on the development of cognitive competencies, strict hierarchy, the authority of the pedagogical workers and the discipline of the students. Occasions for the development of social competencies almost does not exist in frontal and traditional teaching. Social competencies on its side are directly connected to the early social acceptance, involvement of the child in group dynamics, success in school- and all this with the development of the positive image about itself, and finally, with psychical health. The development of social competencies is one of the key constructs in the motivational models with which they want to instigate school learning. The relationship of students and teachers, the relationship of children with peers in school group represents the base of successful school learning and the base for the development of the sequence of personal qualities necessary for every child.

Final conclusions: The teaching organized as a pedagogical interaction, as a social interaction in school conditions, leads to the full cognitive activity of the students and the cognitive activity to needed to achieving pedagogical goals as: cognitive development, harmonized emotional development and the development of the adequate social forms of behavior. The interaction moves, instigates and retains the cognitive activity of the child. The teaching that instigates the child to numerous interactions with the grown ups and other children, beside other things, gives the children the opportunity also to develop communicative skills. On its side, the skills of communication make it possible for the child to go into further social interactions. The social interactions have their intellectual and emotional component, which means that in social interactions the child must necessarily be active and cognitively and emotionally engaged.

The results of the research prove that teaching in the forms of adult-child interaction and child-child interaction (peer interaction), affects considerably the child's cognitive activity, i.e. it affects development of word discrimination ability, as presented in the paper, showing that peer interaction is more successful.

Pedagogical implication of the research results could be raising awareness of teachers at all levels of education of the importance of social interaction in the teaching and learning process.

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