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Does Educational Technology Impact a Child?

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Abstract

In the article the author has made an attempt to find out how teaching technologies can influence motivational, intellectual spheres, and personal traits of primary schoolchildren. For this purpose a stating experiment and a battery of tests were carried out. 150 schoolchildren took part in the experiment. The obtained results were exposed to statistical processing. A psychological profile of primary schoolchildren was developed.

Keywords: educational technology; developmental learning technology; traditional teaching technology; primary schoolchildren; personal traits; motivational sphere; intellectual sphere; Russia.

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Introduction

It is difficult to overestimate a school period in a person's life. Much of it depends on the success or failure during this period as personal features are formed under the influence or as a result of these or those peculiarities of a school period. The major aim of school teaching is to develop such a psychological mechanism that will facilitate in future the process of self-actualization and self-development, that will back up cognitive need throughout the school period and after it in their adult life and will not let them lose a thirst for knowledge and get satisfaction from this. Primary school age is the most important phase of school childhood. The age from 7 to 10-11 is understood as a primary school age in Russian pedagogical psychology. It corresponds to the years of studying at a primary school. High sensitivity of this age period determines great potential possibilities for multi-faceted child development. Main achievements of this age are crucial for further years of learning: by the end of primary school age a child should wish to study, be able to study and believe in his or her abilities.

That's why parents pay great attention to educational technologies applied at school when they choose an educational institution. Russian educational institutions employ various technologies: traditional, technology of developmental teaching (Davydov, 1996), learner-centered technology and other technologies.

Educational technology is understood as a teaching system, a set of methods, forms, educational means and methods of teaching which are systematically applied in the educational process. It is one of the significant ways to impact teaching, upbringing and development of a learner. On the other hand, educational technologies in pedagogy represent the whole science of those ways which are used by a teacher to impact learners by means of technical or information means.

The analysis of scientific literature showed that some aspects of the issue under study can be found in works of many scholars. Kalatskaya's works (2013) are devoted to the issues of psychological features of children trained according to different learning technologies. Slangen and Sloep (2005) examine the way the learning environment in primary education can be enhanced by stimulating the use of innovative information-communicative technologies (ICT). Wong (2007) considered advantages of information-communicative technologies and their application in primary schoolchildren teaching.

The application of the project method is suggested by such researchers as Kanigolla, Cudney, Corns, Samaranayake (2013), whereas others offer differentiated e-learning (Scalise, 2007). Badi (2011) focused on the issues of personality intellectual development.

Bozhovich (1997), Davydov (1996), Markova (1990) studied the peculiarities of schoolchildren learning activity. Pupils' motivation was analyzed by Aseyev (1993), Ilyin (2002), Markova (1990), Matyukhina (1984) and others. The research of schoolchildren individual psychological traits evolution in the context of traditional and developmental technologies was carried out by Vakhrusheva (1999) and Kuzmina (1992).

Nesterova (2004) and Vakhrusheva (1999) studied differences of intellectual and motivational spheres. Kuzmina (1992) emphasized that in the traditional teaching system the developmental effect spread on specific mental spheres, i.e. changes in intellectual activity, motivational activity, and reflectivity are not synchronized, they are isolated from each other.

Purpose and objectives of the study

The objective of this research is to study a motivational sphere, personal characteristics, and brain work peculiarities of primary schoolchildren taught by the traditional and developmental teaching technologies (Zankov). By psychological profile we consider a complete characterization of a person, a description of his or her features, personal traits, and possible actions in certain situations.

The experiment is aimed at revealing to what extent the developmental teaching (Zankov) influences psychological features of primary schoolchildren. Due to the distinction of two teaching technologies, we have carried out the stating experiment and solved the following tasks:

1. To study motivational sphere peculiarities of pupils taught according to different training technologies.
2. To reveal individual psychological features of thinking typical for primary schoolchildren of the two groups.
3. To consider personal characteristics of primary schoolchildren.

Literature review

Features of traditional teaching system

The term “traditional teaching” implies a mode of teaching based on the principles of didactics formed by Komensky (Comenius) in the 17th century and which is still being predominant at schools in the world.

The traditional teaching technology is focused on the acquisition of knowledge and skills, but not on the personal development. The goals of a modern Russian comprehensive school have been modified. The ideologization was excluded, a slogan of full harmonious development was removed, and the structure of moral upbringing changed, but the paradigm of goal representation as a set of planned qualities (teaching standards) has remained the same.

The traditional technology represents, first of all, authoritarian pedagogy of demands. Learning is poorly connected with a pupil’s life with its manifold requirements and needs. There are no conditions for realizing individual creativity. The teaching process as an activity is characterized by the lack of independence, weak learning motivation of schoolchildren. Methods of knowledge acquisition are based on a knowledge delivery; teaching according to a sample; inductive logic from particular to general; mechanical memory; verbal summary; reproductive playback.

The opportunity to transfer a large amount of information within a short period of time is an undoubted advantage of traditional teaching. This method makes learners gain knowledge without finding ways to prove the evidence of its validity. Besides, it assumes the acquisition and reproduction of knowledge, and its application in similar situations. One of fundamental disadvantages of this type of teaching is a focus on memory more than on thinking. It is obvious that less attention is paid to the development of creative abilities and independent way of working. The most typical tasks are the following: insert, single out, emphasize, remember, reproduce, solve according to an example, etc. The educational and cognitive process has a more reproductive (reproducing) character due to which learners’ reproductive style of cognitive activity is formed. Therefore, it is often called a “memory school”. As practice shows, the amount of given information exceeds the possibilities of its acquisition. Besides, there is no opportunity to adapt the rate of teaching to various individual-psychological learners’ characteristics.

Zankov’s developmental teaching technology

L.V. Zankov's developmental teaching system was worked out in the 1960s in Russia. The idea to merge teaching, upbringing and development in a single process makes its foundation: to teach children without "poor" marks, without compulsion, to develop learners' sustainable interest in knowledge and need for their independent search. The Zankov's system covers only initial period of teaching, recognizing that it has fundamental importance. Purposeful work aimed at the development of an internal stream of forces and external influence is the initial point of the system. It suggests the general development of a personality - mind, will and feelings, but not the development of memory, attention, and imagination (Davydov, 1996).

The works of Vygotsky formed the basis of the system. He believed that teaching should not be focused on the already existing features of children's thinking, but it should concentrate on a child's development. The development assumes collaboration. The help from adults should involve the arrangement of joint search for a solution. The Zankov's system accepts each child as a person with specific features, mentality and character taking into account the fact that the child's development is irregular.

The conceptual provisions of this technology comprises: the development of learners' positive motivation for studying and gaining cognitive interests, appropriate development of different types of mental activity, embedment of emotive sphere in the process of learning. In contrast to the traditional technology, communicative situations when every learner can demonstrate independence and choose their own ways of work are created at the lesson. Group search activities, comparison, grouping, classification, quest for objective laws, independent conclusion making are arranged in class. All these cannot but impact schoolchildren's brain development and their motivation. These technologies reveal different approaches to the concepts of personal traits and self-assessment. Therefore, they use various forms, methods and means to realize desired goals.

L.V. Zankov's search for common features of methodological systems (multifacetedness, procedurality, collisions, and variability), uniting different school subjects at the methodological level, creates objective conditions for educational objectives implementation of interdisciplinary character, including the development of general educational skills. The most significant ones are singled out for the implementation of educational activity: observation, listening, reading – information-indicative abilities; classification and generalization – operational-performing abilities; self-examination and self-control – control-correctional abilities; a type of tasks promoting their development was specified. The child's educational activity is arranged as searching.

Comparative characteristic of two teaching technologies

Comparing the traditional and developmental teaching technologies, it is possible to single out the following distinctions (Selevko, 2008).

1. The principle of availability dominates in traditional teaching. It assumes the transition from simple to complex, "from easy to difficult", from familiar specific facts to generalizations, from elementary generalizations to generalizations of a higher order. The increase of subject complexity (difficulty) seems to be the only source of learners' intellectual development.

The fundamental principle of the Zankov's system is teaching at a high level of difficulty. It is specific "difficulty consisting in cognition of studied phenomena essence" that is taken into account, but not the increase of "an average standard of difficulty". Its overcoming demands the reorganization of learners' intellectual (and the whole mental) potential, "disclosure of child's spiritual forces". Teaching is urged to give "space and guideline" to these forces.

2. Traditional teaching is aimed at the didactic training of specific representations about the reality of primary schoolchildren. Leaving the framework of these representations, according to its conceptual sets, is inaccessible for children due to the limitedness of their age opportunities.

The Zankov's system puts forward an alternative solution in the form of a principle of the theoretical knowledge leading role. He approves the priority of conceptual abstractions and generalizations in teaching in elementary schools. It can proceed in the form of acquisition: a) scientific terms and definitions; b) dependences and laws (for example, in math classes, the commutative law of addition and multiplication; regularities of seasonal changes in plant and animal life, etc.). The value of primary schoolchildren's specific skills mastering is not diminished. It occurs on the basis of general development, on the basis of probably deeper comprehension of corresponding concepts, relations, and dependences.

3. The rates of learners' progress are very low in the context of traditional teaching. A lot of time is spent on mechanical learning, repetition and consolidation of educational material.

In contrast to it, the Zankov's system is based on the principle of learning by fast pace. It means not forced teaching, but the refusal of "going round in a circle" and "continuous progress". "Permanent enrichment of schoolchildren's minds by versatile contents creates favorable conditions for deeper comprehension of obtained data as they are involved in a widely developed system".

4. The principle of consciousness in learning, proclaimed in traditional teaching, is applied only for the acquisition of knowledge and skills. It can be expressed in a formula: "know (be able, do) and understand what you know (can, do)".

In the Zankov's system this principle of consciousness in mastering knowledge has another interpretation. Zankov underlined the importance of understanding the educational material, using theoretical knowledge in practice; he recognized the necessity to master thinking operations (comparison, analysis, synthesis, generalization) and the significance of schoolchildren's positive attitude to learning. According to him, all this is necessary, but not enough. The specifics of Zankov's approach is that specific aspects of learning such as lines linking teaching material in a uniform structure, necessity to learn its certain elements, sources of mistakes at its acquisition are to be perceived first of all.

The theoretical analysis showed that this system, unlike the traditional one, focuses on the upbringing of pupils' positive educational motivation; on the development of each pupil in the class. Situations that allow each pupil to show independence and adequately estimate the results of the activity are created at the lesson. The Zankov's didactic system draws teacher's special attention to the development of children's ability to think, to observe and to act.

Methodology

Participants

The experiment arrangement: 150 primary schoolchildren of Kazan took part in the stating experiment. Pupils of the school No. 75 (75 people) comprised the first group; they have been taught according to the developmental teaching technology (L.V. Zankov) for three years. The second group included children from the school No. 91 (75 people) taught according to the traditional teaching technology. The researcher worked with the children of each group separately. Primary schoolchildren answered a series of questions in compliance with the offered techniques.

Methods

In compliance with the research aim, the following methods were applied:

1) theoretical (analysis of psychological, pedagogical and teaching literature, comparison, generalization),

2) empirical (experiments, testing). The results were statistically processed with the student's t-test and Fisher's φ^* -criteria.

The Fisher's criterion is intended to compare two selections due to the occurrence rate of the effect that interests the researcher. The criterion estimates the reliability of distinctions between percentage shares of the two selections in which the effect, that interests us, is registered.

The student's t-test was used to determine the reliability of distinctions between average values of indicators characterizing various groups of pupils.

We have selected the following techniques. The motivation of primary schoolchildren was studied with the help of the following procedures: "Discussion about school" to assess the level of school motivation (Luskanova), "Knowledge acquisition orientation" (Ilyina & Kurdyukova), "Mark orientation" (Ilyina & Kurdyukova), "The ladder of incentives" (Bozhovich, 1997; Markova, 1990), a questionnaire "How do you refer to learning of different subjects?". The first procedure made it possible to reveal five levels of children's attitude to school, to educational process, their emotional reactions to a school situation. The first level is a high level of school motivation and educational activity; the second is a good school motivation; the third is a positive attitude to school, but school is attractive for such children due to its extracurricular activities; the fourth level is a low school motivation; the fifth level is a negative attitude to school and school disadaptation. The results obtained by means of "The ladder of incentives" procedure testify to the ratio of social and cognitive motives of schoolchildren learning which are determined by motives that take the first four places in the hierarchy. Procedures "Knowledge acquisition orientation" and "Mark orientation" are applied together and they are aimed to identify this or that learner's tendency: knowledge or a mark. And the questionnaire "How do you refer to learning of different subjects?" was carried out for a deeper understanding of educational motivation, which showed pupils' level of interest in each of the offered subjects (mathematics, the Russian language, handicraft, reading, etc.).

The primary schoolchildren brain activity was studied with the help of the following procedures: "Cross the odd" (primary schoolchildren's ability to generalize); "Definition making, reasons study, identification of similarity and differences of objects", "Simple Analogies" (logic and flexibility of thinking), procedure "Study of brainwork velocity".

To study primary schoolchildren's level of self-estimation, the Dembo-Rubinstein procedure was employed. To diagnose the level of respondents' incentives, the Schwarzlander procedure was applied.

Cattel and Coin test (adapted by Alexandrovskaya) was used to examine the personal characteristics of primary schoolchildren.

Results

Individual and psychological features of thinking

The results of the research showed that the level of generalization of schoolchildren taught according to the developmental teaching system is by 17.3% ($t_{emp}=3,1$, $p=0,01$) higher than that of schoolchildren taught according to the traditional teaching system (Table 1).

Table 1. “Cross the odd” results

Group of testees	The level of the ability to generalize		
	low	average	high
L.V. Zankov’s teaching system	4 %	14.7%	81.3%
Traditional teaching system	4 %	32%	64%

As for the intellectual process development, schoolchildren taught according to the traditional teaching system have an average level (Table 2). The schoolchildren in the second group have a high level of intellectual processes development ($t_{emp}=3.8$, $p=0.01$).

Table 2. “Definition of concepts, clarification of reasons, detection of similarity and distinctions in objects” results

Group of testees	The level of intellectual processes development		
	low	average	high
L.V. Zankov’s teaching system	8 %	48 %	44 %
Traditional teaching system	10.7 %	66.7 %	22.6 %

The level of mental logics is by 12,1% higher in pupils taught according to the developmental teaching system than in their peers taught according to the traditional teaching system ($t_{emp}=3.1$, $p=0.01$) (Table 3).

Table 3. “Simple analogies” results

Group of testees	The level of thinking logic			
	low	good	sufficient	high
L.V. Zankov’s teaching system	7.9 %	24 %	22.6 %	45.5 %
Traditional teaching system	8 %	24 %	34.6 %	33.4 %

Motivation

According to the chart, it is possible to draw a conclusion that most respondents trained according to the traditional teaching system have an average speed of thinking. The speed of thinking is a result of

how quickly pupils could process the information and make decisions based on this information, concentrate at the right time, and show a high activity of thinking, its flexibility and criticality.

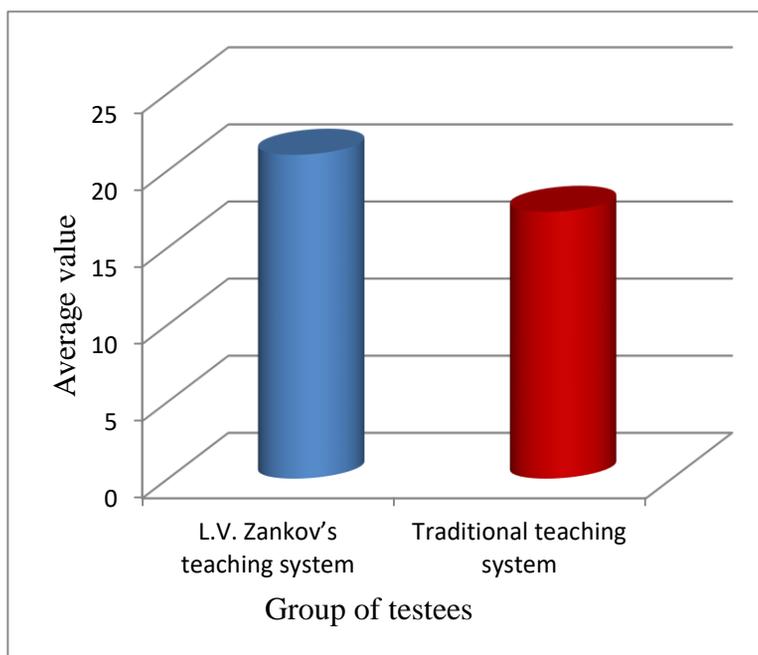
The children taught according to the developmental teaching system demonstrate a high speed of thinking (Table 4).

Table 4. “Studying the speed of thought” results

Group of testees	Speed of thought		
	low	average	high
L.V. Zankov’s teaching system	10.7 %	4 %	85.3 %
Traditional teaching system	8 %	53.3 %	38.7 %

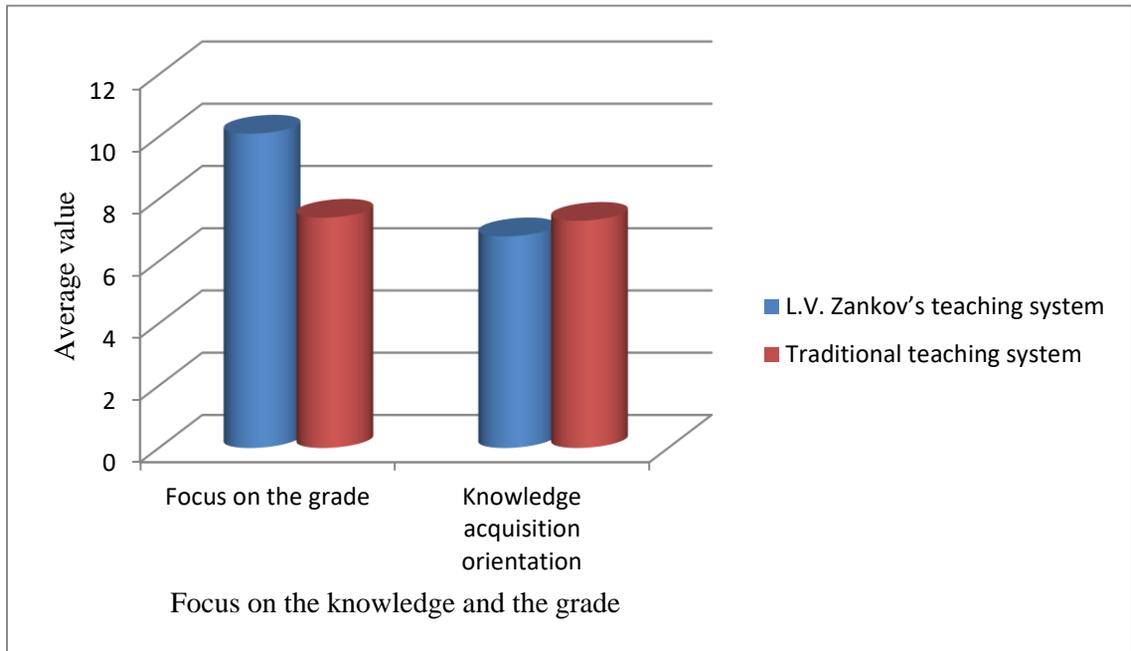
It was also stated that learners really had some motivational differences. The general level of motivation is higher among those taught according to the Zankov’s educational system (Figure 1). These children go to school to learn and gain new knowledge.

Figure 1. “Conversation about school” results



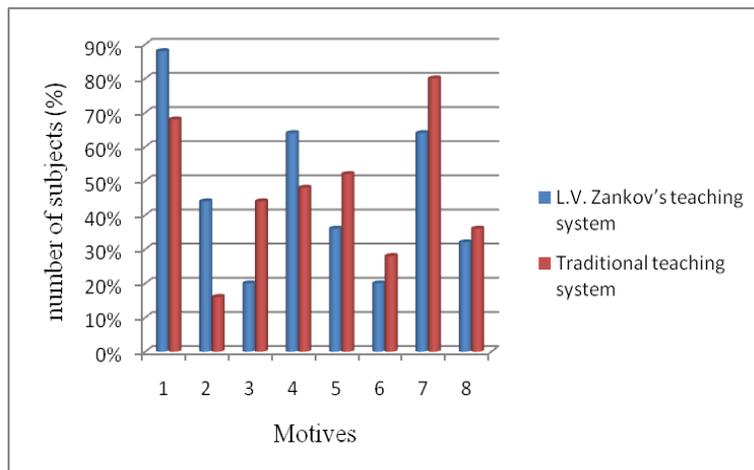
The children taught according to the developmental teaching system are characterized by motivation for knowledge acquisition more than by motivation for getting a mark ($t_{emp}=3.62$, $p=0.01$). The schoolchildren of traditional schools are motivated both by knowledge acquisition and getting a mark, the result of their study is more important for them (Figure 2).

Figure 2. “Knowledge acquisition orientation”, “Mark orientation” results



The pupils taught according to the Zankov’s developmental teaching system have broader cognitive parental motives (more than 50%) (Figure 3). In a traditional school, more than 50% of schoolchildren have broad cognitive, learning-cognitive, social and parental motives as prime ones. The difference validity verification with Fisher’s ϕ – showed the validity of differences according to indexes of “broad cognitive motive” (ϕ emp. = 3.76, $p = 0.01$), “procedure motive” (ϕ emp. = 2.22, $p = 0.01$), “resultative motive” (ϕ emp. = 1.85, $p = 0.01$).

Figure 3. “The ladder of incentives” results



Symbols:

Cognitive motives:

1. wide cognitive (I am learning to know everything),
2. procedural (I study because I like the process of learning),
3. resultative (I study to receive good grades),
4. educational-cognitive (I study to learn to solve problems myself).

Social motives:

1. wide social motive (I study to be to useful for people.),
2. “teacher’s motive” (I study to please the teacher with my progress),
3. “parental motive” (I study to please my parents with my progress.),
4. “friend’s motive” (I study because I want my friends to respect me for my progress).

Thus, the schoolchildren from the first group are motivated for acquisition of new knowledge and parents’ praise, however the way of knowledge acquisition is also important for them, at the same time the character of obtained knowledge is significant for them as they want to be of some help for the society.

The level of cognitive interest in various subjects of schoolchildren taught according to different educational programs was studied. The general level of cognitive interest in mathematics and foreign language is higher in the group of children taught according to the Zankov’s developmental teaching system. In Russian, reading, nature study, PE and handicraft the percentage of interested ones is higher in a traditional school. Nevertheless, it should be noted that the difference of cognitive general level of pupils taught according to different educational programs is insignificant for the majority of subjects. The one-factor dispersing analysis made it possible to single out differences ($p=0.01$) at the level of cognitive interest for subjects: reading ($t_{emp}=5.2$), mathematics ($t_{emp}=4.81$), environment study ($t_{emp}=5.03$), handicraft ($t_{emp}=5.26$). The schoolchildren of traditional schools attend lessons of reading, handicraft with pleasure. The children in the second group prefer mathematics, lessons of environment study (Table 5).

Table 5. “What do you think of studying various subjects?” results

Subjects	Subj	Group of testees	Levels of cognitive interest			
			1 level - situational interest	2 level – to study because it is necessary	3 level – there is an interest in the subject	4 level - the increased cognitive interest is shown
Russian language	The	1 group	36	20	36	8
		2 group	28	26,7	29,3	16
Reading	Rea	1 group	48	12	16	24
		2 group	16	28	20	36
Mathematics	Mat	1 group	16	8	48	28
		2 group	20	32	32	16
The world around us	The	1 group	40	12	16	32
		2 group	16	24	32	28

Physical education	Phy	1 group	36	4	8	52
		2 group				
			16	28	24	32
foreign (English) language	The	1 group	24	20	20	36
		2 group	24	28	16	32
Handicraft	Han	1 group	48	0	28	24
		2 group	24	12	8	56

Personal features

It was stated that schoolchildren taught according to the traditional teaching technology are characterized by a lower level of sociability. They are less confiding, more susceptible to offence; they experience the lack of intuition in interpersonal relationship. Such features as negativism, stubbornness, egocentrism are observed in their behavior. These children are cold and formal in contacts. They are not interested in the life of people surrounding them. They prefer dealing with books and things, they try to work alone. They are not apt to make compromises in conflicts. While doing something they are exact and obliging, but not flexible enough. Besides, such children reveal a high level of excitement, nervous tension and anxiety, at the same time they display a low level of risk taking activity and social courage. A high level of self-estimation and self-control dominates (up to 15%), but nevertheless, a lower level of incentives is detected (12% below) in contrast to children taught according to the Zankov's developmental teaching technology. Individuals with a low level of incentives choose too easy and simple aims, this can be explained by "social slyness" when along with high self-estimation and self-respect an individual avoids social activity and difficult responsible targets and deals.

The schoolchildren taught according to the developmental teaching technology excel their peers in traditional schools: sociability, aptitude to risk, responsibility, social courage, and level of incentives. These results appeared to be statistically meaningful at the level $p=0.05$.

Conclusion

Based on the results of the research a psychological profile of a primary schoolchild taught according to the two technologies was developed. The schoolchildren taught according to the Zankov's developmental teaching are characterized by a high level of self-confidence and incentives. Such children are sociable, responsible, they are not afraid to risk. They have a high level of generalization ability, mental logics, and brain work velocity.

These children are marked by the motivation of attending school in order to learn and gain new knowledge. The highest level of cognitive interests is observed in mathematics, environment study, though such subjects as foreign languages, PE and handicraft are also interesting for them.

The children taught according to the traditional teaching method are characterized by not high results in: ability to communicate, development of intellectual processes, velocity, logics and flexibility of thinking.

They are less confiding, more susceptible to offence. They experience the lack of intuition in interpersonal relationship. Such features as negativism, stubbornness, egocentrism are observed in their

behavior. Such children are cold and formal in contacts. They are not interested in the life of people surrounding them. They prefer to deal with books and things. They try to work alone. They are not apt to make compromises in conflicts. While doing something they are exact and obliging, but not flexible enough. Besides, such children reveal a high level of excitement, nervous tension and anxiety, at the same time they display a low level of risk taking activity and social courage. A high level of self-estimation and self-control dominates, but nevertheless, a lower level of incentives is detected.

At school they prefer to deal with friends and teachers. Cognitive motives are not high and learning process is not attractive for them, but at the same time they feel good at school. The schoolchildren are aimed both at knowledge acquisition and getting a mark, the result of their study is more important for them as they tend to apply obtained knowledge to be useful for the society. The highest cognitive level is displayed for handicraft, though they are interested in reading, environment study and PE.

References

- Adwera A., Hanlin R., & Johnson, H. (2013). Developmental education for innovation: lessons from an experience in Kenya. *International Journal of Technological Learning, Innovation and Development*, 6(3), 244 - 261.
- Aseyev, V. G. (1993). *Personality and significance of incentives*. Moscow: Institute Psychology RAS.
- Badi, J. (2011). "Thinking" terminologies from Quronic perspective and their impact on human intellectual development. *International Journal of Arab Culture, Management and Sustainable Development*, 2(1), 41 - 54.
- Bozhovich, L. I. (1997). *Issues of personality formation: selecta psychological*. In D.I. Feldstein (Ed.). Voronezh: NPO "MODEK".
- Davydov, V.V. (1996). *Theory of developmental learning*. Moscow: INTOR.
- Gurevich, K. M. (1988). *Individual-psychological peculiarities of schoolchildren*. Moscow: Znaniye.
- Ilyin, E. P. (2002). *Motivation and motives*. St. Petersburg: Piter.
- Kalatskaya, N. N. (2013). *Psychological features of children learning according to different educational technologies. The development of pedagogics theory and practice, pedagogical and social psychology in the context of education system renovation*. Kirov: MNTsIP.
- Kanigolla, D., Cudney E.A., Corns, S.M., & Samaranayake, V. A. (2013) Project based learning for quality and Six Sigma education. *International Journal of Six Sigma and Competitive Advantage*, 8(1), 51 - 68.
- Kuzmina, E. G. (1992) Differentiation of cognitive sphere of primary school children at developmental teaching. *In Thesis of reports for the concluding intramural scientific practical conference of Orsk State Teachers' Training Institute named after T.G. Shevchenko* (pp.28-29).
- Markova, A. K. (1990). *Formation of learning motivation: A guidebook for teachers*. Moscow, Prosveshchenie.
- Matukhina, M. V. (1984). *Primary school children motivation*. Moscow: Pedagogika.
- Nesterova, O. V. (2004). *Dynamics of cognitive and personal differentiation of primary school children at traditional and developmental teaching according to L.V. Zankov's system*. Moscow.
- Scalise, K. (2007) Differentiated e-learning: five approaches through instructional technology. *International Journal of Learning Technology*, 3(2), 169 - 182.

- Selevko, G. K. (2008). *Modern educational technologies*. Moscow: Narodnoye obrazovanie.
- Slangen L. A.M.P., & Sloep P. B. (2005). Mind tools contributing to an ICT-rich learning environment for technology education in primary schools. *International Journal of Continuing Engineering Education and Life-Long Learning*, 15, 225 - 239.
- Sloman, M. (2006). E-learning and corporate training: a UK perspective. *International Journal of Learning Technology*, 2(4), 329 - 341.
- Vakhrusheva, I. G. (1999). *Research of school children individual psychological traits within traditional and developmental technologies: on the basis of longitude research of primary school children*. Kazan.
- Venger, A. L. (2005). *Psychological examination of primary school children*. Moscow: Vldos-Press.
- Volkova, M. V. (2005). *Schoolchildren's personal development on the basis of pedagogical technologies integration: A theoretical and methodological aspect*. Kazan: Kazan University Publ.
- Wong, K.-P. (2007). Using ICT in primary schools: different perceptions by school heads and teachers in Hong Kong. *International Journal of Knowledge and Learning*, 3, 342 - 366.