

Information-Educational Environment as a Condition of Formation of Gifted Children's Informational-Digital Competence

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Abstract: The article deals with the influence of information-educational environment on gifted child's development. The study was carried out on the basis of the Laboratory of informational technologies of education in Kharkiv Regional Specialized Boarding School of the 2nd – 3rd degrees "Giftedness". The directions of the activities of the Laboratory of informational technologies of education have been revealed. They included: introduction and integration of distance learning into educational process, organization of distance learning through cooperation with institutions of higher education (dual education); creation and replenishment of methodical-informational resources of school; ensuring sustainable functioning and development of computer network, use of new means of informational technologies; software and technical, methodic and organizational support of educational computer classrooms and computer equipment; providing school representation in world informational space; support of projects that include use of new informational technologies and Internet; funding educational software; researching the effectiveness of using software tools etc. The requirements to information-educational environment and organization of gifted children's work have been determined. They are development of informational culture and competence of the participants of the environment, its orientation on monitoring of development of child's giftedness, harmonization of relationships between participants of educational process, strengthening school ties with the external environment.

Keywords: *Information-educational environment; gifted child; development; requirements; directions; Laboratory of informational technologies of education; Kharkiv Regional Specialized Boarding School of the 2nd – 3rd degrees "Giftedness"; dual education.*

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1. Introduction

At the modern stage of development of education in the world, there is a need in formation of active, creative, gifted, highly developed personality that is able to show his talents and learn lifelong. School is a center of development of such gifted personality, and it has to create a special educational-developmental environment for a child, to construct the educational process so that it could help children realize their individual abilities, promote formation of creative activity and develop talents. Gifted children need creation of special conditions which provide revelation and support for their talents, satisfaction of cognitive needs in volitional, emotional and intellectual spheres, their self-development and self-realization as creative personalities. Taking it into consideration, it is important to liaise between micro-environment (school) and macro-environment (other educational institutions, and higher educational institutions in particular) based on the ideas of dual education. It will promote the full revelation of children's inclinations, create opportunities to satisfy their diverse individual cognitive needs, conduct their research activities and implement lifelong learning.

Moreover, globalization processes, active development of high-tech and information industries predetermine the need to form a generation of leaders, whose intellectual potential can ensure sustainable development of country's economy at the level of modern requirements. The implementation of such public needs requires the solution of priority task by the educational system - creation conditions for children's holistic development.

Actually, modern tendencies in educational system in general (mechanization, informatization, virtualization) cause their penetration into the educational process of educational establishments and using their capabilities for educational purposes. That is why, the creation of information-educational environment as a condition of development of a gifted child is crucial, as it is important for forming a successful person, promotes children's comprehensive development, successfully meets the requirements of time, becomes basis of life of any educational institution and focuses on children's needs and expectations in real life.

Such information-educational environment is learner-centered, aimed at forming students' competences in order to integrate them in the society of the future, in the informational society. This environment involves all modern achievements in technological-educational sphere (e-learning and software in Education, e-learning technologies, distance learning, e-tutoring

etc.), which helps students to adapt to changeable world better and quicker, feel free to learn and use all modern innovations in everyday and professional life and form students' ability to lifelong learning.

It should be noted that some aspects of the problem of influence of educational environment on child's personality has been studied by some scientists. For instance, Adariukova (2007) and Kharchenko (2002) revealed the educational environment from the position of society, as a condition of children's interaction and socialization. Actually, the educational environment means person's interaction with other subjects of educational process.

Furthermore, Alfimov (2017), Bilozerska (2011), Davydenko (2004), Gontarovska (2010), Kostiukevych and Kukh (2006), Leshchuk (2006), Osypenko (2017) investigated the developmental opportunities of the educational environment, its influence of children's education success, their creativity and independence. These scientists consider the educational environment to be an effective means of activating the children. Taking this into consideration, it should be noted that the educational environment of an educational institution has the unique potential for development of gifted children's abilities and cognitive processes due to use of different developing tasks, effective learning activities and dual education. However, it is important to involve children into active work and adapt means, which the environment has, in accordance with a gifted child's individual requirement.

Moreover, a number of scientists, in particular Arhipova and Mukomel (2006), Dubych (2007), Prykhodchenko (2011), studied the developmental potential of the educational environment, revealing its exceptional importance for formation of spiritual values of personality, his qualities and culture. Actually, the educational environment influences person's upbringing through its general atmosphere, educational activities implemented by school, interaction with parents and other educational institutions.

Also, a number of other scientists (Busra & Nurettin, 2018; Galazka & Trinder, 2018; Malach & Kristova, 2017) consider the educational environment to be a means of creation of positive learning atmosphere, a condition of learning success. It includes various equipment, creative and optimistically-oriented communication between the participants of educational process.

Besides, Carroll (2005), Ceci and Roazzi (1994), Visser et al. (2006) take particular notice of psychological basis for educational environment. They study the peculiarities of development of students' cognitive processes,

skills and abilities due to formation of favourable educational environment in educational institution.

At the same time, a number of scientists (Cortina, 2011; David, 2011; Plunkett & Kronborg, 2011; Vidergor & Eilam, 2011) pay much attention to teachers' special training for creation developmental-educational environment. In order to form students' informational-digital competence, teacher should know all innovational in information and communication technologies, feel free to use various devices, have developed informational-digital competence and learn teaching methods and techniques to teach students.

As for information-educational environment, its specific features and opportunities of use for personal development have been revealed in the works by Dmytruk and Konoshevyh (2017), Panchenko (2011), Petruk (2012), Petukhova (2007), Pylypenko (2013), Sokoliuk (2016), Tarkhan (2013). In their scientific works, the information-educational environment is presented primarily from a perspective of teacher's training in its conditions and use of the potential of this environment in learning.

Finally, some aspects of influence of the environment on gifted child's personality have been revealed in the works of researchers. For instance, Zavhorodnya (2006) has studied the problem of gifted schoolchildren's socialization in educational environment; Zuev (2017) has investigated the problem of organization of gifted children's learning in European countries; Udovychenko (2017), based on the data of the experimental research, has determined the educational environment factors which impacts gifted children.

However, the analysis of psychological-pedagogical literature on the topic of research, web-sites of some organizations - European Council of High Ability (2014), Eurotalent (n.d.), World Council for Gifted and Talented Children (n.d.) -, that are aimed at support for gifted children, shows that the problem of influence of information-educational environment on gifted child's development has not been the subject of a comprehensive study, which predetermines this study.

2. Purpose

The purpose of this article is to characterize the possibilities of the information-educational environment created on the basis of the Laboratory of informational technologies of education in Kharkiv Regional Specialized Boarding-School of the 2nd – 3rd degrees *Giftedness* as conditions of formation of informational-digital competence of gifted schoolchildren.

3. Methods

A complex of methods was used to carry out this research. The theoretical methods were: analysis and synthesis of philosophical and psychological-pedagogical literature for comparing scientists' different views on the investigated problem, definition of conceptual and categorical apparatus. The empirical methods were observation (pedagogical observation of the educational process and the educational activities of schoolchildren), questionnaires (schoolchildren's questionnaire about their motivation to learn, values and self-esteem, and teachers' questionnaire about difficulties in teaching and their ideas about modernization of educational-developmental environment), talks, diagnostic testing and self-evaluation for determining the level of formation of schoolchildren's informational-digital competence and the impact of the information-educational environment of it.

For determining the nature of individual's orientation, we used observations, individual talks, questionnaire, diagnostic methodics *Determining the individual's orientation* by Bass (as cited by Romanko, 1983) and "Orientation to acquisition of knowledge" by Ilin and Kurdiukova (as cited by Ilin, 2003). Motives of schoolchildren's learning were studied due to use a complex of diagnostic methodics, namely: the methodics of statements *Why do I want to learn better?*, methodics *Diagnostics of orientation of educational motivation* by Dubovytskaya (2002), test interviews *Assessment of schoolchildren's motivation in educational activities, Motivation of success and fear of failure* by Rean (1999). Motives of learning were studied due to the methodics *Determining the structure of educational motivation* by Karpova (as cited by Polovnikova, 1968). In order to determine schoolchildren's cognitive interest, we also used questions to teachers, monitoring of gifted schoolchildren's participation in activities, their emotions in educational activities, desire to do tasks and methodics *The level of development of educational-cognitive interest* by Ksenzova (as cited by Masalitina, 1999), *Methodics with envelopes* by Shchukina (1988) and "Schoolchildren's cognitive interest" by Volkova (as cited by Baranova, 2005).

Leadership qualities were measured using the methodics *Determining the communicative and organizational inclinations* by Syniavskyi and Fedoryshyn (as cited by Prutchenkov, 1996) and *Diagnostics of communicative social competence*. In order to investigate values of gifted children, we used a complex of methods, namely: talks, questionnaire and diagnostics methodics *Study of schoolchildren's value orientations* by Tulin (as cited by Yeldynova, 2013), *Must-test* by Ivanov and Kolobova (as cited by Khorunzha, 2009), *Diagnostics of adolescents' value*

orientations by Sopov and Karpushina (as cited by Yeldynova, 2013) and adapted methodics of American psychologist Rokeach (as cited by Rimskaya & Rimskiy, 2001) who studied the nature of human values.

The acquisition of the system of knowledge was assessed due to use of the adapted methodics of Vaskivska (2012), Grabar and Krasnyanska (1977), Kasyanova (as cited by Kyverialg, 1974) and Romaniuk (2003). According to these methodics, we divided schoolchildren into three groups, namely: schoolchildren with reproductive level of knowledge, schoolchildren with ability to use knowledge in practice and schoolchildren with ability to use knowledge creatively in new situations.

For diagnostic of schoolchildren intellectual sphere, we used creativity test by Torrance (1974), creativity questionnaire of Renzulli and Hartman (1971) and computer version of the test of Raven (2002).

For determining the level of development of gifted schoolchildren's cognitive activity we used *Methodics with envelopes* by Shchukina (1988), *Project Methodics* and *Referent-Methodics* by Bannikova (as cited by Orzhehovska et al., 1996), methodics *The fourth is superfluous* by Yakovleva (as cited by Orzhehovska et al., 1996) and methodics *Diagnostics of the levels of formation of schoolchildren's cognitive initiative on the basis of scales of polar profiles*. Special attention was paid to schoolchildren's interest in school subjects.

For determining gifted schoolchildren's personal qualities, we used a complex of methodics, namely: methodics *Diagnostics of communicative social competence*, test *Communicative tolerance* by Boiko (as cited by Rimskaya & Rimskiy, 2001), methodics *Study of schoolchildren's moral orientation*, test *Evaluation of communicative skills and abilities*, Thomas's (1975) methodics *Diagnosis of person's propensity for conflict behavior*. They enabled to learn the level of formation of schoolchildren's communicativeness, emotional stability, cheerfulness, sensitivity, ability to self-control, tendency to antisocial behavior etc.

Besides pedagogical observation, questionnaire and talks with schoolchildren and teachers, for diagnostics of the adequacy of schoolchildren's self-esteem we used such diagnostic methodics as *Study the nature of success and failure* by Asmolov, Burmenska, and Volodarska (as cited by Bordovskaya & Rean, 2004), methodics *Study of self-esteem using the ranking procedure* of Rean (as cited by Bordovskaya & Rean, 2004), adapted methodics of diagnostics of self-esteem by Dembo-Rubinstein (as cited by "Methods of Diagnostics", n.d.), test *Three grades* by Lipkina (as cited by "Diagnostics of the Level", n.d.), test *Evaluate yourself*, modified methodics *Who am I?* by Kuhn and McPartland (1954). They helped to determine the formation of schoolchildren's attitude to themselves and self-consciousness.

The research was held in 2015-2018 in Kharkiv, and 73 schoolchildren of Kharkiv Regional Specialized Boarding-School of the 2nd – 3rd degree *Giftedness* took part in it. The consent from children's legal representatives were received.

4. The essence and importance of the information-educational environment

Modern scientists (Alfimov, 2013; Galazka & Trinder, 2018; Malach & Kristova, 2017; Sokoliuk, 2016) note that educational environment has the character of support for each child. It is considered to be a complex of all the possibilities of his upbringing, training and development and a complex of material factors of educational process, interpersonal relationships and the conditions specially created by teachers for child's comfortable stay at educational institution.

However, the educational environment should be renovated in order to bringing it into line with the modern level of technological development of society, state and trends of social development. According to it, it is necessary to implement information technologies and to use their opportunities in educational environment as full as possible. The material and technical conditions and information and communication support are indicators which characterize the quality of the educational environment (Poliakova, 2013).

The information-educational environment is the only space where integration of all information is taken place. It is also considered to be integrated systemic means of increasing the efficiency of educational process due to a set of information transmission media. It is done through the interaction of scientific, vocational guidance, upbringing, sports and recreation work, the organization of educational-productive activities, the work of administration, psychological service, library of an educational institution, its administrative and economic activities etc. The information-educational environment is a part of the learning environment of an educational institution along with virtual environment (software for providing educational services) and interactive learning environment (support for structured interaction between schoolchildren, and between schoolchildren, teachers and specialists in various fields in the conditions of distance education) (Velichko & Denisov, 2007).

5. The Laboratory of informational technologies of education

In order to study the impact of information-educational environment on gifted children's development, we have developed the Regulation on the Laboratory of informational technologies of education and introduced it in the work of Kharkiv Regional Specialized Boarding-School of the 2nd – 3rd degrees *Giftedness*. The Laboratory of informational technologies of education ensures the development and functioning of the information infrastructure of the boarding-school, its connection with regional and world informational space, information-technical and methodical support for interaction of the boarding-school with other subjects of the educational activities by means of modern information and communication technologies, develops and implements software and technical means of informatization of the educational process, management and conducting research in the field of new information technologies (“Regulation on the Laboratory”, 2012).

There are different directions implemented by the Laboratory of informational technologies of education. They are:

- introduction and integration of distance education in pedagogical process as an integral part of modern education, organization of distance learning in cooperation with higher education institutions. It is aimed at strengthening of relations with the external environment for unleashing children's abilities. In order to organize the dual education that means combination of schooling with training in higher education, gifted children learn both at school and outside school. Such organization of education is considered to be a cluster. As a result, the boarding-school signed a number of agreements on cooperation with higher educational institutions (for example, V. N. Karazin Kharkiv National University, Simon Kuznets Kharkiv National University of Economics, H. E. Zhukovsky National Aerospace University *Kharkiv Aviation Institute*, H. S. Skovoroda Kharkiv National Pedagogical University, National University of Pharmacy, Kharkiv National University of Radio Electronics, O. M. Beketov National University of Urban Economy in Kharkiv, Kharkiv National Agrarian University named after V. V. Dokuchaiev. Such integration creates good opportunities for full realization of child's inclinations and talents, promotes conducting fundamental research, understanding the needs of science and society in development of certain ideas and provides continuity of education;
- creation and replenishment of methodical-informational resources of the boarding-school with educational videos, e-guides and materials of

multimedia interactive lessons, technical support for methodical-informational resources (shooting and processing video). It promotes better learning of educational material by children, formation of their abilities to use information devices, contributes to self-creation and use of methodical-informational resources;

- ensuring the sustainable functioning and development of the corporate computer network, telecommunication and information computer networks based on the network of the boarding-school. For example, school computer networks are used for presentation of educational information, illustration of it, independent information search, performance of educational tasks and verification of the learned material;

- development of perspective plans in the sphere of means of new information training technologies, organization of assimilation and use of new software and hardware of information technologies, accumulation of application software. Children, gifted children in particular, should be aware of all the innovations in technologies, be able to use the newest achievements, and teachers have to familiarize children with information novelties;

- development, introduction and maintenance of informational systems of support for the main processes and activities of the boarding-school (educational process, various research, administrative management), software, technical, methodical and organizational support for educational computer classes and computer equipment of classrooms. It promotes full and convenient use of their opportunities by schoolchildren;

- creation, actualization and development of www-servers, which provide representation of the boarding-school in the world informational space. Teachers' sites and blogs are involved in the learning process, and information about the work of the boarding-school is presented on its site (on-line support for teaching basic educational subjects is based on the site);

- support for projects which the boarding-school takes part in. These projects financed by various funds and their implementation involves the use of new information technologies and the Internet;

- funding of educational software (electronic textbooks and manuals), replication of educational materials (teaching materials, textbooks and manuals) developed by teachers of the boarding-school, provision of technical audio and video facilities for the classes for gifted children, providing protection against unauthorized access to the materials of the methodical server of the boarding-school (electronic textbooks, manuals, etc.);

- study of the effectiveness of use of educational software, its impact on the quality of education of gifted children.

6. The requirements to information-educational environment and organization of gifted children's work

Taking into account the specificity of the information-educational environment and the distinguished directions of activities in it, we may determine the requirements to information-educational environment and organization of gifted children's work.

The first requirement is development of informational culture and competence of subjects of environment (Busra & Nurettin, 2018; Panchenko, 2011; Volchegorskaya et al., 2018). It means competent use of information tools for educational purposes, formation of ability to work with them, carefully and critically select information from electronic resources.

The second requirement is harmonization of relationships between subjects of educational process (parents, pupils, teachers). It allows them to be aware of all the features of the information-educational environment, provides support and recognition of child's uniqueness by different participants of the educational process.

The third requirement is orientation of the information-educational environment on monitoring of development of child's giftedness, providing individual methods of optimal development of each child's interests, his abilities, opportunities for self-organization and self-development.

The fourth requirement is strengthening school ties with the external environment (first of all, with higher educational institutions) in order to unleash gifted children's abilities better, create opportunities for their realization in society. It contributes to the expansion of the information field, provides communication and interaction between different subjects of the educational process.

7. The results of the study of the information-educational environment

The effectiveness of creation of the information-educational environment in Kharkiv Regional Specialized Boarding-School of the 2nd – 3rd degrees *Giftedness* was verified by determining the impact of the environment on the formation of gifted children's informational-digital competence, which included motivational-axiological, content-activity and reflexive-personal components. This competence is considered to be one of the basic competence in the Concept of *The New Ukrainian School*.

The research was held in 2015-2018 and involved 73 gifted schoolchildren of the boarding-school.

In our research we did not use traditional comparison with control group. The first reason for it is that the object of the research is gifted children, so they cannot be compared with other children, they can be compared with themselves. The second reason is that pedagogical diagnostics in the system of person-centered education has to fix individual's progress of every gifted children (what changes occurred in his personality in comparison with the previous level of development), reveal the specific features and rate of his development progress through their comparison with the results of the previous diagnostic assessment of a gifted schoolchild. The third reason is that Kharkiv Regional Specialized Boarding-School of the 2nd – 3rd degrees *Giftedness* is the only school for gifted children in Kharkiv Region, so it is impossible to find a group of schoolchildren for control group.

The information about the levels of formation of the studied competence in schoolchildren at the beginning and at the end of the research is presented in Table 1.

Table 1. The levels of formation of the studied competence in schoolchildren at the beginning and at the end of the research, %

Source: Authors' own conception

The levels of formation of the studied competence in schoolchildren		At the beginning of the research	At the end of the research
Motivational-axiological component	High	12.3	15.5
	Medium	63.1	84.5
	Low	24.6	-
Content-activity component	High	15.6	55.8
	Medium	54.8	40.2
	Low	30.1	4.0
Reflexive-personal component	High	13.7	55.8
	Medium	64.4	40.2
	Low	21.9	4.0

The indicators of the *motivational-axiological component* are the development of schoolchildren's motivational sphere and the nature of their life and educational values. The development of schoolchildren's motivational sphere was determined according to the following parameters:

the nature of individual's orientation, motives of learning and schoolchildren's cognitive interests and inclinations.

The indicators of the *content-activity component* are the dynamics of the levels of acquisition of knowledge, skills and abilities, levels of schoolchildren's academic achievements, cognitive activity, learning independence and initiative in learning.

The indicators of the *reflexive-personal component* are development of gifted schoolchildren's personal qualities (moral-volitional, communicative and leadership qualities) and adequacy of schoolchildren's self-assessment of the formation of key competencies.

As a result of the research, we determined the levels (high, medium, low) of formation of gifted schoolchildren's key competencies and informational-digital competence, in particular.

Schoolchildren with high level of formation of competencies had developed motivational sphere, person's focus on learning and communication, social motives of learning, developed human values, systematic and effective knowledge, skills and abilities, high level of academic achievements, stable cognitive activity, independence and initiative in learning, moral-volitional activities, creative nature of activities, reflexivity of behavior and adequacy of self-esteem.

Schoolchildren with medium level of formation of competencies have insufficient development of the motivational sphere, person's focus on learning and communication with situational egocentric motives of activities, social motives of learning and developed human values which are not always stable, insufficient systematic and effective knowledge, skills and abilities, medium level of academic achievements, situational nature of cognitive activity, independence and initiative in learning, moral-volitional activities, reconstructive nature of learning activities, situational nature of reflexivity of behavior and mostly the adequacy of self-esteem.

Students with low level of formation of competencies have undeveloped motivational sphere, person's focus on himself, prevalence of egocentric motives of activity, almost no social motives, low level of formation of human values, unsystematic and low efficiency of knowledge, skills and abilities, low level of academic achievements, low cognitive activity, independence and initiative in learning, unformed moral-volitional activities, reproductive nature of activities, almost no reflection of own actions and behavior, underestimated or overestimated self-esteem.

The comparison of the levels of formation of schoolchildren's informational-digital competence is presented in Table 2.

Table 2. The levels of formation of schoolchildren's informational-digital competence, person

Source: Authors' own conception

The levels of formation of schoolchildren's informational-digital competence	At the beginning of the research	At the end of the research
Low	15	3
Medium	45	30
High	13	40

It should be noted that the information-educational environment both influences the formation of schoolchildren's informational-digital competence and created opportunities for facilitation of the process of their training and upbringing, development of personal qualities and harmonic adaptation in the society.

8. Conclusion

So, scientific understanding and generalization of psychological-pedagogical sources helps to conclude that information-educational environment is specially-organized informational and educational-developing space, that provides integration of all information received from various sources, promotes the development of gifted children's independence, activity and creativity and their self-development. The directions of activities of the Laboratory of informational technologies of education (introduction of distance learning, dual education – interaction with higher educational institutions, replenishment of methodical-informational resources of the school, ensuring the functioning of the computer network, use of new tools of information technology, ensuring school representation in the global information space, studying the effectiveness of the use of software etc.) helps to develop children's cognitive processes, abilities to communicate and interact with people and work with the newest technical devices thoughtfully. The requirements to information-educational environment and organization of work with gifted children include formation of informational culture and competence of the participants of the environment, harmonization of relations between them, orientation of the information-educational environment on monitoring of child's giftedness, strengthening the connection of the school with the environment. The effectiveness of

creation of the information-educational environment in Kharkiv Regional Specialized Boarding-School of the 2nd – 3rd degrees *Giftedness* was verified by determining the impact of the environment on the formation of gifted children's informational-digital competence, which includes motivational-axiological, content-activity and reflexive-personal components.

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