

The Implementation of Multimedia Technology in Ukrainian Inclusive Pre-school Education

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Abstract. Involving children with disabilities in high-quality learning environment since early age has a positive impact on their further education and socialization. To promote development of each child, the educational initiatives within inclusive approach should be aimed at meeting individual needs and abilities disclosure. Broad prospects are revealed through implementing multimedia technologies (MT), due to the range of advantages they propose.

The article represents the results of a survey that involved 453 pre-school teachers from seven regions of Ukraine and was aimed at identifying the state of using MT in inclusive pre-school groups. The model of using MT in inclusive pre-school group is represented. An important element of the model is the bank of multimedia resources. With the participation of experts the criteria for selecting resources were developed using which we are filling the bank. The authors' model is designed to improve the quality of educational process in inclusive pre-school groups in Ukraine.

Keywords: multimedia technology, inclusive pre-school education, children with disabilities, pre-school teacher, survey.

1 Introduction

At the present stage of society development the intensive application of Information and Communication Technologies (ICT) in different spheres of activity becomes significant. The use of new technologies enables the creation of conditions for improving the quality and accessibility of education, effective communication and collaboration, which opens wide prospects for learning children with disabilities.

About 10% of the population of Europe has some form of recognized disability [2] and it is estimated that there are 84 million pupils – approximately 22% or 1 in 5 of the total school aged population – who require special educational provision either in a mainstream classroom, as part of a special class or within a separate institution [3]. Among a variety of inclusive education¹ strategies ICTs seem to be the most appro-

¹ Inclusive education is seen as a process of addressing and responding to the diversity of needs of all children through increasing participation in learning, cultures and communities, and reducing and eliminating exclusion within and from education. It involves changes and

appropriate tool that facilitates individualization of learning by providing disabled children with access to didactical materials in a more acceptable manner, enables combining different forms of information, develops a holistic vision of the world, and realizes the individual potential of the younger generation.

Involving children with disabilities in high-quality learning environment since early age has a positive impact on their further education and socialization. Thus, according to the survey of the National Joint Committee on Learning Disabilities (USA), children with disabilities who have access to high-quality educational services at an early age, show more high learning results in elementary school [4].

To promote development of each child, the educational initiatives within inclusive approach with using ICT should be aimed at meeting children individual needs, abilities disclosure, and complete integration in learning and social environment. Broad prospects are revealed through implementing multimedia technologies (MT)², due to the range of advantages they propose: 1) poly-sensory perception (the possibility to influence different sensory zones); 2) promotion of basic mental processes development (thinking, memory, attention, imagination, speech, etc.); 3) displaying objects, phenomena and processes that are not available in everyday life (space objects, natural phenomena, microcosm, et al.); 4) visualization of abstract information; 5) emotional coloration of demonstration material, etc.

Although in Ukraine the problem of implementation of new technologies in inclusive education, including pre-school, is at an early stage of development, there is some experience and studies worked out: a) Opportunities and prospects of using MT in pre-schools, media-socializing impact of computer technology on the younger generation (V. Kovalenko, Zh. Matyukh [5], S. Semchuk, Zh. Yatsenko et al.); b) Hygienic and ergonomic requirements to educational e-resources, ICT safely usage (O. Burov [1], V. Motorin, N. Pol'ka [7], A. Platonova [7], T. Ponimanska et al.); c) Problems of ICT use in working with children with special needs (L. Koval, K. Kosova, Zh. Matyukh [5], B. Moroz, Yu. Nosenko [6] et al.).

Despite the studies conducted, involving the benefits of advanced ICT, including MT, in inclusive pre-school education in Ukraine is accompanied by a number of obstacles: poor equipment provision; insufficient ICT-competence of pre-school staff; a large number of children in groups (often more than 30), making it difficult to individualize educational impact; insufficient level of awareness of inclusive educational techniques, including using MT. These issues require further study and solution that will facilitate the development and improvement of inclusive pre-school education in Ukraine.

The **purpose** of our study is to reflect the current state of MT use in Ukrainian inclusive pre-school education and to design a model of using MT in inclusive pre-school group educational process, which is to be recommended to pre-school teachers.

modifications in content, approaches, structures and strategies, with a common vision that covers all children of the appropriate age range and a conviction that it is the responsibility of the regular system to educate all children [8].

² In our research MT is seen as a technology that enables integration, processing and reproducing of different types of signals via digital tools (PC, tablet, multimedia boards, etc.).

2 The Presentation of Main Results

2.1 The Current State of MT Use by Ukrainian Pre-School Teachers in Educational Work with Inclusive Groups

The main method used to determine the current state of MT use in Ukrainian inclusive pre-school groups (IPSG) was a survey, which lasted during 2015-2016, and involved 453 pre-school teachers (PST) from seven regions of Ukraine. Among them 35% work in big cities, 23% – in small (regional) cities, 42% – in rural area.

The survey allowed to clarify a number of issues, including: 1) PST awareness of the concepts of inclusive education, MT, etc.; 2) the degree of implementation of inclusive education in pre-schools, where respondents are employed, their willingness to the implementation; 3) respondents' attitudes to implementing MT in educational activities and their experience in MT use.

95% of respondents have heard the term 'inclusive education' before. While most of them (89.4%) said they know its meaning, actually the correct definition among a series of proposed ones was chosen by significantly fewer persons (58.6%). The inclusive groups exist in only 10% of respondents' pre-school educational institutions (PEI). At the same time, 24% have experience of educating children with disabilities.

As for 'inclusive climate' in PEIs, i.e. according to the respondents, the readiness of their colleagues and management to the inclusive education implementation, we received the following results: a total of almost 36% (11.9% – 'absolutely yes', 24.2% – 'uncertain yes') have chosen positive answers; nearly 35% (26.2% – 'uncertain not' and 8.3% – 'absolutely not') have chosen negative answers; almost 30% were not sure ('difficult to decide'). Thus, the results were distributed almost evenly on a third that showed uncertainty of Ukrainian pre-school educational teams in readiness for inclusive education implementation. The respondents also rated their own desire to implement inclusive education as follows: 51.6% answered positively, 48.4% – negatively. That is, the answers were distributed almost in half.

The natural question arises: what causes such a low level of awareness and readiness of PST? The survey showed that among the main problems noted by the respondents that hinder the introduction of inclusive education are: the lack of relevant qualification, experience – 75.4%; the lack of sufficient funds and equipment (methodological, technical support, etc.) – 56.1%; the lack of PEI managers' support – 8%; fear, uncertainty about children with disabilities – 9.5%. Only 7.6% of PST noted that they have no problems and are ready to work with disabled children and to provide the inclusion. Thus, the greatest difficulties Ukrainian PST associate with the absence or insufficient level of their skills, experience and inadequate methodological and technical support.

We consider being positive the fact that the majority of respondents expressed a desire to improve their competency level for inclusive education implementation. Thus, 86.7% of them gave a positive answer to the question 'Do you wish to improve your knowledge and skills for the implementation of inclusive education?'

The next issues we tried to find out was the PST awareness of the concept of 'Multimedia Technology', their attitudes to MT implementation in educational activities

and experience of MT use. Though almost all respondents (98%) answered that they know the meaning of the term 'Multimedia Technology', actually the correct definition among a series of proposed was chosen by fewer persons – 85%.

Only 22% among surveyed PST use MT in working with children. These (22%) respondents mostly use animated films (60%), multimedia presentations (47%), videos (45%), and computer games (16%). Also 30.6% of PST (of these 22%) create some MT on their own (i.e. multimedia presentations). The digital tools used for reproducing MT have been specified as follows: computer – 87% multi-media board – 22%.

It is important to clarify the position of PST towards the expediency of MT implementation in working with pre-school children in inclusive group. Thus, 94% of respondents consider using MT to be appropriate in the inclusive group, reasoning that these tools allow to diversify the educational process (72.7%), motivate children (70.7%), deliver information in different ways (59.8%), enhance children development (57%), draw each child in the cognitive process (44.6%).

Among the difficulties that complicate or make impossible the implementation of MT in educational process the respondents noted: lack of appropriate technical support (70.9%), lack of educators' sufficient training (26.9%), unreasonableness of MT use (1.3%), lack of educators' desire and motivation to implement MT (0.9%).

The problem of PST preparedness, low levels of their ICT-competence, which is an important factor of poor MT implementation in pre-school education, is evident in the answers to the following question. The respondents were asked to assess their own level of skills in the use of computer technology (including MT) on a 5-point scale (if consider that 1 point means 'is not able to use', 5 points mean 'advanced user'). It is found that 9% of PST rated themselves in 5 points, 33% – in 4 points, 39% – in 3 points, 13% – in 2 points, 6% in 1 point. Obviously, this result is rather subjective. However, we believe that some correlation between answers to the previous questions and this one exists.

We consider being positive the fact that the majority of respondents expressed a desire to enhance their own competence in terms of inclusive education implementation (87%) and MT use in the IPST (98%). In Ukraine, the training of PST is carried out in several ways: 1) For future professionals – in higher educational institutions of Ukraine that have a license for conducting training in appropriate direction. The total number of such institutions in Ukraine is 18 (as of 2016); 2) For practicing teachers – through training courses at the regional institutions of postgraduate education. Each educator of Ukraine must pass these courses every 5 years; 3) Both for future and practicing teachers – at specialized training courses on inclusive education and/or ICT use organized by public and private foundations, research institutes and others.

As a result of our study a special course '*Multimedia technologies in inclusive pre-school group educational process*' was developed that can be used in training of future and practicing PST to improve their ICT-competence and skills in using MT in the inclusive group educational process. Since 2016 we have conducted a series of trainings using the authors' special course (within the regional training courses, free). Currently, more than 100 pre-school teachers have been successfully trained and work in this direction continues.

2.2 Model of Using MT in Inclusive Pre-School Group Educational Process

As today in Ukraine the level of methodological support of informatization of pre-school inclusion is quite low, we consider appropriate to project the model of using MT in IPSG educational process. The authors' developed model consists of 5 units, which are caused by the logic of the educational process and its components: target, content, technological, diagnostic, and resulted (Fig. 1).

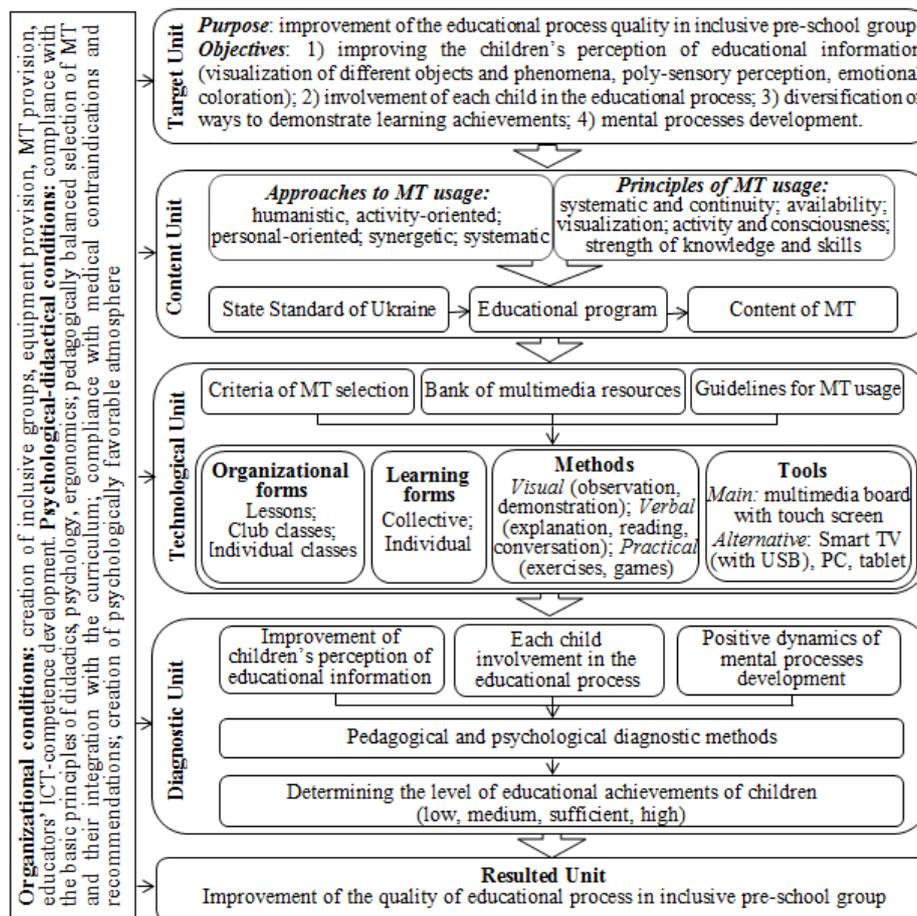


Fig. 1. Model of using MT in inclusive pre-school group educational process

The **Target Unit** defines the purpose, namely improving the quality of the educational process in inclusive group that is achieved through the implementation of a number of objectives: 1) improving the children's perception of educational information; 2) involvement of each child in the educational process; 3) diversification of ways to demonstrate learning achievements; 4) mental processes development.

The educational process in IPSG should be based on the approaches and principles

reflected in the **Content Unit**. The content of the pre-school educational process is determined by the *State Standard of Ukraine*. This standard is implemented under development of *educational programs* recommended by Ministry of Education and Science of Ukraine (more than 30 in total). Each pre-school institution chooses one of these programs that is discussed and approved by its Education Council. Thus, *the content of MT* used in the educational process must meet the State Standard and appropriate program. This is one of the main criteria for MT selection.

The **Technological Unit** identifies the peculiarities of preparation and implementation of educational process using MT, in particular, the selection of high-quality MT and methodological support of their usage. In this regard, the need appeared for creating *Bank of Multimedia Resources* (BMR), which would accumulate high-quality elaborations that can be recommended for use in IPSG.

To create BMR we first needed to determine the *criteria of MT selection*. To determine these criteria were involved 15 experts, each of whom has practical experience in PEI at least 5 years (including work with inclusive groups), and also has the experience of MT usage. As a result, the following criteria were defined: 1) Consistency with the State Standard of Ukraine; 2) Economic accessibility (important for Ukrainian PEIs due to low funding); 3) Simple usage (available for basic users); 4) High-quality voice support (clear diction, moderate tempo, et al.); 5) Ergonomic design (nice and moderate colors and music, etc.); 6) Availability of Ukrainian version; 7) Usability on different platforms (principally Windows and Android for Ukrainian PEIs); 8) Easy installation or web-access.

Using these criteria we form BMR, filling it with three types of resources: a) *Multimedia presentation*. This tool allows combining text, graphics, animations, audio, and video in dynamics that promotes activation of child's voluntary attention. It is appropriate to be applied for studying new concepts or their fixing; b) *Electronic gaming resource*. This is a separate type of game software, designed to address teaching purposes: the game as the leading pre-school activity, and consolidation of knowledge and skills. While playing, children develop positive emotional response, and desire to achieve goals that promote correction of mental processes. Electronic gaming resources are useful for fixing knowledge and skills; c) *Animated films* have a positive impact on the assimilation of behaviors, algorithms to achieve goals, development of the emotional sphere and mental processes. Viewing should start with teacher's intro speech and complete with problematic questions, giving children the opportunity to express their reflection. It is useful for forming complex concepts (moral and ethical values, norms of social interaction, etc.).

Currently, the BMR contains more than 70 resources aimed at various development directions (Table. 1). After completion the bank will be placed in the public domain, providing PST with access to high-quality MT.

The Technological unit also reflects the peculiarities of educational activities, which are implemented by appropriate forms, methods and tools. The main **organizational forms** in Ukrainian PEI are: lessons (compulsory), club classes (optional), individual classes (if necessary). According to the order of Ministry of Education and

Science of Ukraine³, the permissible load for children aged 5-6 years is 15 lessons, 5 club classes per a week (8 hours in total). Along with this, the time limit for using MT is 10 minutes per one session. The recommended *learning forms* (within our model) are: collective and individual. The recommended *methods* are: visual (observation, demonstration), verbal (explanation, reading, conversation); practical (exercises, games). According to the latest Ukrainian medical researches [7] it is acceptable to use monitors in work with children aged 5-6 years. Therefore, the main *tool* that we recommend to use is a multimedia board with touch screen. As an alternative, the TV screen (with USB-access) or PC can be used.

Table 1. MT distribution in BMR according to the development direction⁴

MT types	Total number	Development direction				
		Speech development	Cognitive development	Logical-mathematical development	Artistic and aesthetic development	Social and moral development
Multimedia presentations	32	8	12	7	5	-
Electronic gaming resources	38	7	10	12	9	-
Animated films	13	13	13	-	13	13

The *Diagnostic Unit* aims at determining the qualitative changes in the level of educational achievements of children as a result of the model. The main *indicators*, which we consider: a) Improvement of children's perception of educational information (due to poly-sensory impact); b) Each child involvement in the educational process (due to creation of psychological conducive atmosphere, enabling demonstration of learning outcomes in convenient way); c) Positive dynamics of mental processes (mainly, attention, memory, thinking, speech). To determine the level of each child's achievement for these indicators it is expedient to apply appropriate pedagogical and psychological diagnostic methods.

Organizational and *psychological-didactical conditions* constitute an important element of the model. Their realization largely determines the success of model implementation. *The Resulted Unit* is the latest element of the model and consists in improving the educational process quality in IPST.

3 Conclusions

MT can become an important part of the educational process in PEI, greatly expanding the range of traditional teaching tools and resources, and promoting the creation of inclusive environment. Such prospects are of particular importance for children

³ <http://zakon2.rada.gov.ua/laws/show/z0520-15>

⁴ The development directions are defined according to the State Standard of Ukraine

with disabilities. It is worth noting that a child with disability passes all the same stages of ontogeny as other ones. The differences lie in the rapidity of physical and mental development, the final result and ways of its achievement. The development of child's personality, individual physical abilities and cognitive activity depends on the underlying of disability and requires more time, usage of special tools, methods and approaches. With the introduction of MT, every child receives a chance to overcome barriers to education, gets access to various didactic materials and demonstrates learning outcomes in a convenient format.

Our survey, which involved 453 PSTs from seven regions of Ukraine, has shown that despite the low level of their ICT-competence and awareness of inclusive education, poor technical equipment, lack of methodological support, etc., their willingness to improve knowledge and skills is rather high. Therefore, it is appropriate to intensify training of future and practicing PST by introducing specialized courses. Since 2016 we have conducted a series of trainings using the authors' special course, so more than 100 PSTs have been successfully trained to use MT in IPSEG educational process.

The authors' model of using MT in IPSEG educational process, which is to be recommended to PST, is developed. The model is designed to enhance the methodology of inclusive pre-school education implementation in Ukraine and aims to improve the quality of the educational process in IPSEG. An important element of the model is the BMR. With the participation of experts the criteria for selecting resources were developed using which we are filling the BMR. After completion the BMR will be placed in the public domain, providing PST with access to high-quality MT.

References

1. Burov, O. Yu. Life-long learning: individual abilities versus environment and means. In: 12th Int. Conf. ICTERI. CEUR Workshop Proceedings, Kyiv, pp. 608–619 (2016). http://ceur-ws.org/Vol-1614/paper_86.pdf
2. European Commission Communication (1999) Towards a barrier-free Europe for people with disabilities: A roadmap to the achievement of greater community added value. Brussels, Belgium
3. Eurydice: Key Data on Education in Europe. Luxembourg (2000)
4. Learning Disabilities and Young Children. Identification and Intervention National Joint Committee on Learning Disabilities (2007). <http://www.ldonline.org/article/11511/>
5. Matyukh, Zh. V. (2016) Problems and prospects of multimedia technology implementation into inclusive preschool education. In: *Novi tekhnolohiyi navchannya*, vol. 88, chapter 1, pp. 65–69 (in Ukrainian)
6. Nosenko, Yu., Bogdan, V., Matyukh, Zh. Urgent Directions in scientific research of informatization of preschool education in Ukraine. In: *Science and Education a New Dimension. Pedagogy and Psychology*, vol. IV (39), Issue 79. SCASPEE, Budapest, pp. 52–55 (2016). <https://ru.scribd.com/document/299126740/Nosenko-Yu-Article-Ped>
7. Pol'ka, N. S., Platonova, A. H. (2015) Updating hygienic requirements for the use of modern information technologies in schools. In: *Komp'yuter u shkoli ta sim'yi*, vol. 4, pp. 3–5. http://nbuv.gov.ua/UJRN/komp_2015_4_2 (in Ukrainian)
8. UNESCO (2003) Overcoming exclusion through inclusive approaches in education. A challenge and a vision. Paris, UNESCO