FORMATION OF TEACHERS' READINESS FOR CHILDREN INCLUSIVE EDUCATION BY DIGITAL TECHNOLOGIES MEANS

[a]SVITLANA CHUPAKHINA, [b]TETIANA SHVALIUK,
[c]OLENA PROSKURNIAK, [d]TAMARA OTROSHKO,
[e]LENINA ZADOROZHNA-KNIAHNYTSKA

[a]Department of Theory and Methods of Nursery and Special Education, Faculty of Pedagogy, Vasyl Stefanyk Precarpathian National University, Shevchenka St., 57, Ivano-Frankivsk, Ukraine.
[b]Department of Speech Therapy and Speech Psychology, Faculty of Special and Inclusive Education, National Pedagogical Dragomanov University, Pyrohova St., 9, Kyiv, Ukraine.
[c]Department Correctional Education and Special Psychology, Municipal Establishment "Kharkiv Humanitarian Pedagogical Academy" of Kharkiv Regional Council, Rustaveli Ln., 7, Kharkiv, Ukraine.
[d]Faculty of Social and Pedagogical Sciences and Foreign Philology, Municipal Establishment "Kharkiv Humanitarian Pedagogical Academy" of Kharkiv Regional Council, Rustaveli Ln., 7, Kharkiv, Ukraine.
[e]Department of Pedagogy and Education, Mariupol State University, Budivel'nykiv Ave, 129, Mariupol', Ukraine.
E-mail: [a]akhina.2008@gmail.com, [b]Tetiana.2020@gmail.com, [c]Proskurnia569@gmail.com, [d]Tamar242008@gmail.com, [e]zador_knyag@i.ua

Abstract: The purpose of the article is to form a conceptual model of teacher readiness for inclusive education of children by means of digital technologies. The methodology is based on a quantitative-qualitative methodology and in-depth qualitative case study approach. The in-depth qualitative case study approach made it possible to form a model of the teacher's readiness for inclusive education of children by means of digital technologies. The results demonstrate the average level of efficiency in the practice of using digital technologies and organizing an inclusive environment with the help of tablets, laptops and other equipment. The lack of awareness of the teacher in possible technical problems and technical support and additional difficulties of children with disabilities exacerbates the problems of inclusion.

Key words: readiness of teachers for inclusion, digital pedagogy of inclusion, inclusive digital environment, model of digital inclusion.

1 Introduction

Beliefs and perceptions of the computers and technology use in inclusive education determine the readiness of teachers to inclusive education of children through digital technology. Some factors such as attitude, perception of benefits and ease of use, teacher competence in the use of ICT determine the success and effectiveness of education of children with special needs (Kumar et al., 2008). E-learning technology can also contribute to the level of inclusion of children in the educational environment. Given the goal of governments to include children with special needs in general education (Malinen, 2013; Kiswarday & Štemberger, 2016); the study of teachers' readiness for inclusive education is particularly relevant. The previous experience of the teacher determines the level of his own effectiveness in practical activities with children with disabilities, and the lack of experience leads to a more negative perception of inclusion. The use of technology can simplify the process of organizing inclusive education and increase the level of self-effectiveness of teachers. ICTs are seen as a tool to reduce discrimination, while transforming approaches, strategies and learning structures (Benigno et al., 2007). Understanding the potential of ICT by educators can help improve the inclusion of children in the educational environment (Chupakhina S., 2020). Therefore, teachers need to develop skills and abilities to use technology, perceive inclusion as learning from each other and the process of systematic search to remove barriers to inclusion (Kiswarday & Štemberger, 2016). For example, 75% of Italian teachers understand the potential of technology in the educational process and promote inclusion (Benigno et al., 2007). The integration paradigm of inclusion can lead to teachers' unwillingness to respond to the challenges that will arise in the process of inclusion. Therefore, the level of quality and support for inclusion may vary depending on the perception and willingness of teachers.

2 Literature review

The scientific literature proposes an "interdisciplinary approach combining digital education with disability theory to investigate disabled children's digital use practices for formal learning" (Cranmer, 2020). The theory of social practice and the practice of using technology is the basis for studying the perception of technology by teachers and children in the process of inclusion. (Cranmer, 2020) argues that "digital accessibility practices were potentially stigmatizing and carried an extra task load to overcome barriers that occurred when teachers had not developed inclusive digital pedagogy". At the same time, few empirical studies study the process of forming the readiness of teachers for inclusive education of children through digital technology.

The process of inclusion and socialization determines access to equal opportunities for children with special needs. Digital technology is an important element of this process. Research confirms the transformation of children's lives through digital technologies (computers, laptops and mobile devices) (Bond, 2014). These changes have affected education and training, social activities, friendships, and the development of the digital skills and competencies needed to use the Internet effectively and safely (Ferrari, 2012). Few studies have examined the integration of technology into children's lives and the work of educators (Passey, 2013; Söderström, 2009), in particular studies directly related to children with disabilities. In the literature, attention is paid to understanding the actual state of the inclusion process (Selwyn, 2011). This is due in part to the inability to conduct research with children with special needs (McLaughlin et al., 2016). At the same time, the literature studies the practice of using technology in a conventional educational environment (Watson, 2012).

These articles use a social inclusion model that considers the disability of children as child-centered with disabilities and provides for justice and human rights, views "disability" as based on the "collective experience of disability" (Oliver, 2004). The concept of inclusive education is seen as giving children the opportunity to receive an equivalent education (Corbett & Slee, 2000).

Digital technologies in inclusive education are recognized as effective in educating children with disabilities. For example, a study argues that they are effective in learning as a means of creating conditions to ensure equal access and opportunities to the learning system. The advent of tablets and mobile devices has led to such conclusions in the scientific literature, and the reduction in their cost gives extended access to such technologies to families with different income levels. In Europe, the United States and Australia, there are many practices of providing individual access to computers or laptops to children with special needs (Keane & Keane, 2018). Government initiatives within the framework of inclusion policy ensure the purchase of technology. For example, in 2011-2014, the European Commission funded a project to develop the SENnet network within schools to support children with disabilities and their use of technology. The 2014 SENnet's report identified the potential benefits of tablets for children with disabilities: speed of work; immediate feedback thanks to touch screens; individual use (which became possible due to the selection and organization of applications); opportunities for more personalized learning; availability and greater versatility compared to assistive technologies; the possibility of greater differentiation in the presentation and access to knowledge of different students; built-in accessibility features such as voice, voice control, zoom etc.

Research has noted the potential of tablet computers to include children with disabilities in the educational environment (Dell et al., 2012; Schaffhauser, 2013) The greatest effect is observed when using the same type of technology (European Schoolnet, 2014). That is why tablets are the most popular among educators, who work with children with disabilities. (Pellerin, 2012). However, few studies focus on teachers' readiness for digital inclusion and working with children in the digital environment. (Passey, 2013; European Schoolnet, 2014; Robinson, 2014). In the literature, most attention is paid to the issues of specific practices of inclusion and the consequences of inclusion for the educational environment and children, rather than the practice of using technology by teachers and their readiness for the digital learning environment.

Studies have studied the increase in literacy (Hayhoe, 2012); development of social, communication and organizational skills (Sultan & Hayhoe, 2013); learning process and independence. (O'malley et al., 2013; Lidström & Hemmingsson, 2014) conducted a bibliographic analysis of physical disabilities (i.e., impaired motility, speech, vision, hearing) to study the possibility of increasing the inclusion of children in schools using digital technologies. The analysis shows a narrow range of technologies in the educational process by children with disabilities, the practice of application is limited. Children themselves note limitations, while the desire to use technology is higher. That is why it is important to assess the perception of teachers' readiness for digital inclusion.

The analysis of the literature proves the potential to improve the level of readiness of teachers to use technology as a means of communication, writing and the development of reading skills for children. At the same time, few empirical studies prove the expansion of the effects of inclusion due to the digitalization of the educational environment. There is also the question of promoting equal opportunities for children in education, participation in social interaction.

Thus, empirical research on the readiness and competence of educators on the potential of digital inclusion remains limited. This indicates the urgent need for further research in this area.

3 Methodology

This article is based on a quantitative-qualitative methodology and in-depth qualitative case study approach (Cranmer, 2020) in order to understand the opinions and perceptions of teachers of readiness for the digital environment. This approach also provided for the determination of the level of digital skills of teachers, the need for the development of such skills, the training of teachers and their availability of programs for preparation for digital inclusion. In-depth qualitative case study approach (Cranmer, 2020) made it possible to form a model of teacher readiness for inclusive education of children by means of digital technologies (Figure 1).

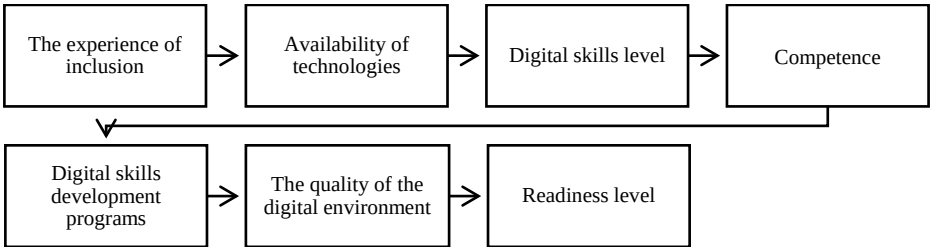

Figure 1. Model of teacher readiness for inclusive education of children by means of digital technologies
Source: developed by the author.

Interviews were conducted with 10 teachers who work with children with visual and hearing impairments, teaching assistants. Teachers who work with children aged 10-15 in general education institutions were interviewed through electronic means of communication during September-November 2020. The survey (Cranmer, 2020) was used to ask teachers questions in order to answer such important components of readiness as experience of inclusion, availability of technologies, level of digital skills, competence, programs of digital skills development, quality of digital environment and level of readiness. Examples of questions: 1. What digital technologies do you use? 2. What equipment is available at the school? 3. Are there teacher-training programs for digital learning? 4. How do you assess the level of your own digital competence? 5. How do you assess the quality of the digital environment? 6. How do you assess the level of impact of technology on the development of children with visual and hearing impairments? 7. How do you assess the level of your own readiness for further development of digital inclusion? 8. What difficulties do you face when integrating technologies? During the experiment, teachers made observations on the use of technology.

To compensate for the diversity, different data from teachers were combined and a pragmatic approach (Duca, 2017) was used to analyze the results with a systematic study. This approach is used to increase the reliability of the results.

4 Results

The practice of using digital technologies shows the average level of effect and organization of an inclusive environment with the help of tablets, laptops and other equipment. Practice indicates differences in the use of technology by children with disabilities and healthy children. Digital accessibility provides a greater level of integration for children and enhances communication through the possibility of digital interaction between different children.

For example, the observation revealed interest in the use of technology by children with disabilities in performing tasks in the classroom, although there were examples of reduced involvement and motivation in learning due to difficulties. At the same time, children developed a creative approach to the use of general hardware capabilities in different ways, and in some cases helped teachers to use the functionality of the devices. This is due to the lack of fears of making mistakes when used by children as opposed to teachers. For example, children use images more according to their preferences, or installed programs for their own purposes. At the same time, built-in accessibility settings and options improve the learning process, such as language output.

The results showed a wide range of benefits of the practice of using digital devices aimed at improving learning in general or providing children with disabilities with access to educational programs. Technology is a tool for improving interaction and communication with children, which contributes to a positive perception of technology by teachers. In some situations, educators have provided support to children with disabilities through certain ways of using technology due to teachers' lack of awareness of how to provide technology-free support. This led to children completing additional tasks to access the curriculum or need teacher assistants to overcome difficulties. For example, in one class (school A) during the observation it turned out that the teacher forgot that the student (14 years old) did not see the

electronic board; therefore, the child was automatically excluded from the learning process. The teacher's assistant provided assistance with a tablet, which provided an increase in the image on the board. However, providing access to learning materials using a tablet negatively affected the student's emotional state, confidence and level of interest in learning. Otherwise, the board did not synchronize with the tablet, which meant the student's dependence on the assistant and the student's need for additional help. This meant the teacher's lack of awareness of possible technical problems and technical support and additional difficulties for children with disabilities, which only exacerbated their inclusion problems. However, providing access to learning materials using a tablet negatively affected the student's emotional state, confidence and level of interest in learning. Otherwise, the board did not synchronize with the tablet, which meant the student's dependence on the assistant and the student's need for additional help. This meant the teacher's lack of awareness of possible technical problems and technical support and additional difficulties for children with disabilities, which only exacerbated their inclusion problems. However, providing access to learning materials using a tablet negatively affected the student's emotional state, confidence and level of interest in learning. Otherwise, the board did not synchronize with the tablet, which meant the student's dependence on the assistant and the student's need for additional help. This meant the teacher's lack of awareness of possible technical problems and technical support and additional difficulties for children with disabilities, which only exacerbated their inclusion problems.

The study proves the high level of interest and enthusiasm of children in the practice of using digital technologies - both in the learning process and accessibility - in terms of technology attributes, complemented by their own skills. Technical support of the school was insufficient, but an effective way to increase the level of readiness of both children and teachers. From the point of view of limitations, teachers noted the insufficient level of technology reliability and random gaps in their skills. There were also examples where teachers did not meet children's expectations due to the continued use of traditional teaching methods and practices, which creates an additional workload.

This study identified the complexity and difficulties in the use of digital technologies by children with disabilities in schools in the context of inclusive education policy. The study shows the diversity of digital practices - digital learning and discrete digital accessibility practices - and the prospects for children with disabilities and educators. Children with disabilities noted the benefits of using tablets without considering individual cases of lack of technical support. Some examples of digital accessibility practices could be avoided through the development of more inclusive pedagogies. In some situations, technology has placed an additional burden on both teachers and assistants and children with disabilities. This affected the level of readiness for further use. Despite inclusive education policies, Children with disabilities often continue to be required to adapt and study in general education schools, rather than schools that adapt to them through the development of large-scale inclusive pedagogy. Moreover, technical problems can have negative consequences for the inclusion of children with disabilities. This study also suggests that schools and especially teachers must play a crucial role in the transformation to improve the learning situation of children with disabilities.

In some cases, instead of including children, technology causes them to be excluded due to insufficient technical support and problems that the teacher is not aware of due to lack of skills in particular. This confirms the need to develop programs to develop teachers' readiness for digital inclusion. This will ensure the overcoming of technical problems and the development of inclusive digital pedagogy. Among the main problems that need to be addressed are the insufficient development of digital pedagogy in schools with the simultaneous integration of inclusive practices, which increases the pressure on teachers; limited use of technology by teachers; failures in the implementation of inclusive education policy. In the future, policies and practices need to be integrated to develop effective inclusive digital pedagogy. In the short term, teachers need to set aside time to work more closely with assistants when planning the learning process, rather than relying on assistants to develop methods to circumvent technical problems. Schools need to improve technical support and provide children with additional opportunities to improve their skills. In the end, schools should enable teachers to raise awareness, knowledge and skills for the development of inclusive digital pedagogy. Assistants can play a crucial role in conducting research and development in schools to provide teachers with instructions that effectively address the opportunities/challenges they face. Digital technology cannot be a panacea for inclusion.

In the course of the study, teachers note a number of advantages that have been identified in the use of technology, among the main:

1) Ability to transfer all materials in electronic form and simplify routine work, which frees up time for more important processes: communication with children, conveying the essence of the material.
2) Increasing the level of children's interest in the learning process, visualization of material for children with disabilities provides a greater effect and a greater level of perception and assimilation.
3) The learning process becomes easier in the organization.
4) Teachers note a higher level of children's independence and interest in individual study of the material.
5) In the process of use, analytical skills of using technologies and additional capabilities of devices in the learning environment are formed, in contrast to previous experience.
6) Previous experience, in particular gained in the process of training programs, contributes to the formation of digital competencies, and therefore the level of perception is more positive, higher level of readiness.
7) Teachers consider training programs as an opportunity to develop skills provided there is sufficient time for learning.

Among the main barriers to teacher readiness for an inclusive digital environment, teachers note:

8) Lack of technology practice in training programs, which causes difficulties and time spent on routine operations during training.
9) Lack of specific examples of technical means and devices in training programs, non-universality of technologies, which causes difficulties in the case of fundamentally different equipment in the workplace.
10) The period of development of competence in the use of technology takes from 6 to 12 months, which affects the socialization of children and negatively affects the quality of the digital educational environment and inclusion.
11) High level of stress and tension in the formation and gaining experience in the use of technology, which affects the level of readiness.
12) As a result, we come to the conclusion about the importance of psychological attitudes, which are an important component of the proposed conceptual model of teacher readiness for inclusive education of children by means of digital technologies (Figure 2) Psychological attitudes (rejection, unpreparedness) are formed due to ignorance of the benefits and the process of organizing digital learning: what will be the new learning process? Lack of a sufficient level of digital skills and fear of not coping with the new learning environment is a major barrier to teacher readiness.

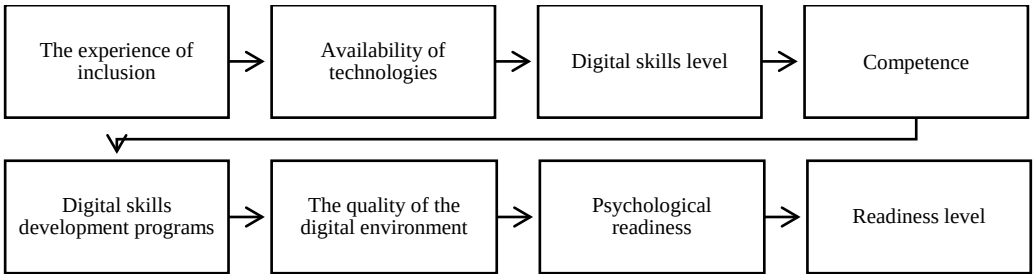

Figure 2. Model of teacher readiness for inclusive education of children by means of digital technologies
Source: developed by the author

In addition, educators do not see technology as an opportunity, but as an additional workload and time spent learning. In this context, it is important to develop gradually an understanding of the importance of learning as a potential for simplifying the learning process and facilitating work with children with disabilities. Such an understanding can be formed only in the course of experience and digital communication, which forms the skills in the best way and the teacher's interest in the capabilities of the devices.

5 Discussion

This study confirms the conceptual model of teacher readiness for inclusive education of children by means of digital technologies. This model combines the components of readiness with the ability of teachers to use technology effectively and anticipates the need to develop digital skills to create a favorable inclusive digital educational environment. Among the main limiting factors of readiness is the age of the teacher, who directly determines the speed of understanding the potential of technology, the effectiveness of the use of technology and interaction with children with special needs. During the observation of the educational process, it was found that the teacher at an older age learns technology less slowly, and therefore the process of communication and overcoming the shortcomings of children becomes less effective, less time is left for interaction with children. However, this barrier tends to be overcome over time. When a teacher identifies and overcomes his own resistance to technology due to insufficient competence in the course of learning, the effect of using technology and their perception as opportunities increases. Overcoming resistance to technology is through understanding the irreversibility of the digitization process and through understanding the benefits of technology, the development of digital skills and the ability to use devices. Thus, the development of digital competencies leads to a positive perception of technology, and subsequently to the full acceptance and increase in the level of readiness to use new devices, regardless of the age of the teacher. Therefore, the psychological component of the teacher's readiness model for inclusive education of children through digital technologies is key in terms of transforming teachers' perception of software from negative to positive through the experience of use. In this context, training programs should include an explanation of possible difficulties, which requires further in-depth research into the psychological barriers of teachers.

This study correlates with the findings (Duca, 2017) on the influence of age, years of study, training and the ability of teachers to use technology on their readiness. “Findings show that tablets help to promote student participation, the development of 21st century skills and personalized learning”. Teachers discuss their own professional development through technology in the process of communication with colleagues, schooling and resource sharing. Supporting the process of digital inclusion requires the help of a pedagogical psychologist to develop innovative pedagogical technological teaching methods. In addition, the pedagogical psychologist provides an understanding of the effect of technology in learning: the extent to which use has a positive effect on inclusion, without causing dependence on digital technology in children.

Studies by (Brecko et al., 2014; Brodin, 2010; Brodin & Lindstrand, 2008) show the frustration of parents of children with disabilities in the low level of technology use in schools, lack of modern software and hardware, teachers' knowledge of technology and its use in learning, slow development of use in in general. (Brecko et al., 2014) proves the key role of teachers in the development of digital pedagogy and identifies the need for effective educational tools along with the willingness of teachers to change their attitudes towards technology. Teachers are often not provided with digital skills training and upgrade programs. Therefore, the competence and readiness of the teacher to resource technologies is crucial, and its absence determines the readiness and perception of the digital environment.

(Bjekić et al., 2014) proved the need for in-service training and teacher development in order to improve the use of digital technologies for teaching. Barriers also highlight the cost of equipment combined with security issues such as lost or stolen tablets (Johnson, 2013). Finally, it is important to pay sufficient attention to children with disabilities who are not interested in digital technology (Robinson, 2014), provided they want to benefit from the use of technology.

6 Conclusion

This study allows us to draw a number of important conclusions about the formation of the teacher's readiness for inclusive education of children through digital technology. The practice of using digital technologies shows the average level of effect and organization of an inclusive environment with the help of tablets, laptops and other equipment. Technology is a tool for improving interaction and communication with children, which contributes to a positive perception of technology by teachers. However, the teacher's lack of awareness of possible technical problems and technical support and additional difficulties for children with disabilities exacerbates inclusion problems. Technical support of the school was insufficient, but an effective way to increase the level of readiness of both children and teachers. In terms of limitations, teachers noted the lack of reliability of technology and random gaps in their own skills. This study also identified the complexity and difficulties in the use of digital technologies by children with disabilities in schools in the context of inclusive education policy. Among the main problems that need to be addressed are the insufficient development of digital pedagogy in schools with the simultaneous integration of inclusive practices, which increases the pressure on teachers; limited use of technology by teachers; failures in the implementation of inclusive education policy. We come to the conclusion about the importance of psychological attitudes, which are an important component of the proposed conceptual model of teacher readiness for inclusive education of children by means of digital technologies. Psychological attitudes (perception, unpreparedness) are formed due to ignorance of the benefits and the process of organizing digital learning: what will be the new learning process? Lack of a sufficient level of digital skills and fear of not coping with the new learning environment is a major barrier to teacher readiness.

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Primary Paper Section: A

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