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POTENTIAL OF DIGITAL TECHNOLOGIES USE IN THE FORMAL PRE-PRIMARY EDUCATION

Dana Petranová* **and Ľubica Burianová**

University of Ss. Cyril and Methodius, Faculty of Mass Media Communication, Nám. J. Herdu 2, 91701 Trnava, Slovak Republic

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Abstract

During the last two decades electronic media have become a common part of educational processes. Media serve not only as a content that is being taught as media education. They also serve as a form by means of which the educational processes are carried out. The paper focuses on formal pre-primary education aimed at an effective, authentic and attractive support of educational goals by means of using digital technologies in educational process. The authors of the paper try to identify various aspects related to the phenomenon. The ambition is to distinguish strong and high-risk points and competently predict the trends of its future development. The authors of the submitted paper interpret the pilot survey results in the empirical part. The aim of the survey was to detect the proportion and use of digital technologies in nursery schools in the selected region.

Keywords: educational robotics, pre-primary education, competence development, educational process, educational purposes

1. Introduction

Media are both common and dominant part of children´s lives. Small children of today use tablets, mobile phones or computers intuitively and actively. Searching the Internet and using social nets has become common and natural for them. Instead of 'let us look it up in an encyclopaedia' approach they will definitely prefer the 'let us Google it' approach. This is a natural status considering the high rate of media consumption. Several surveys claim that children at the age of 4 – 9 spend about three hours a day with media. [In the Czech Republic the experts discussed on media education for preschoolers, online at: http://www.medialnavychova.sk/odbornici-diskutovali-o-medialnej-vychove-pre-predskolakov/].

A child´s mind is very active and open at the same time. It is a fertile land that can be cultivated or damaged by media. Children learn by observing, imitating and looking for models. They tend to copy uncritically everything they see around as they lack a complete value system. Small children do not

*E-mail: dana.petranova @gmail.com

differentiate between real and fictional reality [1]. For that reason parents should consider even more which media contents they will expose their children to, whether and how they will talk to them about the possible negative contents. Nobody is immune against the media, small children in particular.

Teachers at nursery and basic schools feel the need and demand discussions about media already in preschool age. Teachers know that never before have the children been influenced by so many dangerous media contents as they are today. When imitating their models children are not aware of the consequences of their behaviour. In this way media can influence their mental, moral and corporeal development. On the other hand, teachers are aware of the positive potential of media. By using modern digital technologies children can grasp reality better, acquire fast and optimistic strategies for solving real-life situations, etc.

The American philosopher Robert Fulghum claims that all a man needs to know he learned in the kindergarten [2]. It is already the kindergarten where children are able to take pictures using a fully automatic camera and all they need is just a brief explanation. They can use simple programmed toys which help them to acquire the ability to find orientation in space in a playful way. They are excited to record their speech or singing on a voice recorder or any other recording device, they use a microphone and are able to turn a DVD player on. Preschool aged children are able to master the use of digital technologies. By using them we make the educational activities more attractive, children feel the natural need to discover and acquire new information. That is a good basis for further learning. The Slovak educational program ISCED 0 designed for pre-primary education states: "pre-primary education graduate is prepared to enter primary education in a basic school and further active life in a society". [ŠPÚ, Štátny vzdelávací program ISCED 0 – predprimárne vzdelávanie, online at: http://www.statpedu.sk/files/documents/svp/ms/isced_0.pdf].

It is highly important to prepare children to develop their knowledge effectively also by using digital technologies in their lives. It is suitable and necessary to provide children in preschool age with access to digital technologies, to make them grow up in a natural contact with them. Under a conceptual and goal-oriented supervision children in pre-primary education should be given a space to acquire basic competencies to use digital technologies on a level allowing them to continue with further education at basic schools and apply them effectively. A total isolation of children from media or digital technologies did not prove beneficial. There is a threat of a social expulsion, falling behind or induced fear. Current trends in media education prefer prevention and critical thinking development to isolation and intimidation.

2. The role of digital technologies in pre-primary education

The term digital technology in the educational context represents the use of computers, similar devices and technologies supporting teaching, learning and other cognitive activities. To simplify it we can perceive them as computers and

educational software applications (programmes), video projectors, electronic interactive boards, digital cameras, digital devices for communication, programmable toys and similar devices [3]. Digital technologies can be understood in two ways. On one hand we think of technologies as an information medium, on the other hand as a constructive medium. Papert points out that even the education can be perceived from two points of view – informative (acquiring information and skills) and constructive (discovering and constructing knowledge) [4]. Even though both are equally important, the constructive aspect is sometimes slightly underrated.

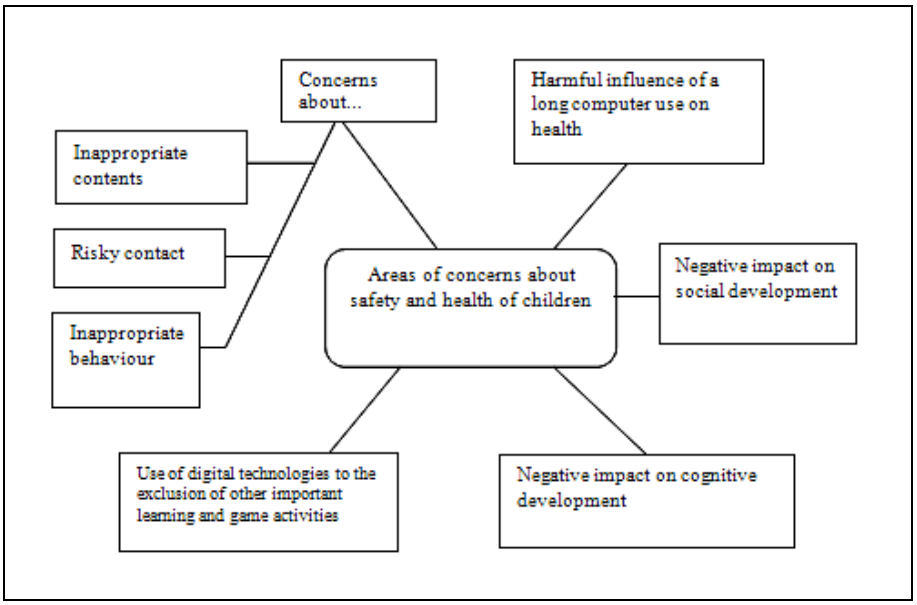

Figure 1. Various areas of scares for the health and safety of children, as they can be found in professional literature [3, p. 26].

Many professionals in the area of education believe digital technologies can be conducive to the development of children's competencies already at this age and can support the affective and authentic aspects of educational goals. In the government document Te Whāriki – national curriculum for preschool education and education in New Zealand one reads "if these technologies are used in an appropriate way, they may become a productive means supporting the cognitive process and child´s development". The Ministry of Education in New Zealand had the document prepared to become the basis for a new government strategy integrating digital technologies into pre-primary education [5]. Some studies point out various dangers in this area (Figure 1). Many of these concerns are rooted in the wrong belief that digital technologies in pre-primary education turn children into passive recipients or lonely computer game players who are excluded from social interactions when learning or playing games. Majority of such concerns is focused on the use of computer, mainly on playing computer games. The use of old screens, sight-threatening of children when working with

projector and many other important factors are often ignored or underrated. Volek says, that W. Benjamin in his pre-digital era defines digital technologies as "new communication technologies as tools for producing phantasmagorical structures and sensual experience that immersed an individualized individual into the total complexity of environment and enabled privatization of world´s fantasy, which acts as a protective shield of senses" [6].

Examples from research reports and professional literature show that computers and digital technologies are integrated in real conditions of preschool institutions into teaching opportunities along with many other means and procedures. It is important to realize that they should not be perceived as a competition or substitution of other opportunities. Neither should they be used to the exclusion of activities supporting the development of gross motor skills by e.g. running, jumping, etc. [7].

The most effective way how to eliminate or at least minimise these concerns in real preschool institutions is to have a well-informed teacher responsible for critical evaluation of the adequacy of individual digital means. He should use digital means appropriate to support creative playing of children and their realization. This is to be done not only by a selection of software applications but also by the use of various forms of digital technologies and educational robotics [8].

One of the most important principles of a correct integration of digital technologies into nursery schools is the concept of a developmental appropriateness according to which it is possible to develop skills in determining and applying appropriate hardware or software digital means. According to the DATEC project (The Developmentally Appropriate Technology in Early Childhood) there are nine general criteria on the basis of which it is possible to assess the appropriateness of any digital means and its use in pre-primary education.

The project outcome lists the features of digital means as follows:

- **educational** - individual tools and means must have clear educational objectives and they should be educational by their own character;
- **encourage cooperation -** to achieve a high-quality cognitive development of small children a shared experience is important along with the support of activities creating a platform for cooperation;
- **support integration** - along with other verified educational procedures a maximum integration of digital applications into games and education is important. It ensures the educational objectives will correspond with child's needs.
- **support games** – game and imitation represent the basic background for representative and symbolic behaviour of children. Thus a role-play is the basis of cognitive processes for preschool aged children, e.g. computer applications offer such an opportunity for children to interact with a wide range of virtual artefacts and settings that would be otherwise inaccessible to them.

- **leave the initiative to children** – applications should put children in charge and never control interactions with children by the programmed teaching method or on the basis of any other similar behaviouristic approach.
- **be intuitive –** functionality of selected applications should be well defined and intuitively evident, i.e. the application will perform every single clearly defined task as one single operation,
- **avoid vulgarity and stereotypes**,
- **contribute to the development of health and security awareness**,
- **support cooperation with parents –** cooperation among parents, children and teachers is extremely important. The ambition to achieve common goals raises the level of children´s academic skills. Connecting families with nursery schools is an important aspect of a quality preschool education [7, p. 34].

Present-day children are more and more flexible and creative, they have the potential to discover and research in a virtual environment. It is necessary to create a space allowing them to participate actively in creating products also by using digital technologies, e.g. a computer. It is important to give them an opportunity to make use of their abilities and information they have already acquired or make them improve or acquire new ones. Using digital technologies in nursery schools should not be limited to the acquisition of skills by a mechanical use of a computer only, e.g. practicing the work with a mouse. It is equally important to create space for children allowing them to acquire the basic competencies in mastering digital technologies with the aim to use them actively in developing thinking and creative activity.

Appropriately selected digital technologies have a positive impact on children's development:

- **in psychomotor area**, e.g. in developing digital literacy we proceed from child´s ability to make a cyclic movement with his/her index finger and the ability to work with a mouse. This skill is related to e.g. sight coordination, work of muscles, hands and fingers – it contributes to the development of fine and visual motor skills.
- **in social – emotional area**, e.g. with well selected rules children can develop their interpersonal and intrapersonal competencies – they learn to accept opinions of others, wait for alternation, choose a solution to avoid conflicts, they learn to assess their options and abilities, to behave self-confidently when working with a camera, scanner or when turning a programme on or off.
- **in cognitive area**, well selected activities aimed at the digital competencies development gradually and in a playful way prolong the concentration ability of children on one activity, they improve the ability to differentiate the perception of more complicated shapes and colours, children develop their memory and thinking. Being offered creative activities with the use of digital technologies develops not only their creative thinking but also communicative competencies. It is often the case that children learn the

whole alphabet or some of them can even write simple messages once they have the possibility to use a computer and a text editor [9].

3. The importance of digital literacy development with preschool aged children

Digital literacy represents a set of skills, knowledge and comprehension required for an appropriate, safe and productive use of digital technologies for learning and discovering in everyday life. It is a set of skills enabling us to:

- use various digital devices to satisfy our needs purposefully, to learn, to express ourselves and complex personal development,
- solve effectively tasks and problems of digital environment,
- choose and use proper digital technology to find, process, use, disseminate or produce information,
- asses and analyze critically the knowledge acquired by means of digital sources,
- understand the social consequences (e.g. security, privacy protection, ethics) originating in the digital world. [3, p. 130].

The experts suppose it is the digital technologies which help to develop children's competencies already in the preschool age. Siraj-Blatchford and Whitebread emphasize that "present-day children grow up in the world which not only includes the digital technologies but is more and more shaped by them" [7, p. 20]. Several experts have already dealt with the issue of a child's development, spread of digital technologies and effects of new technologies on children's lives. The results of their studies can be presented in the following points:

- new technologies significantly influence the lives of small children,
- small children have a specific approach to digital technologies,
- parents do not always realize how their children are exposed to these technologies and content that might be transferred by them,
- the ability to provide one's own children with necessary experience, protection and support varies with children on various level,
- many children have much better access to new digital technologies at home than in an educational institution,
- teachers often lack adequate knowledge and trust to digital technologies,
- equipment of nursery schools with digital technologies significantly differs and it is often deficient,
- communication between parents and teachers about children's skills in this area does not exist in many cases [2, p. 20].

Existing studies in this area point out to the fact that digital technologies can provide space for collaboration, cooperation and positive learning skills among children themselves or between children and adults. That does not have to be evident. However, big emphasis is put on teacher's activity. He/she has to know what teaching interactions might occur in the context of digital technologies and which didactic approaches to choose to support them. The

basic and necessary requirement to integrate digital technologies into nursery schools productively, safely and authentically is also the professional development of teachers at pre-primary level.

4. Pilot survey on representation and use of digital technologies in nursery schools in selected region

The pilot survey was made in thirteen nursery schools in Trnava. Trnava is the seat of our university. The University of Ss. Cyril and Methodius covers also the activities of the International Media Education Centre (IMEC). It is an important research and educational centre in the area of raising the media literacy. Nine out of the surveyed nursery schools were public, two private and two religious. The nursery schools were given a questionnaire including ten questions. Three of them were open. The research method was chosen in accordance with the defined goals and character of the research:

- **in the first phase of collecting the research data** *the questionnaire method* as the main research method dominated (the questionnaire was distributed to schools by e-mails),
- **the second phase** of data collecting was in selected cases focused on *inquiry by phone* (with the school management, i.e. the headmaster or vice-headmaster).

The questionnaire was focused mainly on:

- implementation of digital technologies into the educational process in pre-primary education,
- the most frequent types of digital technologies used in nursery schools,
- advantages and disadvantages of their use in practice.

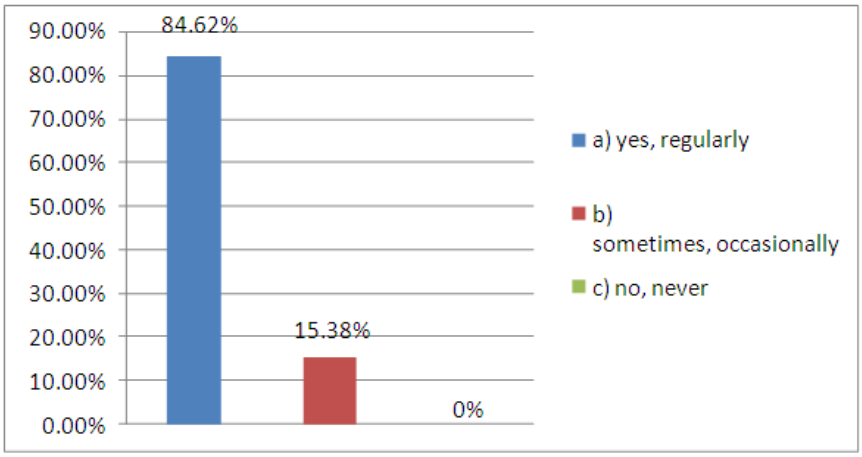

Figure 2. The use of digital technologies.

Based on the structure of the questionnaire the results can be interpreted as follows.

4.1. Question 1 - Do you integrate digital technologies into common educational activities in your nursery school?

Eleven nursery schools use digital technologies in the educational process actively and regularly. Two nursery schools use them to a limited extent or occasionally (Figure 2). We believe it is a positive result. Referring to the theoretical arguments presented in the first part of the paper it is obvious that digital technologies have to be implemented into the educational process.

4.2. Question 2 – Do you use these digital technologies in your lessons?

The digital technologies used most often are CDs and MP3 players (Figure 3). They are used in all inquired nursery schools. Computers, interactive boards, educational software applications of various kinds, digital programmable toys and cameras are used daily. Less frequently used digital means for communication are walkie-talkie or phones (almost in one half of the schools they are not available), microphones or devices for voice recording or remote control devices.

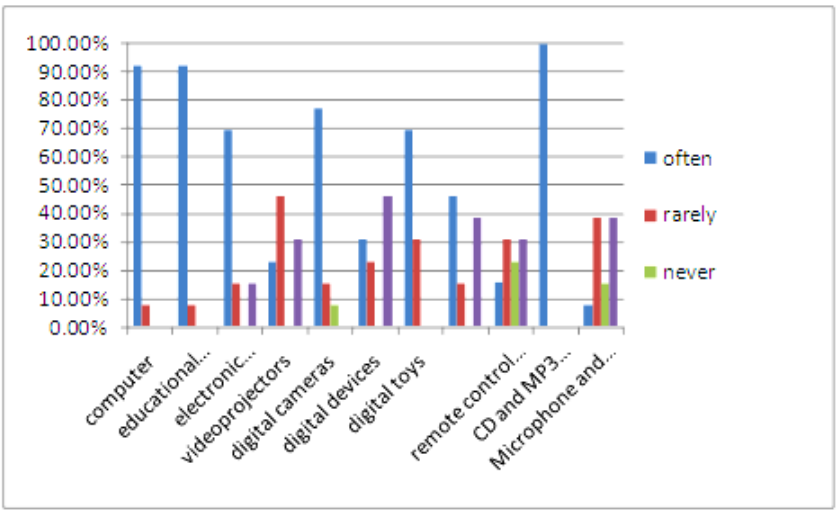

Figure 3. Intensity of use for each DT type.

4.3. Question 3 - Who or what motivated you to use them?

The teachers are most interested in the implementation of digital technologies into the educational process (Figure 4). It is the female teachers´ merit as they are highly motivated to use them - they are very creative and they require them for their educational activities. Frequent answer was also the digital

era we live in. The teachers consider the state requirements regarding digital technologies and their implementation to be sometimes illogical; they do not respect the needs and possibilities of neither the children nor the nursery schools.

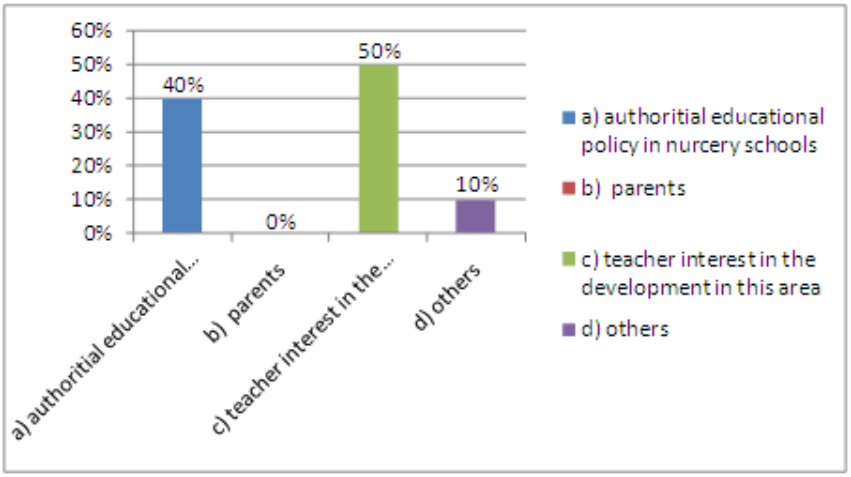

Figure 4. Motivation in the use of DT.

4.4. Question 4 - How often do they use these technologies?

The frequency of digital technology use is high (Figure 5). Nine out of thirteen nursery schools confirmed they use various technological aids several times a week depending on the focus of educational activities in particular week. In five of the nursery schools the digital technologies are used daily.

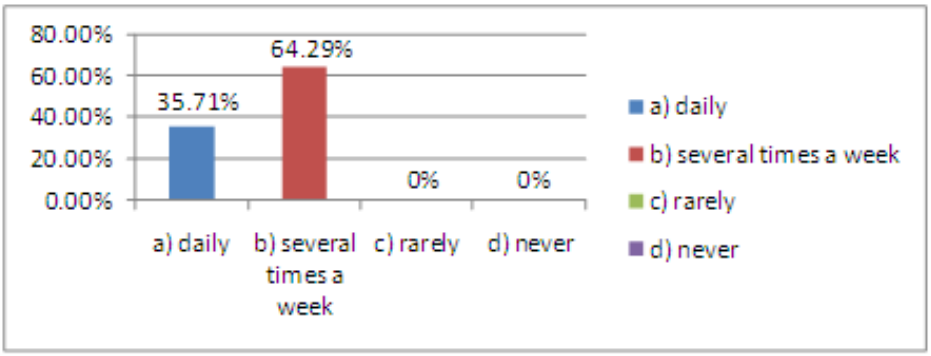

Figure 5. Frequency of DT use.

4.5. Question 5 - Where in your nursery school are these technologies situated?

Digital technologies are freely accessible to children in all nursery schools in the classrooms where children play – playrooms (Figure 6). Children spend most of the time there playing and doing their activities. Teachers from two

nursery schools reported they have special rooms reserved for digital technologies.

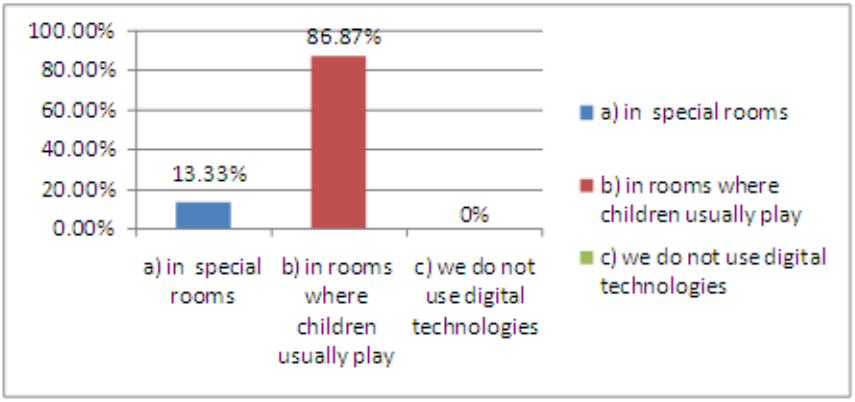

Figure 6. Placement of DT.

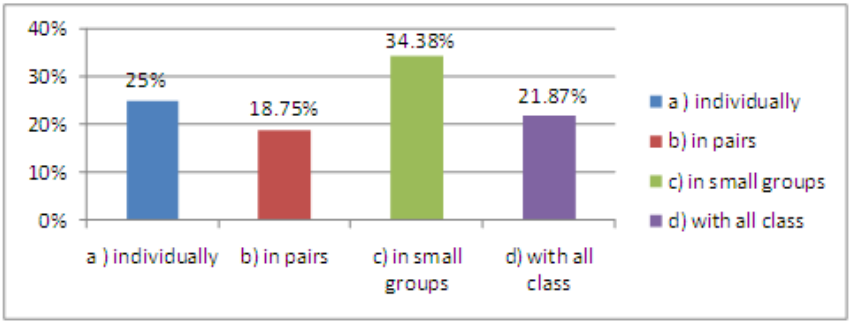

Figure 7. Inclusion of children into the work with DT.

4.6. Question 6 - How do children work with these technologies?

In eleven nursery schools children often work with digital technologies in small groups, then individually (for example with individual educational programs) and with the whole class – when teachers use a data projector (Figure 7). Pair work with digital technologies is the least frequent. It is not exceptional, e.g. when working with a visual computer database. The respondents - the female headmasters agreed unanimously that doing individual tasks and the course of games is very variable. Thus the individual forms of the work with digital technologies often vary.

4.7. Question 7 - Do the parents of your children support the process of the DT integration into the educational process of your nursery school?

Twelve nursery schools reported that parents decidedly support the improvements in the educational process in nursery schools by implementing

digital technologies (Figure 8). The religious nursery school responded that parents leave this competence up to the needs of a nursery school and competency of female teachers. However, they trust them. The same school reported the parents do not insist on the use of digital technologies. They have a rather neutral or even negative attitude to their use.

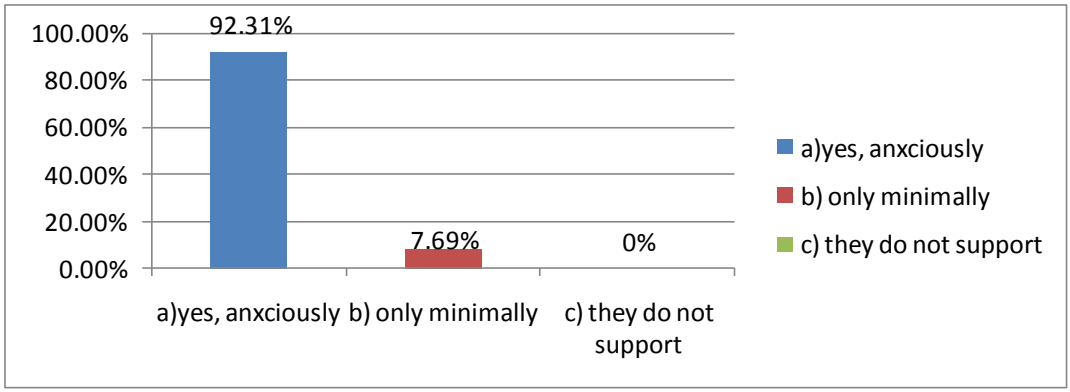

Figure 8. Parents' approach.

4.8. Question 8 - What advantages do you see in the use of DT at your school? What problems do you have and what do you consider risky in this process?

The question was an open one, thus it is not possible to present the acquired data in graphs due to the wide range of responses. Absolute majority agrees with the statement that the digital technologies help to modernize and dynamize the educational process. Female teachers can prepare really interesting and entertaining educational activities for children with their direct participation in problem solving. This is the way how to motivate them and catch their attention. At the same time it is possible to raise children's computer literacy, develop computer competencies, critical, logical and technical thinking, aesthetic awareness and creativity. Using digital technologies is an interesting and attractive way for children to work, visualize various objects, facts and phenomena via pictures (e.g. cartoon reading), videos.

It is important to differentiate between individual topics and use digital technologies teleologically and coherently (e.g. why to observe, study the bark and leaves of a tree in a PC, on the Internet or by means of an educational program instead of a child's direct experience including several senses). Nowadays children are technologically more skilled and face various types of technologies even at home. Thus it would be ineffective to limit them in using the technology. On the contrary, their activity should be professionally managed and controlled by using it. The responses show clearly the modern age requires the use of new modern technologies. It is important to consider a good choice and time to avoid addiction. With the excessive use one can neglect health and

sports. Under teacher's supervision children are not overloaded. The activities must be altered, it is necessary for the children to move and take care of mental health. Headmasters of nursery schools often see problems in the rules of school policy (e.g. the inspection orders the use of PCs and other digital technologies on everyday basis as an evaluation tool, in every class – regardless the current focus of educational activities which do not require their use. Accomplishing the goals and standards is often even more effective without the use of technology.

4.9. Question 9 - What was, or still is, the biggest obstacle that you had to overcome (or you are overcoming) when introducing DT into the educational process?

Responses apparently coincide in two points: a) insufficient abilities and knowledge in the area of digital technologies among pedagogical staff in nursery schools b) finance. Majority of schools tries to solve the problem by training and professional preparation of female teachers. Once completed, working with an interactive board, educational software and other technologies commonly used in the educational process follows.

4.10. Question 10 - Have you got any plans for further development and broader use of DT? Which particular ones would you like to have at your disposal in your institution in the near future?

Many nursery schools are satisfied with the digital technologies equipment and claim that current capacities are sufficient for them to develop children's digital literacy. They have mainly computers, laptops, interactive boards, digital toys and cameras. They do not intend to buy any other digital technology in the near future. If needed, they consider the purchase of another interactive board or new educational programs. Many nursery schools participate in various projects applying for digital aids of different kind, such as the project Computerization of educational system in regional school system. One of the inquired nursery schools plans to broaden this area by purchasing digital cameras, Bagger-Bot and transportable visualizer for children. The philosophy of one religious nursery school was also interesting [10]. They believe children are a precious gift. The management of nursery school thinks it is important to support children's development in the emotional and social areas. The vitally important areas can be developed with children up to the age of six. If neglected, they will not develop anymore. The work with digital technologies is part of further life after the pre-primary education. The teachers in this nursery school believe that children will live in the world full of media and technologies in the future. Thus there is no need to hurry with technology now. School age would be more appropriate.

5. Conclusions

Media literacy development and achieving media competence through the process of media education have become a natural part of contemporary world [11]. Based on the summarized results of the pilot survey and the obligations resulting from the National educational program we can say that nowadays we would hardly find a nursery school without any digital technologies. At present we are preparing a nationwide representative research which should analyze the issue in details in the context of defining the media literacy level of the Slovaks.

More and more children get in contact with technological aids before they start attending basic school, even nursery school. Thus, it is natural that they are exposed to positive and also negative effects of new technologies. Nursery schools should be interested in procedures and strategies integrating the digital technologies that would allow them to achieve the teaching objectives in a more effective, persuasive and modern way anytime it is appropriate. Nursery school teachers are often excited defenders of the educational value of digital technologies. They are aware of the fact that education of small children is actually a creative and natural activity in which they face the complex reality of the cognitive process. Due to this fact they think thoroughly about children´s learning and recognize the opportunities beneficial for them. At present we see an extraordinary interest in a creative integration of digital technologies into pre-primary education. It is the task for teachers to prepare opportunities for children enabling them to learn and learn the world. They create stimulating environment, cooperate with children and strive to meet the requirements of pre-primary educational programs.

Children are curious, ask questions, love storytelling and listening to stories about them, other people and things. They like drawing houses, animals, trees, their parents, fairy-tale creatures, they are creative and interact with other people and animals. Digital technologies may help them – they can make the content and activities provoking and supporting their emotions available. They can be used as a background and means for a child´s development. When nursery school children play with digital technologies and invent stories, build castles and draw pictures, they develop and improve their abilities to think creatively and cooperate in digital environment. These are the abilities without which we can be neither successful nor satisfied in the 21st century. It is very probable that children will face digital technologies throughout their entire lives.

Kalaš comments aptly on the issue: "Sometimes a tool (the use of technologies to make the cognitive process more attractive and effective) and a goal (to learn how to work with computer) are interchanged. Information and communication technologies are not a new typewriter. It is a revolution in the cognitive process. The information and communication technologies can be integrated in a way allowing us to teach the old content in a new way. However, this can be done also to teach new content in a new way to turn a school into an interactive laboratory for discovering, researching and constructing." [3, p. 135]

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