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Interactive Learning Environment – Realization of Dynamic Model for Teaching and Learning with Technologies in Kindergarten

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ABSTRACT

The paper presents an educational solution developed and implemented in kindergarten. The aim is to realize a dynamic model of pedagogical interaction between the teacher and the children. The model is structured in training and management modules. The paper presents part of the training module - the technological solution for interactive work on digital educational content. The cotemporary situation concerning technological equipment of Bulgarian kindergarten is analyzed. For levels of IT equipment are identified and described. Software solution developed and implemented is presented. The solution is approbated in 9 kindergarten groups with 260 kids in 2016-2017 school year. From September 2017, it is applied in new 21 kindergarten in Bulgaria. Some results and conclusions are formulated.

KEYWORDS: Technologies based teaching and learning, kindergarten education, software educational solution

INTRODUCTION

Technologies integration in teaching and learning process at early ages is widely researched during last years. The resistance of generations of teachers and principals permanently decrease and most of the new teachers and educational leaders accept the need of new vision of Kindergarten and Primary school with modern and technology equipped learning environment [1].

One rich of technologies environment could provide multisensory and interactive educational process. The children's access to contemporary educational technologies is a strong motivation factorto participate into the educational process. The use of technology as both – learning tool and learning environment– forms different attitude towards technology in children. The device is a tool for learning and acquiring knowledge, not just for playing and entertainment.

LEARNING ENVIRONMENT

The achieved level of interactivity is used to evaluate the quality of the technological solution. Now, four levels of technological equipment could be identified in schools and kindergartens in Bulgaria, which correspond to the efficiency of the technological solution to the quality of the realized educational process (from the lowest to the highest degree of efficiency of the technological solution):

1. First level – Personal Computer or a laptop (without possibility of projecting on a large screen)
2. Second level – Presentation computer system – PC / laptop and projector.

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3. Third level – Interactive presentation system – PC / laptop, projector and interactive whiteboard (or digital screen with built-in computer).
4. Fourth Level – Interactive Integrated System – a solution that combines the interactive presentation system (Level 3) with mobile devices (tablets) integrated into a computer-controlled system.

The first level of technological equipment in the kindergarten has practically no added value to the overall educational process. The teacher cannot show a teaching resource on a small screen to a group of 25-30 children at the same time. Teachers using this level of equipment share that they use the computer to work with problem children, to set individual children's tasks in the afternoon before the end of the school day, to play audio recordings from the Internet, i.e. A UNESCO report describes an attempt to build computer rooms in kindergartens in Moscow, but the model is not included into the recommendations set out in the report and the guidelines for technology integration in the early ages [1]. Placing the child alone in front of the computer and building skills for working with mouse and keyboard corresponds to first grade national educational standards for teaching ICT at Primary school.

The technologically rich environment in kindergarten aims to provide a multisensory and interactive educational process. The rich in technology cognitive environment is a strong motivating factor for participating in the educational activities of children in the kindergarten. Early use of technology as a learning environment and learning tool has a different attitude towards technology in children - as a means of learning and acquiring knowledge, not just as a means of play and entertainment.

The second level of technological equipment in the kindergarten is widespread. It is mainly used to implement multimedia situations on different learning subjects by using teacher-developed, downloaded or purchased learning presentations. Preschool teacher use PowerPoint presentations in their work. The positive effect is the high level of visibility and structuring of the content. The negative side of this type of media situation conducted by the teacher is the static passive role of the children. The level of interactivity is low. Animation usually is reduced to a pre-set show, moves and effects. The presentation does not give the teacher the freedom to react instantly to a situation for the realization of interdisciplinary connections and real knowledge transfer.

At the first and the second kindergarten groups the frontal work dominates, which determines the higer effectiveness of conducting multimedia situations on different learning subjects. The multimedia situation presents the learning content through images, animation, video, sound. This enhances the child's various perceptions and achieves a very high level of active learning.

There has been good progress in the development of young children in the third and the fourth kindergarten group. The frontal work must go to a next stage of development, enabling children to be non-passive viewers of the multimedia situation and to actively participate in it.

The third level of interactive equipment in the kindergarten enables interactive multimedia situations to be held. It is being worked with an interactive whiteboard or new up-to-date solutions (digital touchscreens with built-in computer, interactive tables, etc.) and professionally developed interactive learning resources. Children work on a screen where they can manipulate the relevant learning resources. The interactive whiteboard offers tools with which the teacher and the child can move images, draw, group, delete elements, and work with rich interactive content.

- Option 1. Using a touchscreen interactive board.

The necessary technical equipment includes laptop, projector, and touchscreen whiteboard

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with educational software with e-resources for preschool level. Advantage of the touch screen interactive board is the easy and intuitive interface for both the teacher and the child.

A disadvantage of the technology is the price. Each kindergarten group has to ne equipped with quite expensive hardware and software. Other option is the arrangement of multimedia center into the building of the Kindergarten. In this case the use of the technologies becomes episodic and unsystematic.

- Option 2. Using an interactive display

This option, even better and more easy to use and work, is still expensive for Bulgarian Kindergartens. There are still isolated implementation of this hardware solution.

The interactive whiteboard offers higher degree of pedagogical interaction with the active participation of the children. Even with the frontal organization of work, the teacher could put the children in an active position by performing short tasks.

The main disadvantage of the third level of technological solution is the frontal organization of work. The teacher is in front of the group, manages the teaching and learning work and gives access to the technology to one or several children during the learning situation. Particularly in the third and fourth group, children experience impatience, dissatisfaction and protest against the inability to work more and more often with the computer technology. Children are in the position of observers, not active participants in the education process.

The fourth level of interactive equipment in the kindergarten is designed to solve the problem described in Level 3. To the interactive presentation system, consisting of interactive whiteboard, projector, and a computer, is added equipment of tablets for individual work of the children (standard 25-30 tablets per group). Tablet solutions come with specific educational products that support the simultaneous work of children on the same task under the control of the teacher. Each system has its own connectivity model and set of functionalities – for example, a connection of all tablets to a single internal network, the possibility of simultaneous switching of the children's task, the possibility of visualizing the work of a selected child on the interactive whiteboard screen for comments the way the task is done, and so on.

Second, third and fourth level equipment is used not only to conduct multimedia and interactive learning situations. The technology enables the teacher to play audio and video information, to present Internet-based educational content, educational games and services.

The model for providing a dynamic learning environment requires changing methods, technologies, and style of work. In this connection, it is important to have an up-to-date game park, including the traditional toys for the Bulgarian kindergarten combined with new digital games.

The model for providing a dynamic cognitive environment requires changing methods, technologies, and means of work. In this connection, it is important to have an up-to-date game park, including the traditional toys for the Bulgarian kindergarten with new digital games as well as games that model real life processes. In order to provide technology for the game and teamwork, it is necessary to upgrade the playground in the kindergarten by purchasing a variety of interactive, manageable toys with methodological resources to them, not only to play toys but also effective educational resources (Papancheva, et al., 2014).

The digital toy is preferred because of its interactivity. It reacts to the action of the child or the teacher with sound or light indicators. In first and second group the games are played mainly in groups and the use of the digital toy is done by whole group. The digital toy, which is controlled by the teacher, is the main hero, used by the

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teacher for knowledge building. In the third and the fourth groups the children are using and contrloing the toys by themselves. It is a process in which the child learn from its mistakes, without the negative reaction and scolding of the adults. The digital playing park offers a variety of toys with a specific accent – forming of spatial thinking, communication skills etc.

TECHNOLOGICAL SOLUTION

In order to realize a dynamic model of work in the kindergarten, a fourth level of technological equipment was chosen, corresponding to the high degree of effectiveness of the technological solution to the quality of the educational process.

The technological solution includes:

1. Touchscreen interactive board for the pedagogue's frontal work.
2. Laptop or microcomputer.
3. Multimedia projector (installation of ceiling stand).
4. Rotter.
5. 25 - 32 tablets (one for each child) connected in an internal network.
6. Educational software.

INTERACTIVE SOFTWARE SOLUTION

An interactive software platform ITI wasdesigned, developed and implemented for the needs of the experimental work. It includes the following modules:

- Design module – for creating of educational content
- User module
- Communicational module

The educational content designing module has the following functions:

- Web based platform for creating educational content.
- Access to the platform with a username and a password.
- Access to a web-based file manager. Ability to upload images, sound and video and to edit files – renaming, moving between directories, deleting.
- Ability to create different categories of educational content
- Ability to create situations/lesson to a specific category.
- Ability to add new pages to the situations/lessons.
- Ability to create a background with including pictures and sound.
- Ability to move images over the screen, take notes over the screen, interacting with figures, zooming in on an image, hyperlinks between pages, etc.
- Ability to save the created situations/lessons.

The user module includes the following functions:

- Desktop application ITI-DG [3]
- Connection with the tablets in the local network.
- Categorization of the situations in modules.
- Choice of situation.
- Access to helping methodical advices about every topic in electronic format.
- Moving images over the page.
- Taking notes – short notes, circling, connecting.
- Drawing of figures.
- Coloring of figures.
- Playing sound, etc.
- Assigning a task to the tablets for individual work done by the children.

The communicational model includes the following functions:

- Desktop application.
- Permanent connection between computer and all tablets within local network
- Ability to choose a random tablet and visualize the screen of the chosen tablet on the interactive whiteboard on real time.

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The software platform of ITI-DG supports touch screen technologies. The interface of the software is plain, suitable for the age of the children. The activities that a child do are clicking and dragging. The child could choose an object, to move it over the screen, to circle objects and connect objects. A couple of basic instruments are used for this purpose.

- The instrument "Choose/Hand" is used in the choice of and object and its movement over the screen by dragging and dropping. If there is a sound attached to the object, it is played with this instrument.
- The instrument "Pencil" is used to draw over the screen. When the pencil is selected a vertical menu with a palette and additional instruments appears on the left side of the screen. From the palette is chosen the colour and from the last three instruments the thickness of the pencil is selected.
- The instrument "Marker", like the "Pencil", is used for drawing and taking notes over the screen. When the Marker is selected a vertical line with a palette and additional instruments appears on the left side.
- The instrument "Bucket" is used for coloring of figures, created with the figure instrument in the software. When the bucket is selected a vertical menu appears on the left side, from which a colour is chosen. After the colour has been chosen, the figure can be colored with a click over it.
- The instrument "Figure" gives the teacher the opportunity to draw a geometrical figure on the page. When the instrument is chosen, a vertical menu appears on the left side, from which the type of the figure is chosen. The figure is drawn by dragging over the screen until the desired size is reached. After the figure has been drawn it can be moved and resized with the help of the instrument "Edit".
- The instrument "Line/Arrow" gives the opportunity to connect two objects on the page. After selecting the instrument, an additional menu appears on the left side, from which the colour and the type of the arrow – one-way or two-way – can be selected.
- If an error occurs, the instrument "Undo" can be used, which is positioned over the palette with colours in the upper left corner of the screen.

APPROBATION

The model was approbated during the school year 2016-2017 in 5 kindergartens with 9 classes 6-7 years old children (the Preschool level according Bulgarian educational system). The total number of children participating in the experiment is 265. The teachers are 17 (aged 30-55), the principals – 5, students – 8. The period of approbation was May 2016 - May 2017.

Experimental work included variety of situation on Math, Bulgarian language and Science classes. Children worked with tablets on interesting problems. On figure 1 some examples of learning tasks with Math content are presented.

For estimation and analysis of the work expert SWAT analysis is done. Some conclusions from it are presented.

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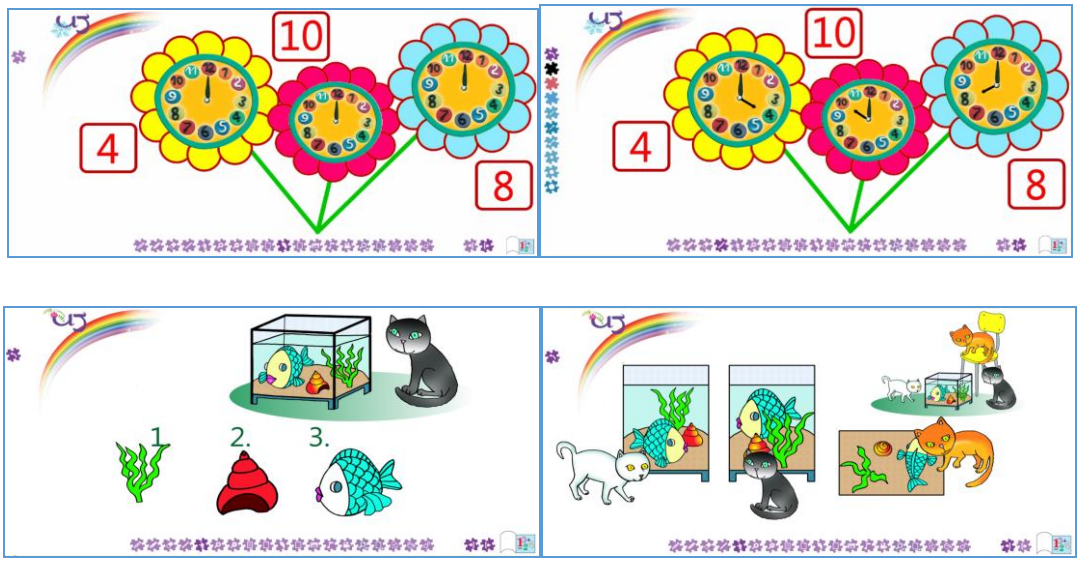

Figura 1. Example pages from the Kindergarten e-content [3]

SWOT-ANALYSIS

A SWOT analysis was performed to evaluate the conducted experimental work. SWOT analysis is defined as an interactive technique that analyses the strengths and weaknesses, opportunities and dangers of applying the model in pedagogical practice.

The SWOT analysis was based on the author's expert opinion and a survey was conducted among the 17 teachers who implemented the model in their practice. These teachers are defined as expert teachers. The survey was conducted in mid-March 2017, after teachers had worked 5 months on the model.

Table 1 includes the most popular answers given by teachers during the survey.

Table 1. Some accents from the SWOT analysis.

Strengths	Weaknesses
1. Higher interest and motivation for work in children. 2. Higher number of solved tasks. 3. Easier work for the teachers, due the access to available e-resources.	1. Need of modern equipment with the necessary technology. 2. Need of additional teachers' trainings. 3. Possible problems with the technical equipment.
Opportunities	**Threats**
1. Rich interdisciplinary connections. 2. Use of various organizational forms - individual work and group work - team work, work in pairs. 3. Formation of teamwork skills	1. Health problems for children, concerning vision and physical conditions. 2. Over-use of E-resources and neglecting the time requirement for working with technology. 3. Higher noise level into the group.

Strengths

For today's digital generation, the use of a mobile device (tablet) at kindergarten is undoubtedly desirable and interesting. Some of the teachers share success in working with hyper-active children and children with special educational

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needs when using tablets during teaching situations. High motivation for work is a necessary condition for achieving an effective educational process.

All teachers participating in the experiment were happy to use the resources and found them as extremely useful for building new knowledge's and skills.

Important strength outcome of the model is the positive image that the kindergarten receives as an institution that offers modern methods and educational environment. Most of the parents fully supported the teacher's work with the use of technologies.

Weaknesses

As weaknesses of the model, teachers point to the problem of providing financial resources for purchasing contemporary hardware and software equipment. Another weakness identified was need of higher digital competencies of the teachers, although the digital competency itself is not a weakness but a strong feature of the educator. Uncertainty in the use of the technique leads to fear of problems with its use, which can also be attributed to the weaknesses of the model.

Opportunities

The model reveals to the educator many positive opportunities - to realize rich interdisciplinary connections, to transfer knowledge among subject areas, to build strong teams among children's group, for a high motivation and active position of the child, etc.

As a result of the model work, a number of competences of the pedagogic teacher are being enhanced - digital, methodical and presentation skills. The positive attitude of parents and community to modern methods of work in the educational institution reveals new opportunities for better cooperation.

Threats

There are no exact dimensions, research, schedules or standards, how much to work with technologies at Kindergarten. Determining for the correct "dosing" are the teacher's judgment, the control or corrective function of the principal of the educational institution, the opinion of the parents, i.e. During experimental word teacher used up to half of their time spent working with technology. The rest of the time they worked on tasks form the students' book and implemented variety of game models of pedagogical interaction.

CONCLUSIONS

The use of technology in the kindergarten in Bulgaria isa process that even slowly goes up. The reasons are insufficient technological equipment, as well the low digital culture and competencies of the Preschool teachers.

Successful approbation has led to wider implementation of the model into the practice. During 2017-2018 school year, another 21 Kindergarten started the implementation by the support of the municipal level. The project includes more than 700 children and over 65 teachers.

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