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Modern Educational Tools in the Teacher's Work

Abstract

The article serves as a summary of one of the parts of the research carried out under the NP-2550 grant in the Department of Education and Media in Education of the Faculty of Pedagogical Sciences at Nicolaus Copernicus University in Toruń. The presented analyses concern the application of modern educational tools in the process of education. The work includes a discussion of the frequency, as well as ways, of using ICT devices by early education teachers. It shows the relationship between the presence of modern computer tools in the teaching process and the constructive-cognitive character of activities undertaken in the classroom. The research referred to was carried out among 148 teachers in the Kujawsko-Pomorskie Province. The analyses presented to the reader are mainly based on the quantitative data obtained on the basis of: knowledge and skills tests, observation, as well as surveys. The research material was supplemented with qualitative data obtained through the conducted interviews.

Keywords: *cognitivism, constructivism, modern educational tools, tablet, interactive whiteboard, Internet, smartphone, multibook*

Introduction

The educational space – regardless of its real or virtual character – has become significantly diversified in the last decade. Computers, interactive whiteboards, tablets, smartphones, multibooks, and other electronic teaching tools have appeared (U.S. Energy Information Administration; Bulman, Fairlie, 2015). Day by day,

they are becoming more and more accepted, appreciated, more often interwoven into the course of daily activities, unfortunately, not always in a correct manner. Sometimes the lack of professionalism on the part of lecturers may entail discouragement of children from learning as well as from computer teaching aids. In order to improve the situation, the academic community should constantly control the level of knowledge and skills of educators, diagnose the needs and problems of teachers, promote appropriate work patterns with modern computer tools, take care of access to educational materials, promote lifelong learning, thoroughly prepare students – future teachers who will undoubtedly come across the problem of the constantly evolving school reality (Siemieniecka, Kwiatkowska, Majewska, Skibińska 2017; Siemieniecka, Siemieniecki, Rice, Kelly, 2016).

Analyzing the pace of transformations related to the emergence of modern educational tools, it should be stressed that despite the efforts made by the head teachers of educational institutions, few schools are keeping up with the changes. As a consequence, teachers do not always have access to modern educational tools, or do not know how to use them properly. It is worth emphasizing the importance of continuing education, as well as the need for open access to various forms of education that help in mastering the necessary knowledge and skills. As an example, the first in-line full-time first-cycle studies in the field of media pedagogy launched in the 2015/2016 academic year can be used[1].

Modern educational tools from the perspective of constructive-cognitive theories (Research Problem)

Undoubtedly, one of the most important theories in modern education is cognitive-constructivist theory, which facilitates planning and undertaking effective educational activities by the teacher (Siemieniecki 2016, pp.21–35), in this case – supported by elements of ICT. The interactive whiteboard, computer, or tablet, connected to the network, make it possible to provoke situations in which children (in groups or independently) look for, interpret, experience, check, and thus create their reality. What is helpful in this area are: educational portals, interactive dictionaries, exercise books, multibooks, e-bases, games, chat and forum, etc. Learning through them can follow one of three schemes developed by Bronisław Siemieniecki:

- sender – content, form of communication – recipient,

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[1] Pedagogika medialna, http://www.edukacja.torun.pl/pedagogika_medialna/ accessed on: 2017–12–11.

- sender – content, form of communication – other participants in the communication process, e.g., Internet users,
- recipient – content, form of communication – other participants in the communication process, e.g. Internet users (Juszczyk, 2007).

It is worth noting that the form of messages conveyed with the use of modern educational tools correlates with the division proposed by Krzysztof Kruszewski, according to which information may occur in the form of:

- teaching material,
- information received by the learner,
- information created by the student,
- information in the student's memory.

The main advantage is the interactive nature that stimulates visuals, auditors and kinaesthetics.

A brief overview of the research (Research Focus)

In the last decade, many studies have been carried out covering various aspects of the use of information and communication technologies in the work of teachers, as well as of students from various age groups. The following have have been subjected to analysis:

- changes related to equipping classes with computer devices and to the use of ICT during lessons (Johnson, Wood, Sutton, 2014, pp.91–96),
- preparing teachers (and students of pedagogy) to work with new media (Voogt, McKenney 2017; Juszczyk, Kim, 2015),
- acceptance of modern educational tools by students and teachers (Jen-Hwa Hu, Clark, Ma 2003; Majewska, 2014),
- frequency of using ICT in the classroom (Pelgrum, Voogt, 2009),
- popularity and form of using computer tools in leisure time (Žumárová 2015; Siemieniecki, Majewska 2015; Juszczyk, 2014),
- benefits and losses resulting from the use of computer tools in the teaching and learning process (Siemieniecka 2013; Livingstone 2012; Riasati, Allahyar, Tan, 2012), etc.

Some of the procedures mentioned are complementary and overlapping, showing an analysis of the same problem at various educational levels. This does not mean, however, that further exploration of the topic is not needed, but just the opposite. The influence of Western trends on Polish education, as well as the rapidly changing situation in education, mean that these results must be constantly updated and expanded with new contexts. Especially that the teacher's role in the world determined by technological development is constantly changing.

Referring to the problems raised in the presented research, it should be emphasized that the dynamism of the changes related to the appearance of ICT is very big. In 2001 in Poland, there were about fifty students per one computer, in 2005 – 26, while in 2014 – six. (Jaranowska, 2005, The Educational Research Institute). In the following years, interactive boards, electronic register (Majewska, 2016) and tablets appeared in schools. It is worth noting that despite the passage of time and a number of activities undertaken, the level of school equipment is still very different. A sample survey conducted in the spring of 2014 showed that in Poland there are still schools where there is *"only one interactive whiteboard available (…) – in one school the whiteboard is in the first class, whereas in another the board is in the mathematics classroom. This considerably limits the chances of other teachers using the interactive whiteboard in their classes"* (Brosch, 2014, pp.76).

In the group working at the early education level, the cassette player (84%) and the CD player (80%) were still most often used at that time (Maciejewska, 2014, pp.7). These tools were used mainly for listening to music recordings and less frequently for watching films. Additionally, in the early education classes, the following were used:

- desktop computers - 40%,
- laptops – 37%,
- audio equipment – 39%,
- multimedia projectors – 33%,
- interactive whiteboards –37% (Ibidem, pp.6,8).

It is worth adding that at the level of early education, multimedia educational materials have started to play a significant role. Their use in grades 1–3 of primary school was declared by three out of four respondents. Usually, the respondents supported their work with resources contained in multibooks (64.6%). On average, one in four (25.6%) used interactive educational games. Electronic textbooks (18.9%), online exercises, and network resources (17.9%) were slightly less important. They were used by only one class in five. One may wonder about the reason for this phenomenon, as the data collected show that approximately 95% of the facilities had connection to the network. In the early education classes, both educational materials and homework were transferred in a traditional way – the Internet was, therefore, rarely used for contact with pupils (which was declared by about 7% of the respondents) (Ibidem, pp. 10–14).

Research Methodology

The presented research was carried out in 2016[2], on a group of 148 early education teachers from the Kujawsko-Pomorskie Province. The selection of the research group was random. The actions taken were based on the diagnostic survey method (questionnaire, partially directed interview, and observation), supported by statistical methods (knowledge and skills test). The inference was mainly based on quantitative data supplemented with a qualitative analysis. The main goal of the presented project was to examine teachers' preferences regarding: computer educational tools, educational software, as well as websites containing teaching materials used during lessons. The focus was also on teachers' skills and competences, associated with the use of computer educational equipment in the course of teaching. During the research, the relationship between the presence of specific ICT tools and the constructive-cognitive nature of teaching was analysed. As a result, the following research goals were distinguished:

- *Analysis of types, methods, and forms of using computer educational tools by early education teachers.*
- *Understanding the relationship between the presence of computer educational tools in the teaching process and the constructive-cognitive nature of teaching.*

Among the specific issues distinguished there were the following:

1) *What kind of computer educational tools do teachers use?*
2) *How often and for what purpose do early education teachers use computer educational tools?*
3) *What forms and methods of teaching do teachers use when using computer educational tools?*
4) *What factors influence the use of computer educational tools?*
5) *Is there a connection between age, seniority, or professional level and the form of using computer educational tools?*
6) *Do early education teachers want and are they able to operate interactive whiteboards, tablets, smartphones, computer didactic software, and e-books?*
7) *How often and of what type of teaching software do early education teachers use?*
8) *Do early education teachers benefit from Internet resources and, if so, of which resources?*
9) *Do teachers have any problems with using TI tools, and if so with which tools?*

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[2] The main part of the research was carried out under the NP – 2550 grant, the analyses were completed in the first quarter of 2017.

10) *Do early childhood education teachers deepen their knowledge about teaching with the use of modern computer didactic means? If so, how do they do it?*

11) *Do teachers see the connection between the presence of computer educational tools in the teaching process and the constructive-cognitive nature of teaching?*

The statistical significance was verified using Chi square tests as well as properly determined correlations.

Research Findings

The completed research showed that the teachers used modern educational tools during their daily work. Currently, in grades 1–3 of primary school the most commonly used are computers, interactive whiteboard, and multibooks (less frequently – e-books). However, it should be emphasized that despite the long-term presence of the equipment in everyday life, there are still people who avoid educational activity supported by ICT tools. Two of the teachers surveyed, despite access to IWB[3], used only a traditional, dry-wearable board, justifying this by the lack of the need to reach for new media and various problems arising in the course of working with computer equipment.
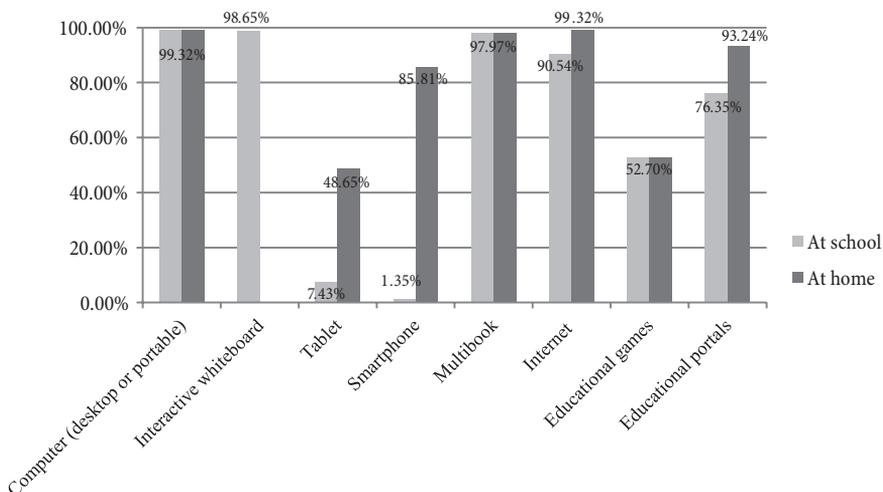

Figure 1. The number of teachers using specific computer tools (percentage).
Source: own study.

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[3]   IWB - Interactive White Board

The emergence of computers and interactive whiteboards in the classroom has largely replaced CD and DVD players, which were used by only 2.7% of the participants in the research.

The research shows that an average of 94.93% of the teachers who have access to the efficient Internet use the resources at home or in the classroom. Educational portals, websites containing video guides, interactive games, and lesson plans and materials developed by educational publishers (enriching traditional textbooks) are of great interest. The teachers emphasize that when preparing for classes they use the help of virtual educational space. Interesting resources are saved or printed. The majority (76.35%) prefer to conduct lessons based on ready-made materials – thus giving up the search for videos, games, or educational portals directly in class. Their reasons include concern about: a slow-operating network (7.43%), problems with the correct loading of websites (16.22%), and inability to complete the planned stages of lessons (21.62%). Over a half of the teachers (58.78%) are afraid of having to install drivers or update programs. Anxiety is also caused by the risk of encountering websites with pornographic content (54.73%). The aforementioned concern of the mentioned group does not mean that the teachers are not interested in diversifying activities. On average, 85.81% of the teachers (in their spare time) browse the Internet using a smartphone, and almost half of them (48.65%) use tablets at home. These people emphasize that these tools should be included in the equipment of each class.

The tools available in the school space make it possible to enrich everyday activities with multimedia elements such as: film, graphics, sound, presentations, exercises, educational games, etc. 96.62% of the teachers describe the teaching software used as mainly free software supporting learning Polish literature or mathematics. Usually, the interactive potential of computer resources is used several times a week on average, as is declared by 63.51% of the respondents. Every third teacher participating in the research (33.78%) declares that he/she includes interactive forms of activity almost every day in the course of lessons. Obviously, in the course of the research, a group was distinguished which either did not use computer tools during their lessons or used them in a completely incorrect way, but they were a minority – 3.38%. The mentioned classes were traditional, and the tools used brought to mind the first of the SAMR levels developed by Ruben Puentedura (Puentedura, 2014).

During the research, it was noted that lessons supported by computer tools were of a mixed character. Some information was provided in the expository form while other information in the inquiry form. The teachers are attached to traditional methods, and ICT tools in this system only enrich the course of the lesson. The

total cut-off from the models of: reverse class, rotational model, connectivist model, gamification, and others, is accounted for by the teachers as caused by lack of time (76.35%), lack of trust (85.13%), and ignorance (41.89%).

A special role in the case of the teachers using computer educational tools is played by school class equipment. Its insufficiency causes the teachers to give up new technologies in class. They do not seek access to tools or to a computer lab. The teacher's age and the level of acceptance of multimedia computer tools are also important. The results of the surveys show that the level of knowledge and the sense of confidence in the context of using new technologies play an extremely important role. The teachers admitted that they were more eager to reach for new media in a situation in which they had ready-made resources, including teaching games, interactive exercises, multimedia presentations, etc.

The analyses carried out showed that there was a connection between: seniority and the form of using computer educational tools as well as the teacher's age and the form of using computer educational tools. As the teachers' age and seniority increase, the number of interactive educational resources included in the course of lessons decreases. On the basis of the collected materials, it can be concluded that these values directly correlate with knowledge about the possibilities of use as well as the ability to use modern computer tools. The analysis of the data showed that especially against the background of the whole, a group of teachers over the age of fifty-five stands out. These people declare that they have problems with operating modern computer tools, including updating and installing software, drivers, selecting the appropriate equipment parameters, starting the sound, etc. The reported problems are, therefore, technical. The fear associated with the emergence of numerous difficulties significantly discourages teachers from using computer educational tools. As a result, more than half of the respondents over the age of fifty-five admitted that they had never used tablets or smartphones. The above teachers frequently stressed that *"computers and interactive whiteboards are tools for young people"*.

The observations made showed that teachers are aware of and accurately assess their knowledge and skills in working with computer equipment.

In order to supplement their skills, the teachers participate in free training, start postgraduate studies, use resources developed by their colleagues, and suggestions from students or members of their own families – usually children.

According to the indications of the respondents, the inclusion of information technology in the course of lessons favours the making of references to the constructive and cognitive trend. Why? The following arguments dominated the answers given:
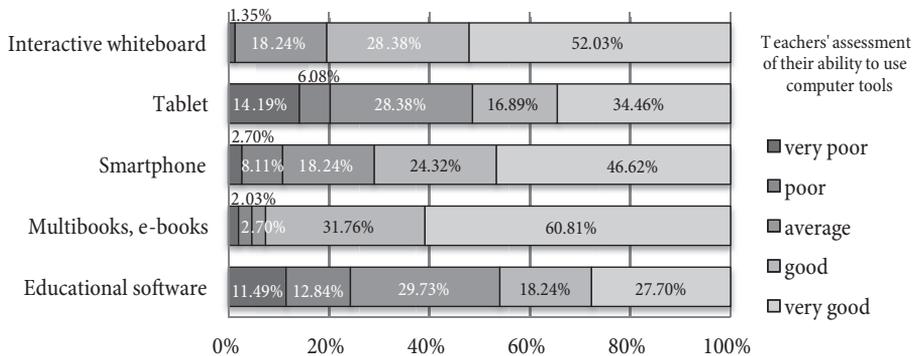
Figure 2. The ability to use computer tools
Source: own study

- the interactive whiteboard favours children's working together (81.08%),
- the interactive whiteboard helps to visualize problems (75.67%),
- interactive exercises involve students in the cognitive process (68.24%),
- connection to the network makes search for additional information possible (65.54%),
- lessons in the lab with a tablet or smartphone facilitate the individualisation of teaching (25.67%).

Discussion and Conclusions

The collected data show that the current model of early education using modern computer tools is closely related to traditional education, in which the teacher plays the main role. Of course, on lessons, reference is made to constructive-cognitive thought, which is only a diversifying element.

As part of the conducted research, it was noted that although the teachers were aware of the importance of autonomous action and gaining experience, the vast majority of them decides on a given character of the activities. In their opinion, the extensive curriculum does not allow for experimenting or unnecessary fun. As a consequence, the pupil should learn the material presented by the teacher during the lesson, remember it, and then practice the application of the memorized knowledge. The above course of thought, as well as the consistency of the actions taken, makes the children absorb rigid patterns of action, including solving equa-

tions, substituting data into a pattern, writing letters, invitations, etc. The need to master specific skills directly related to the result plan[4] destroys the spontaneity of teachers, depriving them of the desire to act creatively and to stimulate in children higher levels resulting from Benjamin Bloom's taxonomy.

As a result, the school teaches pupils mainly to remember and apply knowledge in typical situations, which has often been pointed out in the interpretation of PISA results (OECD, 2012). Teachers, despite having access to computer devices and good skills in their use, use them mainly for presentations: films, graphics, sound, etc., thus departing from the educational models developed for the new media, which should arouse a number of reflections and well thought-out activities in the academic environment.

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[4] The competence-based teaching programme related to the syllabus, defines the skills that should be acquired by the pupil after completing a given education stage.

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