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## Pedagogical Premises of the Use of Tablets in the Teaching Process

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### Abstract

The article is a summary of one part of the research conducted in the Department of Didactics and Media in Education, regarding the use of tablets in the teaching process. The paper provides an overview of the frequency of use, as well as ways of using the tools by students of the humanities. It presents the relationship between the presence of tablets in the teaching process and the cognitive-constructivist nature of acting. The presented study was carried out among 396 students of the humanities. The study used diagnostic survey methods, as well as the pedagogical crossover experiment.

*Keywords: tablets, constructivism, cognitivism, higher education*

### Introduction

Recent years have witnessed increasing use of new media in education. Information and communications technologies (ICT) are included in the process of education often in a manner not entirely thought through. It is generally acknowledged that their use in education benefits and contributes to the modernization of the educational process. However, when analysing numerous studies, the occurrence of cases that defy this common view can be noticed. What, then, determines the effectiveness of the use of new media? The studies conducted since 1992 in the Department of Didactics and Media in Education at Nicolaus Copernicus University in Toruń indicate the significant role of the environment in the educational process. So far, there has been a widespread view that a new medium used in education is only an addition to the existing arsenal of forms

and methods used in teaching-learning. Meanwhile, we are witnessing a change that requires tailored didactic solutions. There is also an impact of new media on the social, organizational, and cultural environment of education. By introducing these tools to the teaching-learning process, we also make transformations in the environment, contributing to changes in the awareness of both the learner and the teacher. In other words, new information and communications technologies enable us to achieve high results in learning when they are used in an appropriate manner, tailored to their specificity, distinct from the previously implemented educational process.

One of the most promising educational tools operating on the educational market for several years now is the iPad, which embodies the dreams of Allan Key, who in the early 1990s saw a need to replace paper notebooks and books with electronic tablets containing textbooks and learners' notes. Today, information technology allows us to make the dreams of that visionary of modern education come true.

The term *tablet PC* was introduced into general use in 2001, when Microsoft presented a device known as the Microsoft Tablet PC, dedicated to employees of the business sphere. Being a kind of personal computer which features a flat touch screen and lacks a physical keyboard, the tablet PC is a good tool for intellectual support in David H. Jonassen's meaning (Siemieniecki 1997, Siemieniecki, 2007, pp. 301–302). The small size of the device means that it can be used in the classroom, the lecture room, at home, and while travelling or walking. The studies conducted in the Department of Didactics and Media at Nicolaus Copernicus University in Toruń indicate the use of the tablet by teachers and students primarily as a tool to:

- shoot videos or take photos,
- work with text documents, multimedia, etc.,
- teach (it is possible to connect it to a projector, present interactive exercises, educational materials contained in e-books, or use it in the Moodle system, etc.),
- record the course of lessons, write notes, etc.,
- communicate,
- create blogs, post entries on websites, gather opinions, etc.,
- get connected to network drives, cloud storage of materials, etc. (Churchill, Fox, King 2012, p. 253).

Upon closer examination of these opportunities, we notice a number of problems that working with the tablet poses in the learning process. Wanting to get to know them better, some multi-faceted research on the students of Nicolaus

Copernicus University in Toruń was carried out in the Department of Didactics and Media Education. Because of its broad spectrum, only some of the results will be presented in this article.

### **Tablets in the teaching process from the perspective of cognitive-constructivist theory (Research Problem)**

Modern cognitive-constructivist theory makes it possible to predict effective actions taken by the teacher, which is possible by reducing the number of variables that determine the outcomes of educational efforts. It is also possible to consider educational processes at different levels of the education system hierarchy (Siemieniecki, 2002, p. 19). This approach was adopted while studying the use of tablets in the educational process. The starting point was an analysis of the communication process based on the interactive model developed by Bronisław Siemieniecki (cf. Juszczak, 2007). It shows three areas of relations:

- the sender – the content, the form of communication – the recipient
- the sender – the content, the form of communication – other participants in communication, e.g. Web surfers
- the recipient – the content, the form of communication – other participants in communication, e.g. Web surfers

Let us consider each of these relations in the context of using the tablet in the educational process. The first relation appears to be only seemingly the simplest. Two-way communication always relates to specific contents. They can be in the form of messages or information about the very carrier of the message itself. Let us note that most research does not separate the existing differences (for more detail, cf. Siemieniecki, 1991). Speaking of messages, we should take into account the comments made by Krzysztof Kruszewski on their form. Namely, messages may exist in four forms as:

- teaching material;
- messages received by the learner;
- messages generated by the learner;
- messages in the learner's memory.

When using the tablet, we have to deal with all of these forms of messaging. Accordingly, two-way communication is much broader than it may seem. From the pedagogical point of view, the tablet is also more complex. It is enough to look more closely at the structure of the software and the limitations of the tool itself.

Analysing the other relations of the interactive model, a number of problems associated with the use of tablets in education can be noted. An example could be

the possibility of direct and indirect contact (via the Internet) with other participants in the educational process.

### **A brief overview of the research so far (Research Focus)**

The research on the use of iPads has mainly focused on the search for their possible applications in the educational process, and on the description of the software and its utility. Clearly, there is lack of broader theoretical generalizations in terms of the impact of the iPad on the educational process as seen from the perspectives of both the teacher and the student.

Attempts to determine the advantages and disadvantages of iPads used for different types of activities have been widely made. The research has also shown that tablets:

- contribute to an increased level of acceptance of the learning process (Kinash, Brand, Matthew, 2012, pp. 115–128),
- facilitate access to information and work of persons who have problems with learning (McClanahan, Williams, Kennedy, Tate, 2012, pp. 20–28),
- make learning simpler and more interesting, which has a direct impact on student achievements (Rossing, Miller, Cecil, Stamper, 2012, pp. 1–26),
- facilitate the implementation of different teaching strategies (Fernández-López, Rodríguez-Fórtiz, Rodríguez-Almendros, Martínez-Segura, 2013, pp. 77–90),
- assist in individualizing the learning process (McClanahan, Op. cit.),
- have a positive impact on learning to read (Sloan, 2012, pp. 87–104) and write,
- encourage pupils/students to talk, as well as facilitate cooperative work in the classroom (Geist, 2011, pp. 758–768),
- improve computer skills,
- stimulate pupils' creativity,
- are devices mobile in nature, which makes learning possible also outside the classroom (Kinash, Op. cit),
- facilitate the assessment of students and organization of school activities (Churchill, Op. cit.),
- allow for preparation and participation in multimedia presentations.

The cited studies indicate that there are many advantages of tablets used in the educational process. However, after conducting an in-depth analysis of the research so far, we have noticed a number of gaps, e.g. the lack of discussion on the adopted research methodology, and carrying out research in too small groups. The

lack of any specific indication of what prompted the decision that iPads should be used in teaching particular educational content has also raised objections. Are we dealing here with the adaptation of teaching material to the existing software or, on the contrary, was the software selected for a given subject? In addition, the description of the conducted research lacks information about its cultural and social contexts.

Taking into account these concerns, let us try to analyse the use of iPads in education using the cognitive-constructivist theory.

## **Research Methodology**

The presented research was carried out in 2014 in a group of 320 students from the Faculty of Educational Sciences, and 76 students of Cognitive Science from the Faculty of Humanities at Nicolaus Copernicus University in Toruń.

Diagnostic survey methods, i.e. a survey and an interview, were used in the first study. Statistical inference was conducted on the basis of the data of quantitative nature. The primary motive for the commencement of the presented analyses was to get to know the frequency and methods of using tablets in the educational process, and their relationship with the cognitive-constructivist nature of teaching. As a result, the following objectives of the study were highlighted:

- *getting to know the frequency and methods of using tablets in the educational process.*
- *getting to know the relationships between the presence of tablets in the teaching process and the cognitive-constructivist nature of learning.*

The following six key research questions were formulated:

1. *How often do students use tablets in the learning process?*
2. *What, if any, is the connection between gender and the frequency and form of using tablets in the learning process?*
3. *What is the purpose of students' use of tablets during the learning process?*
4. *How does the presence of tablets motivate students to learn?*
5. *How does the presence of tablets foster an autonomous search for knowledge?*
6. *How does the presence of tablets affect the social nature of education?*

The data for calculation were collected based on the questionnaires and interviews conducted with students. Statistical significance was verified with the use of the chi-square test, as well as appropriately determined correlations.

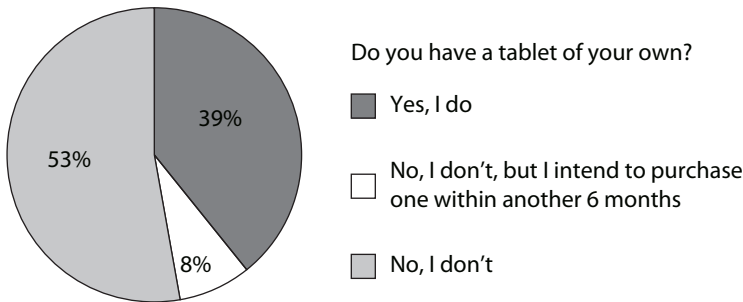
The second study was performed with the use of the pedagogical crossover experiment. The objective was to indicate didactic differences occurring in

the educational process while using the traditional method and the innovative method, the basis of which was the use of the tablet.

### Research Findings

The conducted research indicated an increase in the students' interest in tablets after the conducted classes. It turned out that almost 39% of the students owned the device, while 8% intended to purchase one within the next six months (cf., Chart 1). These results are consistent with those obtained by the American Pearson Foundation, which conducted similar research at the beginning of 2012. Among all the surveyed students, 25% already had such a device, and another 25% planned to purchase one within the next six months (Gałuszka, 2014).

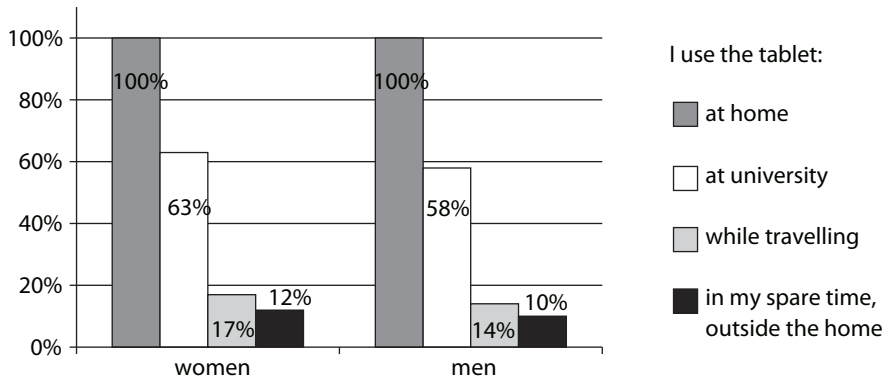
The students owning a tablet used it on average thirteen times a week. They emphasized that they reached for the tablet more frequently while studying at home, at university, when travelling, as well as in their free time spent outside the home.



**Chart 1.** The percentage of students owning a tablet of their own  
Source: own study.

It is worth noting that there is no statistical relationship between gender and the frequency and form of using tablets in the learning process. The students of either sex used the tools to search, view, analyse, play back, and assimilate the materials available for them through tablets. It turned out that the tablet was a good tool of intellectual support, and a handy notepad. Less often, the tools were used to create, e.g., long essays or complex presentations, etc. This results from the functions which the students used their tablets in. They preferred to use a traditional laptop for bigger undertakings. Probably, the decisive factor for the use of a tablet or laptop is their convenience for the tasks performed.

Chart 2 presents four places of the most frequent use of tablets by the students. Definitely, the first place is the home where all the respondents pointed to using the tablet for educational purposes. The second place is the university. The presence of the small but significant 5% difference between the male students and the female students is worth mentioning here. The women reached for the tablet more willingly while on the campus.



**Chart 2.** Places where students use the tablet for educational purposes  
Source: own study.

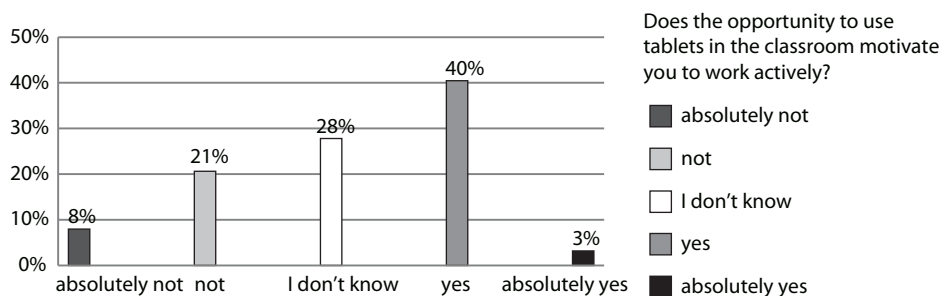
Differences in the frequency of using tablets in the learning process were observed during the study. Tablets were used to:

- search the Web and share one's experience – 86%
- download educational materials published by the faculty – 71%
- take traditional notes – 36%
- prepare notes containing hyperlinks – 29%
- read books – 42%
- prepare written assignments – 19%
- prepare multimedia presentations – 42%
- run blogs or web pages related to academic interests – 14%
- solve on-line tests – 29%
- communicate with other network users, e.g. send e-mails – 98%
- record videos – 29%
- record sounds, e.g. during lectures or classes – 11%
- take photos – 36%
- participate in on-line courses – 11%
- use mobile applications for learning, e.g. foreign languages – 38%.

As mentioned previously, an experiment using tablets was carried out as part of the study. One group used tablets, the other one used traditional paper notebooks. It turned out that the use of tablets by students strongly motivated them to work actively and independently, as well as to take active steps during classes. This was particularly visible during classes. Already during the first session, the students showed great interest in using this tool. Although there was the phenomenon of over-concentration on the tool during the first classes, it was a one-time event, which occurred only at the first contact with the tablet. With other media, the phenomenon usually lasted longer (Siemieniecki, 1991).

What is noteworthy is the fact that the use of tablets has a positive impact on the effectiveness of teaching, which is also indicated by other studies (Kinash, Op. cit.).

Chart 3 presents the opinions of the surveyed students on the impact of tablets used in the educational process on their motivation to work independently.



**Chart 3.** Motivation to work during classes

Source: own study.

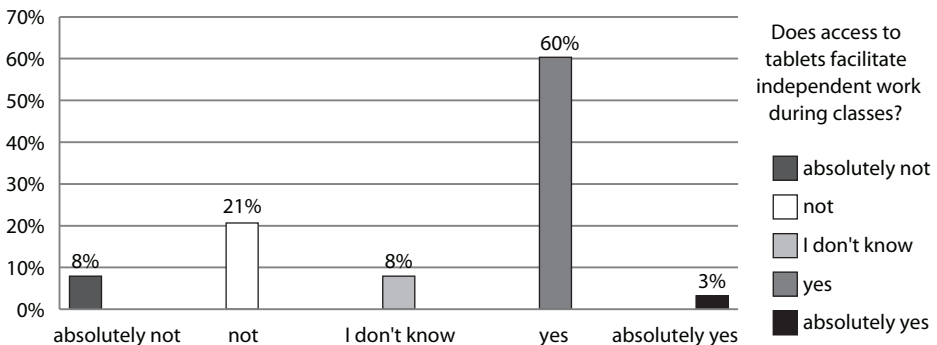
The vast majority of the respondents pointed to the increased motivation to be active on their own during the process of learning, when there was an opportunity to use tablets (cf. Chart 3). That activeness is an important factor in developing the evaluation of the possibilities and limitations of using tablets in education. This in turn determines the success in solving tasks, and promotes the growth of motivation. A feedback loop, which determines the growth of achieved learning outcomes, was thus established. Being familiar with the possibilities of tablets was revealed in the statements of the students during the interviews, where the respondents indicated the limitations of their use, and provided examples of their advantages and disadvantages relative to conventional computers, such as, e.g.: *“Tablets are extremely useful, however, they are not able to replace traditional computers”*. Among the limitations of tablets, the students listed:



- lack of possibility of doing effective, multitasking work (49%);
- limited nature of mobile computing applications counterparts (57%);
- difficulties in working with the touch interface, e.g. when writing long-text assignments (92%);
- problems with the technical shortcomings related to tablet operation, e.g. non-custom input jacks requiring special converters or adapters (12% of the respondents), etc., and quite frequent cases of improper display on your computer of documents saved in standard formats (61% of the respondents).

The cited drawbacks noticed by the students using tablets on the one hand show the imperfections of the tool and, on the other hand, are an important indicator of where and how best to use them in the learning process.

Mobility, small weight and size, ease of use, and a large number of free applications were mentioned among the main advantages of this tool. Unlimited access to the Internet, allowing the retrieval of information and contact with other people on the Web at any time was of particular importance for the users. For the interviewees, this created the possibility of retrieving data actively, processing notes that contain numerous references to multiple pages on a current basis, and analysing problems in depth. A consequence of these actions was conscious participation in classes, which is important for learning outcomes.



**Chart 4.** The tablet and independent work during classes

Source: own study.

This fact should be taken into consideration when planning the use of tablets, not only in universities, but also in senior or junior high schools. Undertaking a study on the possibility of using tablets at the primary school level is also worth considering.

As already mentioned, during the study an attempt was made to find an answer to the question regarding the use of tablets in order to increase the autonomy of learning in the classroom. Chart 4 presents the results of the research into this issue. The majority of the respondents (63%) pointed to the relationship between the availability of tablets and an increase in independent work. It is worth quoting the results obtained during the experiment. It was observed that the students turned more and more frequently to tablets during subsequent classes, not only to obtain information, but also while solving problems. There was an important relationship between the frequency of the presence of tablets during classes, and their stand-alone application to solving tasks. The longer the tablets were used, the more frequently the students departed from an occasional verbal exchange regarding technical issues. In this place, the importance of network communication and collaboration within a group suddenly increased. Initially, there was a significant barrier in the form of a lack of the ability to cooperate. Most of the students had to learn this art, which took time. This phenomenon is related to the lack of wider application of the model of group work in Polish schools. It is also observed in the survey statements of the students. The majority (81%) were unable to answer the question *Does access to tablets facilitate working together during classes?* It was only in the distance studies that the vast majority of the respondents (89%) indicated an increase in the ability to cooperate with other students and attributed its acquisition to working with tablets.

The presented results indicate the need for higher education courses aimed at the acquisition of the skills of cooperation. Without them, it will be difficult to make effective use of tablets in the classroom. This is not the case with Internet communication. High mobility of this tool facilitates cooperation with other participants on the Web.

## **Discussion and Conclusions**

The presence of tablets in the educational process promotes independent and autonomous exploration, discovering, and analysing messages posted on the Web. The students had a positive attitude to working with this tool. They believed that the tablet promoted the growth of motivation, and encouraged activeness, bringing a breath of freshness to the traditional course of classes. Studies have shown that forums and topical sites rich in examples going beyond the scope of textbooks, as well as issues raised by the teacher, prove to be extremely valuable. This is confirmed by previous observations (Rossing, 2012, p.10). The importance

of the said materials is also increased by their broad context, showing the issues discussed from different points of view (Skibińska, Kwiatkowska, Majewska, 2014). Analysis, synthesis, as well as comparing information consequently result in the development of cognitive skills (Juszczuk, 2003, pp. 155–159). Also the multimedia nature of the data and exercises conducive to both the general development of interests and the thought processes of people in different age groups, is not insignificant.

In the case of working with the tablet, applications designed to make notes and drawings also appear to be helpful. They allow for voice recording, as well as saving the image on the tablet screen. Developed materials may be posted on the Web, or left for personal use. Computer recording allows tablet users to play back the course of lessons, pause at any time, fast-forward or rewind it by a specific time period. Unlike traditional notes, electronic documents prepared with the use of tablets allow for an analysis of the sequence of operations carried out to solve a problem.

The acceptance of the tool, as well as a positive attitude to working with the device fosters the application of various working methods, including problem-based teaching. Motivation seems extremely important in this context.

The introduction of tablets to the educational process is also supported by Lev Vygotsky's thesis which emphasizes the social nature of human development.

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