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Model of the Research on the Expression of Laptop Computer Use Factors in University Studies

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Abstract

The article seeks to answer a number of questions. What factors influence the use of laptop computers in university studies? What features reveal a successful integration of laptop computers into studies, or, on the contrary, what evidence shows that this technology might be hard to implement into the study process? The article consists of four parts. The first part discusses preconditions for the use of laptop computers in studies. The second part discloses the factors of the laptop computer use in studies; the third part reveals the criteria for the expression of the factors. The fourth part integrates a complex system of factors into a methodologically grounded model of the research on the expression of laptop computer use factors in studies at the university.

***Keywords*: the use of the laptop computer (LC) in studies, Technology Acceptance Model, Unified Theory of Acceptance and Use of Technology, laptop computer use factors.**

Introduction

In education, technologies do not lie among the aims of teaching and learning; the purpose of technology is to change the environment of teaching and learning so that these processes become professional as much as possible. According to Culp, Honey and Mandinach (2005), the aim of technologies in the process of higher education is to be a clear and universally available tool which allows students to learn and teachers to teach more effectively and efficiently. With the help of technologies, not only a learning environment is created, but also a learning content is conveyed and motivation to learn is enhanced. One of the most frequently used technologies is the computer. Decreasing prices of laptops, a large supply of wireless internet services, and the development of science computerization induce the use of laptops in university studies. Most foreign universities (Drew University, USA, University of Minnesota Crookston, USA, and others) use laptops for organizing the teaching process, for promoting communication, and for ensuring feedback. Students bring their laptops to class and successfully work during their lectures and after them. Though at foreign universities laptops make a frequent phenomenon, this form of learning is still considered to be an innovation among education activities. The use of laptop computers has been analyzed by a number of foreign authors in the following aspects: Kay and Lauricella (2011), Ni and Branch (2004), Wurst, Smarkola and Gaffiney (2008), and Fried (2008) have analyzed the benefits provided by laptops; Melerdiercks (2005) has analyzed a negative influence of laptops upon university studies; Caudill (2007) has aimed at finding out the influence of laptops upon pedagogy; Demb, Erickson and Hawkins-Wilding (2004) have analyzed student reactions to the use of laptops; Hembrooke and Gay (2003) have studied the use of laptops during reports on self-study assignments; Gulek and Demirtas (2005) have figured out the dependencies of laptops and a study field; Cola (2010) has studied which way of note-taking in class is more effective, by pen and paper or using a laptop. However, neither a more thorough scientific discussion nor further consistent investigation on the use of laptops has been detected in scientific literature concerning university studies. The situation when students bring in their own personal portable computers has not been analyzed, and the factors influencing the use of this technology have not been explored. Thus this article seeks to answer the following questions: what factors influence the use of laptop computers in university studies? What features reveal successful integration of laptop computers into studies, or, on the contrary, what makes it evident that this technology is hard to implement in the study process? In other words, what criteria make it possible to analyze the factors, influencing the use of laptop computers in university studies? These questions bear both theoretical and practical significance, and the search for answers frames the scientific problem presented in the article.

The aim of the current article is to substantiate a model of the research on the manifestation of the factors for the use of laptop computers in university studies.

The article consists of four parts. The first part discusses preconditions for the use of laptop computers in studies. The second part discloses the factors of laptop computer use during university studies; the third part reveals the criteria for the expression of the factors. The fourth part integrates a complex system of factors into a methodologically based model of the research on the expression of the factors concerning laptop computer use in studies.

The research methods are literature analysis and modelling.

Preconditions for the use of laptop computers in studies

The development of technologies has opened new possibilities for global communication and interaction and has created a world communication space, bearing no usual restraints of time and distance. Such technologies as the laptop computers provide human powers with inexhaustible resources to universally process, accumulate, and render data and knowledge of most different kinds and volume.

When analyzing the factors of the use of laptop computers in university studies, it is important to identify the range of the concept of university studies. The Law of Science and Studies of the Republic of Lithuania (2009) defines studies as 'learning of a person who acquired not less than secondary education at a higher education institution in the frame of a certain study programme'. This term involves not only studying in class, but also working after lectures, independent of location.

In spite of the fact that there are a lot of classifications of computers, there is no unified system of their distribution. As this work analyzes laptop computers, the most relevant classification would be according to the computer mobility. Though some authors (Aries Institute of Technology, 2007; Chang, Yu and Zhang, 2003) attribute personal digital assistants, tablet computers, or pocket computers to the category of laptop computers, this question is controversial because the above mentioned technologies in their functionality and uniqueness can be classified as separate computer categories. As a matter of fact, this question needs separate investigation, therefore, this research concentrates on the laptop computer and notebook computer; they are given a general term – the laptop computer (LC).

Considering the aims of education, the factor ensuring the LC advantage is mobility (Demb, Erickson, and Wilding, 2004) which allows a student to have the access to the Internet any time, any place, and which gives the access to academic electronic mail, library services, information resources on the Internet, materials on a study subject, academic virtual discussions, forums, the projects created, wiki websites, diaries, e-books, virtual communication means, virtual conferences, information sharing, discussions, etc. The LC helps students cumulate, process, and systemize the information, get feedback. The LC fosters teachers' consideration of using technology to modify teaching methods.

A unique feature of the LC use in studies is the mobility which ensures greater functionality, privacy, better feedback, establishment of the data, and successful group work (Rockman, 2000).

So far, there have been a lot of discussions whether the LC use for university studies gives benefit or makes a negative influence. Besides convenience and flexibility in using an LC any place and any time, little is known about how the LC changes the academic life of students. There is no doubt that the LC, when used in class, can modify the learning way: a traditional model of a lecture is switched to the analysis of interactive, problematic situations. As Fay (2006) states, the LC gives the possibility for students to create a learning environment; however, this change induces students' individuality and results in a lesser use of social networks and less face-to-face communication, because the LC allows students to choose the workplace, so that privacy is ensured.

It is very important to point out that the learning paradigm allows both learner and an educator's getting into active participation, critical analysis of a situation, new knowledge production by referring to different methods of the search. It stimulates the wish to communicate, develop, learn, and choose tools for the most effective implementation of assignments, as only by applying technology as a learning tool it is possible to attain better study outcomes. Rockman (2000) points out the following characteristics of students using the LC:

- students distinguish in their activities, purposeful activity, and perfection of assignments;
- students are receptive to active learning;
- students distinguish in collaboration with one another;
- students willingly take part in project activity.

Gulek and Demirtas (2005) characterize the change of teacher's role when using the LC: such teachers apply constructive teaching, they see more possibilities for teaching in the auditorium, they give less time for lecture delivering, and more for practice.

Factors of laptop computer use in studies

According to Schaper and Pervan (2004), the research on technology acceptance and use is not a new area; however, despite the abundance of the performed works in foreign countries, this kind of investigation is missing in Lithuania. Thus, first of all, it is important to ascertain the factors which determine that the technology (in case of this article – the LC) is applied.

Consumer approval for the use of new technologies, their understanding and satisfaction with technology use are important indicators in analyzing the LC in university studies (Holden and Rada, 2011). Therefore, students' opinion, understanding, and beliefs, formed by the factors analyzed, determine whether they use the LC during university studies or not. Afari-Kumah and Achampong (2010) define the use of technologies as psychological disposition by stating that the reason for the use lies in the sub-consciousness of a technology user. Venkatesh, Morris and Davis (2003) treat technology acceptation as an elementary process saying that this is only the approval to use the technology; thus, in this work, the premise is drawn that the concepts technology *approval* and *acceptance* are synonyms characterizing the use process.

The use of technology and the factors influencing it can be systemized into a theoretical model (Marchewka, Liu and Kostiwa, 2007) by distinguishing the factors, which, in their turn, influence consumer's decisions. Thus, this article seeks to form a complex model which is

particularly adapted to the identification of the expression of the LC use factors in university studies by modifying the already existing models.

One of the oldest and most influential theoretical models is the Technology Acceptance Model (TAM), the aim of which is to find external variables that influence person's internal beliefs, attitudes, and intentions to use one or another technology (Figure 1). The TAM points out that the following two factors are especially important: the *perceived usefulness* and *perceived ease of* use of the technology. In other words, this model explains the dissemination of innovations on the level of a consumer and helps disclose and prognosticate the reactions of technology consumers (Rezaei, Mohammadi and Asadi, 2008).

However, the TAM has certain disadvantages, because this model does not estimate all the external variables (only *usefulness and easiness to use* are evaluated), it does not refer to consumers' age, family, or social influence. The original TAM has been created for business organizations; therefore, this model is not completely suitable for higher education (Afari-Kumah and Achampong, 2010).

Venkatesh, Morris and Davis (2003) have formulated the Unified Theory of Acceptance and Use of Technology (UTAUT), according to which the previous TAM has been attempted to relate to the teaching process (Figure 2).

According to Donaldson (2011), the UTAUT is suitable for the LC acceptance analysis due to the following reasons:

- The theory has been empirically checked and it couples eight models of technologies' acceptance (Table 1).
- It has been stated (Venkatesh, Morris and Davis, 2003; Moran, 2006) that, so far, the UTAUT is the most effective model created for the technology acceptance to explain up to 70 percent intentions of consumers to use technology.
- Venkatesh, Morris and Davis (2003) assert that four external factors: performance expectancy, effort expectancy, social influence, and facilitating conditions are the essential factors, influencing the option of a consumer to choose a technology.
- The UTAUT explains not only the factors of technology use, but also students' readiness to accept technology.

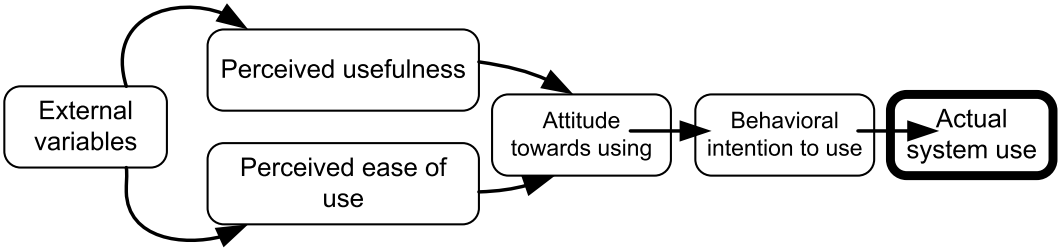
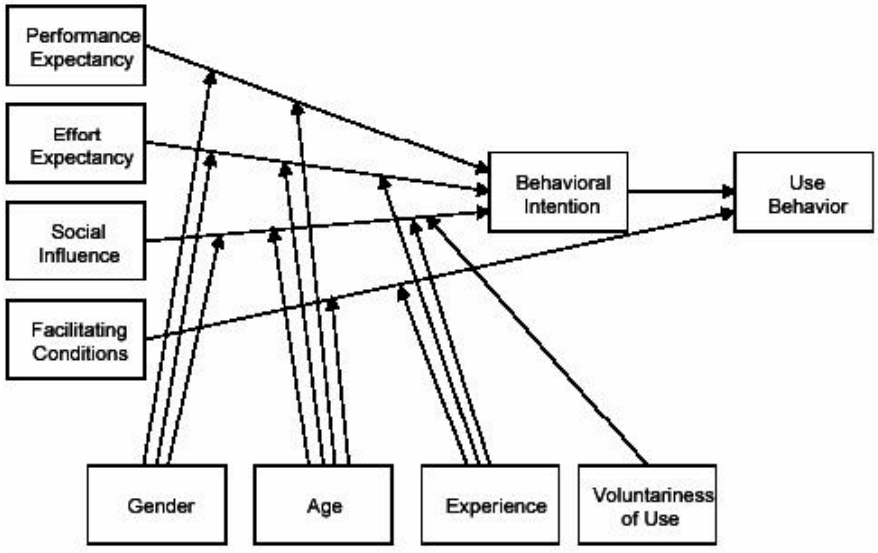


Figure 1. Technology Acceptance Model (TAM) (Davis, 1989; Rezaei, Mohammadi and Asadi, 2008)



Source: Venkatesh et al. (2003)

Figure 2. Unified Theory of Acceptance and Use of Technology (UTAUT)

Table 1

The Structure for Unified Theory of Acceptance and Use of Technology

Author	Year	Model
Devis	1989	Technology Acceptance Model (TAM)
Roger	1995	The Innovation Diffusion Theory (IDT)
Fishbein and Ajzen	1975	Theory of Reasoned Action TRA)
Davis, Bagozzi and Warshaw	1992	The Motivational Model (MM)
Ajzen	1991	The Theory of Planned Behaviour (TPB)
Taylor and Todd	1995	The Combined Technology Acceptance Model (TAM) and The Theory of Planned Behaviour (TPB)
Thompson, Higgins and Howell	1991	The Model of PC Utilisation (MPCU)
Bandura	1986	The Social Cognitive Theory (SCT)

Source: Moran, 2006.

According to Schaper and Pervan (2004), Wang, Wu and Wang (2009), and Moran (2006), the UTAUT has been formed by distinguishing the empirically checked advantages against eight previous models, presented in Table 1. However, not a single author denies that the UTAUT basic theory is the TAM.

The UTAUT includes eight models by combining them into four factors, namely, performance expectancy, effort expectancy, social influence, and facilitating conditions; gender, age, experience, and voluntariness of use are posited to mediate the influence of the four key constructs on usage intention and behaviour (Venkatesh et al., 2003; Moran, 2006).

In their investigations, Marchewka, Liu and Kostiwa (2007), as well as Chiemeke and Evwiekpaefe (2011) have proved how the factors *(usefulness, easiness to use*, *social influence* and *facilitating conditions*) vary when the regulators change:

- When the gender of a technology consumer differs: *easiness of the technology use* as a factor is more significant for women, while the indicator of *usefulness* is more significant for men.
- When the age of a technology consumer differs: the factor of voluntariness of use is more relevant for older consumers, because they pay their attention to subjective and established norms; it is hard for them to adopt innovations. Young technology consumers are greater realists.
- When the acquired experience in using the computer by a technology consumer differs: the *usefulness* factor is more relevant for an experienced consumer, and an inexperienced consumer gives the priority to the factor of the easiness of the use.

The analysis of the regulators has shown that, in this area, a lot has been done and the main provisions have been conformed. Thus, when analyzing the regulators of the LC use in university studies, the regulators will not be included into the research of dependences.

According to Wang (2007), when analyzing the LC acceptance, it is important to add *informal learning* to the UTAUT four main factors, because this process performs one of the important roles in technology use. Liu (2009) suggests adding five more factors to the UTAUT: *activity, mobility, value added, pleasure, and informal learning*. Following the viewpoint that the LC mobility is their unique feature, this factor and the factor of *informal learning* are incorporated into the theoretical model created.

Criteria for the factors of laptop computer use in studies

Usefulness factor. Usefulness shows the goals of technology use and is defined as a measure, according to which a person thinks that technologies will improve the result of the work being performed (Venkatesh et al., 2003).

The LC use in university studies can have positive influence, i.e. give benefit. Thus one of the factors of using the LC in university studies is *usefulness.* Usefulness can be characterized by different criteria.

Referring to Tapscott (2008), Kay and Lauricella (2011), the LC use in higher education has been growing fast due to four reasons:

1. Modern-day students are representatives of the digital age; thus it is hard to imagine most teaching or learning assignments completed without the computer. The research performed in Australia (Dyson, Litchfield and Lawrence, 2009) has shown that even 95 percent of the Australian students, born since 1980, can be called ‘digital people’, i.e. the people, who grew with computer technologies.
2. The need to use the computer and technologies everywhere and always.
3. The LC prices have reached the epoch that almost every higher education student can purchase this technology.
4. As most universities offer a universal access to the Internet in their environment, students get the access to scientific works, electronic books, and statistical data.

During university studies, the LC can be useful in different fields: communication, organization, use, receiving information, or leisure. The LC is useful both in asynchronic (e-mail) and synchronic (online chat) *communication*, in consulting with teachers, administration, or simply in communicating with colleagues. In the *organization* field, the LC is of service in recording addresses, making work lists, writing certificates, creating work calendars; in *use* – in using

Office programmes, the Internet, databases, or electronic books; in *receiving information* – in using Internet browsers and useful references. After lectures, during *leisure time*, the LC is useful in studying music, listening to audio books, playing educational games, reading electronic books, etc. Among all the presented areas, according to Rockman (2000), the area of communication is the most useful in university studies. Thus ***academic communication*** is considered as the criterion which characterizes the *usefulness* factor.

According to Dunleavy, Dextert and Heinecket (2007), the LC ensures the access to the Internet anyplace and anytime; and this access, in its turn, provides:

- access to the data;
- possibilities for information processing;
- possibilities for information sharing.

When using the LC, the *access to the data* warrants greater possibilities for the search, information timeliness, and suitability. *When processing the information by LC,* it is possible to choose the desired pace; it is possible to work individually, there is a possibility to correct the data, to adapt it practically, to visualise, to classify, and systemize it. When using the LC, *sharing the information* is very convenient: the spread for the audience as well as authentic communication styles and forms. Thus, referring to Dunleavy, Dextert and Heinecket (2007), the ***access to the Internet*** is considered as the criterion which characterizes the *usefulness* factor.

According to Barak, Lipson and Lerman (2006), in university studies the LC guarantees active learning, which takes place when students actively process information, successfully adapt it in their practical activity and learn meaningfully. When students actively learn, they are not passive listeners but they pay their attention to the cognition process. Active learning transfers the responsibility from an educator to a learner and integrates different learning styles. Thus, referring to Barak, Lipson and Lerman (2006), ***active learning*** (Figure 3) can be considered as the criterion which characterizes the *usefulness* factor.

Another important focus in analyzing the benefits of the LC use is constructivism. This theory states that a higher level of thinking is achieved by means of technologies. Referring to Gulek and Demirtas (2005), it is possible to state that the LC use in university studies ***stimulates thinking***; this is the criterion which characterizes the *usefulness* factor.

Ni and Branch (2004) have analyzed the positive LC influence upon studies very comprehensively; they distinguish the following usefulness features: the LC use guarantees effective recording and spreading of ideas, it gives the possibility to make notes, it allows meaningful usage of dictionaries and allows students to work at their desired pace and get deeper into a study subject. Gulek and Demirtas (2005) also distinguish a wider usefulness spectrum by stating that the LC induces active learning, develops research skills, guarantees independent coordination of actions and learning, fosters active problem solution and critical thinking, allows intensive usage of dictionaries and the possibility for students to work at their individual pace.

As Kay and Lauricella (2011) state, a person can focus his/her attention for 10 minutes because later he/she becomes restless. The lectures at Lithuanian universities last for 1.5 hours; thus it is expedient that students cannot stay active during the lecture. They get tired or bored. The LC can become a tool for solving this problem. Some part of a lecture can cover the theoretical material, and during the other part students individually or in groups could work using the LC. So, their active work in a lecture and the practical use of the acquired knowledge could be ensured.

It is evident that there is a lot of investigation which has disclosed numerous different aspects of the LC use in higher education. The aspects which have been confirmed or disclosed by at least several scientists can be summarised and estimated as criteria to characterize the *usefulness* factor:

- ***Better study outcomes*** (Kay and Lauricella, 2011; Elwood-Salinas, Cutshall and Changchit, 2005; Ni and Branch, 2004; Gardner, Morrison and Jarman, 1994; Fay, 2006; Gulek and Demirtas, 2005; Rockman, 2000; Dunleavy, Dextert and Heinecket, 2007; Barak, Lipson and Lerman, 2006).
- ***Computer literacy*** (students distinguish in firmer and more flexible use of technologies) (Gardner, Morrison and Jarman, 1994; Kay and Lauricella, 2011; Elwood-Salinas, Cutshall and Changchit, 2005; Rockman, 2000; Moran, Hawkes and Gayar, 2010; Tapscott, 2008; Demb, 2004; Gulek and Demirtas, 2005; Ni and Branch, 2004).
- ***Motivation*** (Kay and Lauricella, 2011; Elwood-Salinas, Cutshall and Changchit, 2005; Rockman, 2000; Tapscott, 2008; Demb, 2004; Gulek and Demirtas, 2005; Ni and Branch, 2004).
- *Help the* ***disabled*** *study* (Carey and Sale, 1997; Ni and Branch, 2004).
- ***Due to video presentations, the integration of notes creates 'the bridge' between the university and home*** (Siegle and Foster, 2001; Ni and Branch, 2004; MacKinnon, 2007; Murphy, King and Brown, 2007).
- *The access to resources* (Kay and Lauricella, 2011; Dunleavy, Dextert and Heinecket, 2007; Gulek and Demirtas, 2005; Hembrooke and Gay, 2003; Fried, 2008).
- ***Guarantees more convenient work in group and project activities*** (Kay and Lauricella, 2011; Ni and Branch, 2004; Demb, 2004; Gulek and Demirtas, 2005; Wurst, Smarkola and Gaffney, 2008).
- ***Guarantees more comfortable note-taking than using a pen*** (Ni and Branch, 2004; Gulek and Demirtas, 2005; Cola, 2010).

Each criterion presented in Figure 3 defines the *usefulness* factor.

Easiness to use. This factor is related to investing attempt in order to work with a new technology (Venkatesh, Morris and Davis, 2003). The following criteria characterize this factor: ***privacy assurance and habit to use technologies.***

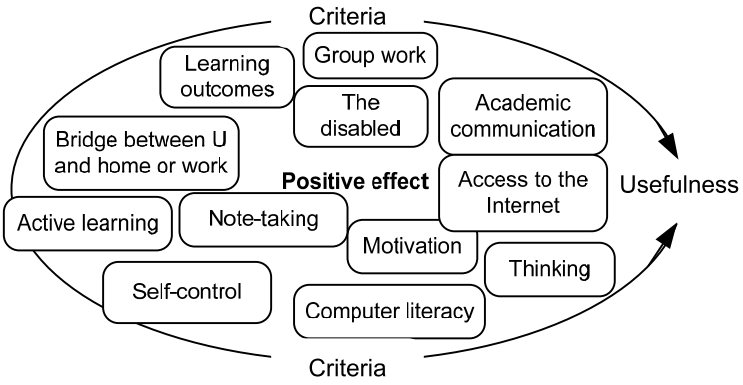


Figure 3. The criteria characterizing the usefulness factor

Social influence. Holden and Rada (2011) state that, when striving for a new technology to be used, i.e. integrated into the educational process, the approval should be received not only from teachers, the university, but also from the university administration. Thus, referring to Eleood, Changchit and Cutshall (2006), it is possible to state that the approval of teachers, university as well as the opinion of people around and colleagues are the criteria characterizing the factor of *social influence*. Social influence is a very important factor. Therefore, it will be discussed in more detail. Teaching methods chosen by the teacher influence students' understanding of the LC use in university studies. Elwood, Changchit and Cutshall (2006) point out that, when striving for positive changes provided by technologies in the teaching processes, it is necessary for teachers to change as well. It is very important that teachers are receptive to innovations and adjust to technologies fast. As a matter of fact, teachers could successfully adapt to the LC use in the teaching process; so, they have to accomplish the following (Windschitl and Sahl, 2002):

- to possess high technology competences;
- to be able to integrate technologies into the study subject being delivered;
- to understand the influence made by technologies;
- to adjust technologies to the development of thinking skills.

According to Kay and Lauricella (2011), the LC use in university studies can evoke three reactions among teachers: rejection, disregard, and acceptance.

Rejection. There are some teachers who strongly reject the LC use during lectures because students get engaged into activities, not related to their studies. Kay and Lauricella (2011) call this situation unhappy confrontation of 'professors against technologies' which does not give anything good for the educational process. It is important to develop student's learning not by prohibitions but by the development of his/her understanding that he/she has to take responsibility for one's own learning and achievements. It is also to point out that strict limitations for technology use violate one of the most important principles of higher education – academic freedom.

Disregard. Teachers do not forbid using the LC during lectures; however, the attention is not paid to technology users and a traditional lecture is conducted. This situation allows students to individually decide how they work with the LC; sometimes this situation is called 'unformed' method (Kay and Lauricella, 2011).

Acceptance. The LC acceptance during lectures in order to enhance the effectiveness of learning is called the formed method. The research performed by Kay and Lauricella (2011) has shown that most students estimate the LC use during lectures positively. Thus, summing up, it is possible to state that this criterion is characterized by ***the approval of teachers and the university, opinions of colleagues and the people round about.***

Facilitating conditions. This is the factor involving the skills of a technology consumer, environmental conditions, and all other situations facilitating the LC use (Venkatesh, Morris and Davis, 2003). The following criteria characterize this factor: ***possessed knowledge, adaptability of university desks, and learning styles.***

Informal learning is understood as natural, not necessarily deliberate, less organized, and less structured learning taking place every day. It can be stimulated by life, professional circumstances, family and other conditions; thus it can be not admitted by individuals who develop their knowledge and abilities. In the analyzed case, the LC initiates informal learning, due to which a technology consumer develops his/her computer literacy, develops skills in thinking and self-control in an unplanned way. All these developed unplanned skills are considered to be the criteria characterizing informal learning (Wang, 2007).

Mobility. This factor is considered to be a unique LC feature. Mobility can involve such criteria as sending electronic letters, free internet access, handy work in groups and projects, information capture when the necessity emerges.

Obstacles/barriers (negative influence). It is important to point out that scientific literature presents the research (Melerdiercks, 2005) which states that the LC use can have a negative influence upon the study process as well; thus it is also important to evaluate possible obstacles and negative influence too.

The LC use in university studies can make negative influence for university studies, e.g., elicit non-academic communication. Other LC use obstacles also exist, e.g., the

weight of a computer. Though these two categories differ, both influence negatively and use obstacles for technology use in studies; thus it is considered as the entirety, i.e. **the factor of obstacles** which influences the LC use. As there are a lot of obstacles, the criteria characterizing this factor are analyzed.

According to Key and Louricella (2011), the LC use in university studies can have the following barriers:

- information loss – the fear of the LC use that having pushed the wrong key or in cases of technological shutdowns some part of the accumulated information can disappear;
- communication disorder – problems among non-academic, personal message sending are observed;
- entertainment – playing games, watching movies, listening to the music, browsing the Internet.

There are more criteria which reveal the negative influence. As Melerdiercks (2005) states, it is impossible to forget the harm the computer produces upon health (e.g., eye problems, dependence diseases). Also, a portable LC can weigh up to five kilograms; thus carrying it can be difficult and it may cause discomfort. Another important criterion which can prevent from the LC use is charging the battery. All the criteria characterizing the factor of *obstacles/barriers* are presented in Figure 4.

As Key and Louricella (2011) note, one of the obstacles to use the LC is conservative standpoints of teachers. However, it is possible to eliminate this challenge by substantiating it by one of the principles of higher education, which states that academic freedom has to dominate in universities.

The influence upon the LC use is made by the factor of obstacles, characterized by the following criteria*:* information loss, non-academic communication, entertainment, health, weight, and battery.

The model of the expression of laptop computer use factors in university studies

Having performed the analysis of scientific sources, an original model, aimed at researching the expression of the factors of the LC use, has been created. The model integrates the UTAUT (Venkatesh, Morris and Davis, 2003) involved factors (utility, easiness to use, social influence, stimulating conditions) and the factors distinguished by foreign scientists (Liu, 2009; Wang, 2007): informal learning and mobility as well as the disclosed negative factor, namely, obstacles and barriers (negative influence). The entire model of the LC use integrates seven factors, presented in Figure 4. Each factor for the LC use can make positive (increases the usefulness) or negative (decreases the usefulness) influence.

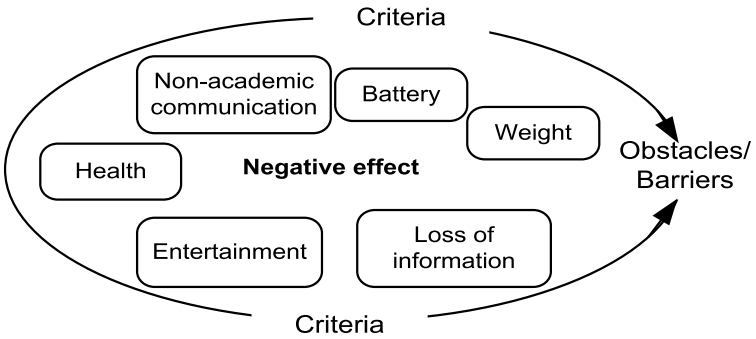


Figure 4. Criteria characterizing the factor of obstacles/barriers

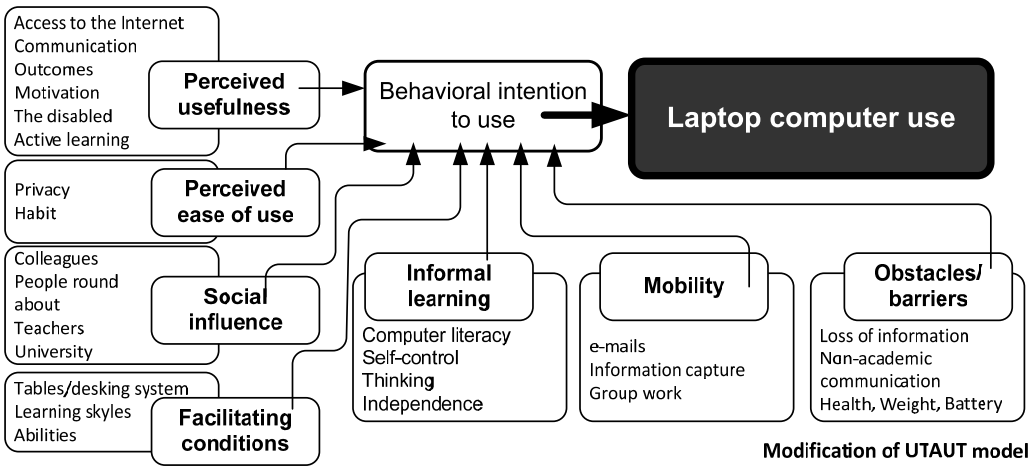


Figure 5. The model of the expression of laptop computer use

The criteria distinguished by referring to the analyzed scientific literature characterize each factor, presented in Figure 5. The constructed theoretical model of the LC use factors becomes a methodological basis for the implementation of empirical research and the LC use in university studies for the identification of the factors' expression.

Conclusions

1. A unique feature of the laptop computer is mobility which ensures greater accessibility of education goals, privacy, better feedback, data introduction, and successful group work.
2. The analysis of the positive influence of laptop computers upon university studies has disclosed that the following benefits are achieved: better study outcomes are provided, a 'bridge' between home and the university is created, access to the Internet is ensured, academic communication and self-control are stimulated, computer literacy is developed, more successful group work is ensured, note-taking is more convenient, thinking and active learning are induced, the disabled are helped in their studies, the motivation to learn is increased. Among the negative aspects of the laptop computer use in university studies are: communication on non-academic issues, the negative influence upon health, the weight of a laptop computer, possible entertainment (movies, music, social networks) during the study process, battery discharge, and the possibility to loose the accumulated information.
3. The model of the factors of laptop computer use consists of seven factors: usefulness, easiness to use, social influence, facilitating conditions, mobility, informal learning, and obstacles. Each factor is characterized by the criteria which can make positive (induce the use) or negative (not to induce the use) influence upon the laptop computers' use.

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Nešiojamųjų kompiuterių naudojimo veiksnių universitetinėse studijose raiškos tyrimo modelis

Santrauka

Technologijos švietime nėra mokymo ir mokymosi tikslas, technologijų paskirtis – keisti mokymo ir mokymosi aplinką taip, kad šie procesai taptų kuo profesionalesni. Pasak Culp, Honey, Mandinach (2005), technologijų tikslas aukštojo mokslo procese – būti aiškiu ir visuotinai prieinamu įrankiu, leidžiančiu efektyviau ir veiksmingiau studentams mokytis ir dėstytojams mokyti. Technologijų dėka sukuriama ne tik mokymosi aplinka, bet ir perteikiamas mokymosi turinys bei didinama motyvacija mokytis. Viena iš dažniausiai studijose naudojamų technologijų yra kompiuteris. Sumažėjusios nešiojamų kompiuterių kainos, didelė bevielio interneto paslaugų pasiūla, mokslo kompiuterizavimo plėtra, skatina nešiojamųjų kompiuterių naudojimą universitetinėse studijose. Nors užsienio universitetuose nešiojamieji kompiuteriai studijose yra dažnas reiškinys, tačiau ši mokymosi forma švietimo veikloje vis dar vertinama kaip naujovė. Mokslininkai nešiojamųjų kompiuterių naudojimą švietime tyrė šiais aspektais: Kay, Lauricella (2011), Ni, Branch (2004), Wurst, Smarkola, Gaffney (2008), Fried (2008) analizavo nešiojamųjų kompiuterių teikiamą naudą; Melerdiercks (2005) savo darbuose analizavo neigiamą nešiojamųjų kompiuterių poveikį universitetinėms studijoms; Caudill (2007) aiškinosi nešiojamųjų kompiuterių poveikį pedagogikai; Demb, Erickson, Hawkins-Wilding (2004) tyrinėjo studentų reakcijas į nešiojamųjų kompiuterių naudojimą; Hembrooke, Gay (2003) studijavo nešiojamųjų kompiuterių panaudojimą atsiskaitymų metu; Gulek, Demirtas (2005) aiškinosi nešiojamųjų kompiuterių ir studijų krypties sąsajas; Cola (2010) tyrinėjo, kuris konspektavimo būdas paskaitose yra efektyvesnis: naudojant popierių ir tušinuką ar nešiojamąjį kompiuterį. Tačiau mokslinėje literatūroje neaptikta išsamesnės mokslinės diskusijos bei nuoseklesnių tyrimų apie nešiojamųjų kompiuterių naudojimo universitetinėse studijose veiksnius. Situacija, kai studentai į universitetą atsineša savo asmeninius nešiojamuosius kompiuterius yra neanalizuota, neanalizuoti ir netyrinėti veiksniai, darantys įtaką šios technologijos naudojimui. Todėl šiame straipsnyje siekiama atsakyti į klausimus: kokie veiksniai daro įtaką nešiojamųjų kompiuterių naudojimui universitetinėse studijose? Kokie požymiai rodo, kad nešiojami kompiuteriai bus sėkmingai integruoti į studijas, arba priešingai, kuo remiantis, galima teigti, kad šią technologiją sunkiai pavyks įdiegti studijose? Kitaip tariant, kokias kriterijais remiantis galima tirti veiksnius, kurie daro įtaką nešiojamųjų kompiuterių naudojimui universitetinėse studijose? Šie klausimai aktualūs tiek teoriniu, tiek praktiniu požiūriu, o atsakymų į juos paieška sudaro straipsnyje sprendžiamą mokslinę problemą.

Straipsnio tikslas – pagrįsti nešiojamųjų kompiuterių naudojimo veiksnių universitetinėse studijose raiškos tyrimo modelį. Tyrimo tikslo siekiama keturiose straipsnio dalyse. Pirmojoje analizuojamos nešiojamųjų kompiuterių naudojimo studijose prielaidos. Antroje išryškinami nešiojamųjų kompiuterių naudojimo studijose veiksniai, trečioje atkleidžiami veiksnių raiškos kriterijai. Ketvirtoje kompleksinė veiksnių sistema sujungiama į metodologiškai pagrįstą nešiojamųjų kompiuterių naudojimo studijose veiksnių raiškos tyrimo modelį.

Straipsnyje teoriškai pagrįsta unikali nešiojamojo kompiuterio savybė – mobilumas. Nustatyta, kad mobilumas užtikrina didesnį ugdymo tikslų pasiekiamumą, privatumą, geresnį grįžtamąjį ryšį, duomenų įvedimą ir sėkmingą grupinį darbą. Nešiojamųjų kompiuterių teigiamo poveikio universitetinėms studijoms analizė atskleidė, kad gaunama tokia nauda: geresni studijų rezultatai, sukuriamas „tiltas" tarp namų ir universiteto, užtikrinama prieiga prie interneto, skatinama akademinė komunikacija ir savikontrolė, didinamas kompiuterinis raštingumas, užtikrinamas sėkmingesnis grupinis darbas, patogesnis konspektavimas, skatinamas mąstymas ir aktyvus mokymasis, padedama studijuoti neįgaliesiems, didinama motyvacija mokytis. Neigiamas nešiojamųjų kompiuterių naudojimo aspektas universitetinėse studijose yra: komunikacija ne akademiniais klausimais, neigiamas poveikis sveikatai, nešiojamojo kompiuterio svoris, galimos pramogos (filmai, muzika, socialiniai tinklai) studijų metu, baterijos išsikrovimas, galimybė prarasti sukauptą informaciją.

Nešiojamųjų kompiuterių naudojimo veiksnių modelį sudaro septynios sudedamosios: naudingumas, naudojimo lengvumas, socialinė įtaka, skatinančios sąlygos, mobilumas, savaiminis mokymasis ir kliūtys. Kiekvieną veiksnį charakterizuoja kriterijai, kurie nešiojamųjų kompiuterių naudojimui gali turėti teigiamą (skatina naudoti) arba neigiamą poveikį (skatina nenaudoti).

Reikšminiai žodžiai: nešiojami kompiuteriai, technologijų pripažinimo modelis, unifikuotas technologijų pripažinimo ir naudojimo modelis, nešiojamų kompiuterių naudojimo veiksniai.

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