



Effectiveness of teaching aided by distance learning

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Abstract:

In the information society conditions and social needs are constantly changing. The development of information technology together with the new methods of gathering and distributing information that have been generated open the way to alternative forms of education in knowledge society. Intensive development of distance education is a response to changes caused by the escalating pace of innovation in many areas of social and economic life. Computers and the Internet are replacing the previous model of traditional education. The development of technology has contributed to the search of mobile forms of learning, or e-learning. E-learning allows you to fill gaps in the traditional teaching. Modern techniques allow you to find previously unknown solutions that can be used to streamline the process of distance learning. Both traditional education and the world of business treat e-learning as an effective tool that supports science. The convenient application of this tool, the opportunity to individually decide about the time devoted to studying, low costs and easy access speak for applying e-learning as an educational method.

This article attempts to present the role of the Internet in the educational process. The aim of the paper was to show the influence of e-learning on raising the efficiency of education.

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1. Introduction

Employing the capabilities of the Internet, distance education greatly increases the effectiveness of learning and provides access to knowledge to anyone who is hungry for knowledge. This allows you to adjust the rhythm of learning to individual needs, which can significantly increase the effectiveness of the process.

Remote learning has been known for a long time. The effectiveness of distance learning has been verified by the increasing number and diversity of remote courses. The research done in the United States in 2000 shows that 75% of universities offered a variety of styles of learning over the Internet. In the European Union e-learning has become a priority in education (CKNO, 2016).

E-learning enables a person seeking knowledge to complete courses and trainings without having to leave home. To participate in them it is required to have a computer with Internet access. This form of learning makes it possible for the student to reconcile the very process of training with the duties of everyday life. The methods of distance education do not only save time, but also money as students do not incur fees associated with commuting or accommodation in places where courses are conducted. This leads to the individualization of the educational process and, in turn, to increasing the effectiveness of teaching. For remote education to bring the expected results, the interaction between the person who conducts the course and a participant is necessary. Dialogue is a fundamental aspect of effective educational processes (Heuristic, 2016).

The factors that increase the effectiveness of distance learning are (Heuristic, 2016):

- Various forms of presentation of training materials,



- Skillful transfer of program content,
- Using specialized educational software,
- Systematic control of materials assimilated by the participants,
- Encouraging students to complete independent tasks, and to extend knowledge on their own,
- Enabling participants to express their opinions,
- Selection of the optimal learning techniques in the training,
- Analysis of the various stages of the course.

The effectiveness of distant learning courses is related to such motivational elements as rewarding, strengthening, and encouraging activity in certain educational projects.

The introduction of e-learning is connected with some economic, organizational, and social benefits for the participants of distance learning. It raises students' level of knowledge of information technology whereas the university having a distance learning platform is recognized as innovative and promoting new technology, which has positive implications for its image. The recruitment potential of such a school is increased as it more easily attracts the interest of people from different regions. E-learning increases the level of education not only in schools but also in large organizations, where the idea of e-learning has been introduced (Bakonyi, 2008).

From the point of view of the management of the institution a training prepares employees to perform different roles in the company and improves the quality of work. However, from the point of view of the employees a training improves their qualifications and skills, and is to broaden their qualifications and to make them acquire new skills. (Woźniak & Kozioł, 2012)

The knowledge of techniques for assessing the effectiveness of e-learning helps:

- Assess what solution should be implemented in order to raise the degree of achievement of the developmental objectives of an organizations,
- Delve into the phenomenon of e-learning to such an extent as to be able to draw from it as much benefit as possible.
- Contribute to the development of distance learning using new technologies.

The most common approach to assess the effectiveness of distant learning is the opinion based on the objectives that should be achieved in the course of training, as well as after its completion. An example of such a formula for assessing the effectiveness is the model of Donald L. Kirkpatrick, according to which the training should be evaluated on four levels (Woźniak & Kozioł, 2012)

2. Distance education

Rapid changes that have recently taken place due to the development of the media, information technology and their new functions, allow for performing many tasks that are essential not only for work or pursuing hobbies but especially for education. Modern society has become information society which offers everyone, including the disabled and the socially excluded, a unique opportunity to develop. Under these conditions, a new form of education – distance education – has developed and is being constantly modernized thus forming an option for traditional science and common educational solutions. We can take the opportunity offered by the *virtual university* wherever we are. Distance education is often the only possibility for people with disabilities to meet their needs in terms of expanding their knowledge and developing their own interests (Marciniak, 2006).

Thus, it is impossible not to notice that new technologies are changing the world. Universities present more and more proposals and ideas about how to employ them in the teaching process. Many of them can bring about significant changes in the ways of studying.

2.1. Analysis of the development of distance education

Distance learning is a teaching process without direct contact between the teacher and the student. It has a long tradition because as early as the seventeenth century marked the beginning of correspondence learning, which in the twentieth century took the form of radio and television broadcasts. Currently, this trend has been dominated by the Internet. The definition (Przybyła & Ratalewska, 2012) of distance learning formed by the authors of the project “Model of the system of implementation and dissemination of distant learning in learning throughout life” defines distant learning as:

“All forms of support and conduct educational process (learning teaching, checking materials and skills) that do not require direct communication between the teacher and the learner and employ modern information and communication technologies” (ICT – Information and Communication Technologies).

Roman Nagórski (2000) gives the broad definition of distance learning:

“Distance learning is conducting an education process taking into account the significant for this process lack of direct communication between the student, the teacher and other learners – through the use of a specific organization of education, in which the following are of key importance:

- specially prepared teaching materials and tools to be used in the learning process,
- opportunities to communicate between the teacher and the student, tracking the learning process by the teacher, other ways of communication between the learners – all of them different than in the traditional school education,
- adequate service and administration of this form of learning”

On the basis of the presented definitions, as well as others found in the literature, it can be concluded that distance teaching / learning is similarly interpreted by many authors. The difference lies only in details.

The characteristics of distance learning are the following:

- accomplishing the same purposes as a stationary system of education but without imposing formal barriers to recruitment,
- full implementation of the programs developed by the school and the person concerned,
- use of various mass media information and all possible methods of transmission and communication,
- opportunity to choose the forms and methods of teaching and the mode of study,
- flexible selection of teachers and training materials,
- adapting to the capabilities and needs of the listener,

The features resulting directly from the nature of communication over the Internet are as below:

- teachers – students contact via the Internet in synchronous or asynchronous mode.
- individualized way of learning,
- the ability to customize the forms and methods to the needs and interests of the participants,
- freedom of space and tools to achieve the intended purpose,
- participation time adequate to the needs and capabilities of the participants
- forced activity of each listener,
- dominance of the electronic transfer of voice and written texts, websites and presentations,
- individualized methods and forms of crediting,
- criterion evaluation of assimilated knowledge built into the system, an option for descriptive assessment.

Distance learning is described as a method of teaching in which teachers and students are remote from one another. To transmit information they use traditional methods of communication, as well as modern telecommunications technology. Modern technology facilitates direct communication in real time. Remote classes can be carried out in two modes:

- synchronous – free communication between the teacher and the student via the Internet. Classes are held under total control of the teacher and resemble traditional classes. The main advantage of this solution is direct contact with the teacher. The necessity of participation of the teacher and students at the same time is said to be the main disadvantage
- asynchronous – the basis for the functioning of such systems is the lack of contact between the teacher and the student in real time. Teaching materials for individual courses are published on the server, where specified log mechanisms recognize students and teachers, giving them appropriate content. In addition, these systems contain mechanisms for cooperation, i.e. electronic mail and discussion forum. The main advantage of this method is time independence of the participants. Lack of direct contact with the teacher could be the only disadvantage of this method.

2.2. The methods of distance education

Based on the quoted definition (Przybyła, Ratalewska, 2012) it can be stated that distance education meets two important assumptions:



- it covers a wide range of ICT applications to support classes. Partial or complete replacement of traditional classroom with various forms of distance learning.
- it does not require direct contact of the teacher and the student.

The process of teaching using ICT can be implemented in various forms (Przybyła & Ratalewska, 2012):

- e-learning,
- m-learning (mobile learning)
- blended learning,
- supported learning and teaching.

E-learning – a way of learning that consists solely in education over the Internet. There is no direct contact between the teacher and the student, which allows among other things, to save time and makes it possible for students to learn at their own pace. Conducting examinations might be the exception to this rule when it takes place at school, in the training company or workplace

Thus, e-learning is an interactive process involving all processes related to teaching and learning through modernist information technologies (Ce-L AGH, 2008).

M-learning (mobile learning) – a learning process which involves the use of mobile equipment, e.g. a laptop, a tablet, a palmtop or a smartphone. Permanent access to the Internet that offers the opportunity to use its resources at any time is necessary. The applications are integrated with the platform in a way that is intended to provide communication between the teacher and the student in the best possible way. The system is based on communication with the server via the Internet and bluetooth technology (Figure 1).

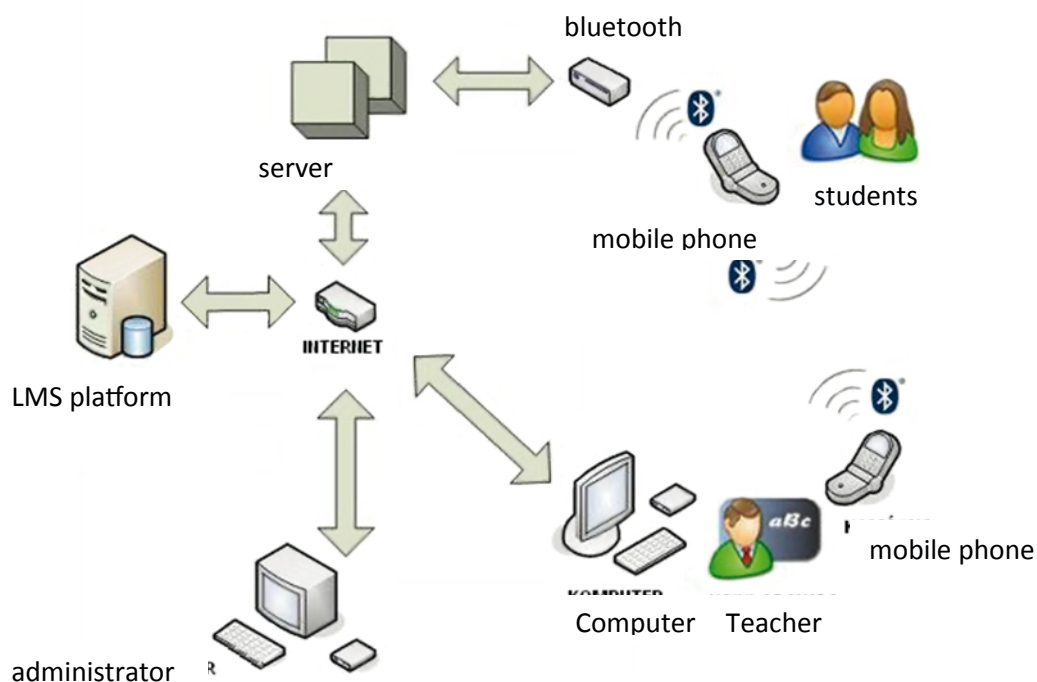


Fig.1. The system architecture of e-learning (Lubina, 2007)

Blended learning (blended learning, hybrid) – is a form of learning, which comprises both traditional (direct contact with the lecturer) and remote (e.g., via computer) methods of education. In such a mode of distance learning trainings are divided into stationary and remote parts.

Supporting the process of learning and teaching (with techniques for distance learning) – the whole educational process is conducted in the traditional way, whereas the innovative methods and techniques of distance learning are or may be the addition to it. The teacher and the student spend a certain number of hours in the classroom plus they have the option of using teaching aids available over the Internet, for example, on an e-learning platform.

Blended learning and the mode that consists in supporting the learning and teaching process are traditional methods, but they apply information technology to achieve higher learning outcomes. On the basis of observations and literature research it can be confirmed that e – learning (also m – learning), are becoming more and more attractive. According to some authors, the development of these forms of teaching may in many cases completely replace traditional education in the future.

The forms of the educational process that involves distance education characteristic for the dynamics of teacher – student interactions are the following:

- course, training – a process in which the student works with teaching aids posted on the Internet, for example, on an educational platform. Trainings which do not require difficult knowledge or skills belong to this category. Most often these are the so called tutorials, trainings in handling applications or vocational trainings. In this kind of training individual work, regularity and conscientiousness are necessary. The student is not in any way motivated and works completely independently,
- courses with an e-mentor – participants' activity is limited mainly to interaction with teaching aids in order to carry out specific tasks that are performed independently (exercises, tests). In case of doubt it is possible to obtain the teacher's support. Then, a lecturer acts as a consultant, but does not check exercise or remind the student about deadlines, etc. Communication is done via chat, forum or videoconferencing,
- courses with a teacher held in virtual classrooms – in this case the teacher is to control the course of the educational process. He/she prepares tasks, checks, reminds students of due dates and if necessary lends support. Students work both individually and in groups, using communication tools. Working in teams enables the participants to cope with tasks that would not be possible in the modes presented above. However, it is a motivating factor encouraging people to participate in the course and study.

2.3. Managing the process of distance learning

Systems supporting the process of distant learning initially were to teach Computer Based Training (CBT) that was used at home or during lessons at school. When the Internet became more popular, there appeared tools to support education through the network of Web (Web Based Training – WBT). At first they were static websites with educational content. Then dynamic websites were created, which coexisted with a database containing educational materials and tests for assessing the users' knowledge. The data on users' activity were recorded on the server. Such sites gave the possibility to add and store teaching materials in an electronic database. It also became possible for the teacher to communicate directly with the student and employ electronic correspondence.

The next step in the development of web-based systems, was the emergence of synchronous communication tools (chat, video conferencing, virtual whiteboard, application sharing, etc.), which together served as a virtual class (Kopciał, 2013).

Currently, there are three basic classes of management information systems that support distance education (Hyla, 2009):

- LMS (ang. Learning Management System) – system administration training,
- LCMS (ang. Learning Content Management System) – systems to administration the content of a training,
- LCS (ang. Live Communication Systems) – synchronous communication systems.

LMS systems – computer systems that report of, manage, administer, and monitor all activities associated with trainings in one or more institutions. These systems provide the ability to create, store and manage teaching materials and publish them in the form of ready-made multimedia courses and web pages. There is also the opportunity to monitor students' progress in learning. LMS include the following modules (Gierłowski & Nowicki, 2004):

- module of training management – the ability to create class schedules and courses, catalog available resources, import and share content with trainees, manage classrooms and settle the charges for the courses. The module also supports tracking the educational process and the functions to generate reports of an administrative nature,
- remote self-learning module – enables participants to benefit from remote courses. This is a special site on which educational materials designed for a specific person are placed,
- construction courses module – allows you to create the skeleton of the course, filling it with teaching materials, text and multimedia content, and adding specific tasks related to the course. Additionally, you can build your own template or use ready-made ones,



— communication module – enables communication between the lecturer and the student, usually with the help of ways of communication that are popular with the internet users.

LCMS – is for designing, creating, storing and delivering personalized learning in the form of training facilities. In addition to creating and offering courses it also facilitates the organization of educational processes and monitoring students' progress. The basic elements of LCMS are the following (Szabłowski, 2004):

- repository objects module – supports database containing components of courses, from which objects that make them are sent to the users. Online courses can be generated in various forms e.g., as a Web page, courses distributed on CD or DVD or as learning materials to be printed,
- module to create courses – creates sharable content objects – (SCO). This module support both the construction of new facilities and using templates with access to extensive ready-made objects management activities. By using SCO objects a complete the training can be built,
- delivering courses module – facilitates delivering courses to students according to the established profiles. It allows you to track the progress of participants and generate reports on exercises, tests, etc.,
- administrative module – the main objective of this module is to manage the learning process, manage the users' accounts and conduct administrative activities.

LCS – is used to ensure effective communication. It is used for training, for remote support of participants and different areas of business activity e.g. sales and marketing. The basic features of LCS are:

- management functions – communication schedules, invitations and confirmations of participation and the right to access the session,
- technical features – transmission of image and sound at a distance via the Internet or telephone; recording and playback of format sessions; chat and other instant messengers support,
- functions consisting in support of the presentation as well as interactive features – cooperation of several participants involving smooth switching from one application to another,
- collaboration with the people participating in the session – questions and answers, the ability to share the screen, virtual array, individual and group messages, etc.

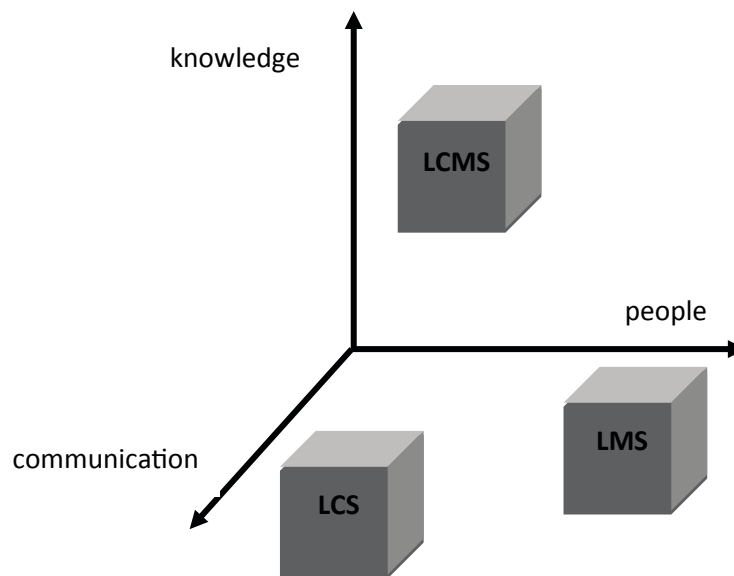


Fig. 2. Types of systems that manage distance learning (Szabłowski, 2004)

In addition to the three basic classes of distance learning systems that have been presented, a few others can be distinguished (Przybyła & Ratalewska, 2012):

- AT systems (Authoring Tools) – systems which support the process of creating learning materials. They are designed for the producers of these materials. However, most of the AT tools are available in LCMS,
- AS (Assessment System) – systems supporting the process of checking knowledge. They make it possible to test knowledge and manage credit appointments, to automatically check tests, to create tests and test database, to analyze and report test results,



- Skills Management System (SMS) – Most often such systems are used in companies to manage the development and acquisition of competences, and to employ talents. They are also used by universities to support the student's individual course of study.

1.4. Advantages and disadvantages of distance learning

In 2000, in the United States, about a million people benefited from education through the network. In the same year, 75% of colleges offered education over the Internet. In 2001 90% of the learning centers made such an offer. More and more colleges offer courses that enable the learners to get a degree using the network (Bednarek & Lubina, 2008). The biggest advantage of distance learning is providing an opportunity to learn at the student's own pace, at any time and place. This resulted in an alternative method of education, broadening knowledge as well as pursuing one's own interests.

Distance learning as a new form of learning requires from students self-reliance and being active. It encourages the manifestation of initiative and thoughtful questions. Knowledge combined with modern technologies made the e-classes become more interesting interactive. They demand work and thinking. Students can use the material disseminated via the Internet at any time, and thus have a choice of a place of learning. This makes studying easier regardless of age, place of residence or living conditions. This form of education attracts interest of, among others:

- the disabled,
- the unemployed,
- people raising children and burdened with family responsibilities,
- the elderly, who due to age and ailments cannot leave the house,
- people from smaller towns,
- people residing abroad.

Distance education in comparison with the traditional form provides a more effective learning process. It is a friendly method for the people with limited access to traditional education, e.g. people from small towns and villages, or the disabled. This way of learning is largely individualized, developing self-reliance and improving learner's discipline. The system of distance education in financial terms is more efficient than the traditional one, as it contributes to train more people.

However, there are also disadvantages of distance learning. The lack of direct contact between the teacher and the student is a big problem as it can cause a lack of encouragement and self-discipline. Deciding independently of the place, time and pace of learning is also difficult for some users. Another problem is dropping out of e-learning courses due to problems with hardware support or the use of the system tools. The use of new technological solutions can be also difficult for many users.

Preparing teaching materials is a problem for many teachers as the preparation requires more time than in the case of traditional education. Additionally, teaching aids used in distance learning must meet two criteria, i.e. they must be understood by the learners and must not violate intellectual property rights. (Betlej, 2009).

Distance learning also has many other disadvantages (Bednarek & Lubina, 2008) i.e.:

- limitation of human relationships, it scatters professional groups,
- decrease of importance and loneliness caused by the lack of direct contact between the lecturer and the student,
- difficulties in absorbing knowledge and catching up after, e.g. skipping one of the multimedia lessons,
- lack of educational opportunities of this method in some fields of study, e.g. medicine, nursing, physiotherapy,
- costs of hardware,
- lack of access to the network,
- time-consuming and often complex organization of training.

2. Summary

Recently, learning via the Internet and other electronic media has rapidly developed. This is due to the need to improve and broaden qualifications and skills of learners in all areas of life and science (Sałata, 2009).



Distance learning compared to conventional methods has many advantages. The most important one is the possibility of dispensing knowledge at any place and time, which makes this form of learning a valuable option compared with traditional forms based on the contact of the teacher and the student. Currently, distance learning can be used as complementary to classical training methods or be an independent teaching tool. Based on the research it can be stated that the process of distance teaching contributes to a more efficient use of the communication resources of the Internet. People who participate in distance learning learn to communicate effectively and work in virtual teams, which is an important part of their development and smooth functioning.

In distance learning special tools such as computer programs, websites, forums, email, chat, video conferencing as well as extensive technological systems enabling distance learning are employed. (Plebańska, 2011). Currently, the most popular and effective forms of sharing knowledge are learning platforms, allowing both self-study and learning under the supervision of a teacher. These advanced systems are increasingly beginning to resemble traditional learning environment.

REFERENCES

- Bakonyi, J. (2008). *Efektywność procesów dydaktycznych wspieranych metodami e-learningu*. Sosnowiec: Oficyna Wydawnicza „Humanitas”.
- Bednarek, J., & Lubina, E. (2008). *Kształcenie na odległość – podstawy dydaktyki*. Warszawa: Wydawnictwo Naukowe PWN.
- Betlej, P. (2009). E-learning w organizacji zajęć i opinii studentów – studium przypadku. *E-mentor*, 1(28). Retrieved from: <http://www.e-mentor.edu.pl/artukul/index/numer/28/id/615>
- Centrum e-Learningu AGH (2008). *Wprowadzenie do e-learningu, Uczelniane wydawnictwo naukowo – dydaktyczne*. Kraków: Wydawnictwo Akademii Górniczo-Hutniczej.
- Gierłowski, K., & Nowicki, K. (2004). Zastosowanie technologii internetowych w realizacji systemów zdalnego nauczania. *Zeszyty Naukowe Wydziału ETI Politechniki Gdańskiej, Technologie Informacyjne*. Gdańsk: Wydawnictwo Politechniki Gdańskiej.
- Heuristic (2016). *E-learning – zalety i wady edukacji*. Retrieved from: <http://www.heuristic.pl/blog/e-learning/E-Learning-zalety-i-wady-e-edukacji;160.html>
- CKNO (2017). *Platforma kształcenia zdalnego UP we Wrocławiu*. Retrieved from: <https://www.ckno.up.wroc.pl>
- Hyla, M. (2009). *Przewodnik po e-learningu*. Kraków: Wydawnictwo Wolters Kluwer Business.
- Kopciał, P. (2013). Analiza metod e-learningowych stosowanych w kształceniu osób dorosłych. *Zeszyty Naukowe Warszawskiej Wyższej Szkoły Informatyki*, 9(7), 79-99.
- Lubina, E. (2004). E-społeczność jako środowisko e-edukacji. *E-mentor*, 5(7). Retrieved from: <http://www.e-mentor.edu.pl/artukul/index/numer/7/id/87>
- Lubina, E. (2007). M-learning w strukturze metodycznej e-learningu. *E-mentor*, 5(22). Retrieved from: <http://www.e-mentor.edu.pl/artukul/index/numer/22/id/485>
- Marciniak, Z. (2006). *Kształcenie na odległość – wyzwania i szanse, Część I Wyzwania dla szkolnictwa wyższego, Materiały z III ogólnopolskiej konferencji Rozwój e-edukacji w ekonomicznym szkolnictwie wyższym*, Kraków: Akademia Ekonomiczna w Krakowie.
- Nagórski, R. (2000). Edukacja na odległość. *Dyrektor Szkoły*, 5, 23-27.
- Przybyła, W., Ratalewska, M. (2012). *Poradnik dla projektujących kursy e-learningowe*. Warszawa – Radom: Wydawnictwo Naukowe Instytutu Technologii Eksploatacji – Państwowego Instytutu Badawczego.
- Sałata, E. (2009). *Wybrane problemy wykorzystania komputera w nauczaniu i zarządzaniu szkołą; Informatyka w dobie XXI wieku. Technologie informatyczne w nauce, technice i edukacji*. Radom: Wydawnictwo Politechniki Radomskiej.
- Szablowski, S. (2010). *E-learning dla nauczycieli*. Rzeszów: Wydawnictwo FOSZE.
- Woźniak, M., & Kozioł, M. (2012). Kryteria i metody oceny efektywności szkoleń e-learningowych. *Zeszyty Naukowe Małopolskiej Wyższej Szkoły Ekonomicznej w Tarnowie*, 2(21), 181-195.