

# E-LEARNING IN TERTIARY EDUCATION FROM STUDENTS' POINT OF VIEW

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## Abstract

*E-learning has become an integral part of the present day tertiary education, not only within the framework of combined, but, to an increasingly larger extent, also of full-time study modes. However, its deployment on a large scale resulted in the emergence of many problems which shall become a subject of research and investigation. The present study reflects the attitudes of university students toward e-learning within their course of study, and submits partial results of the research investigation implemented throughout the years 2007 to 2011. The hereinabove described survey research focused on monitoring and evaluating students' attitudes to the teaching through e-learning based on the use of electronic study supports enriched with multimedia elements. The research data collection was carried out by means of a non-standardized research questionnaire and the data were subsequently analysed using nonparametric statistical methods. Selected outputs of the research, focused primarily on the assessment of the level of students' satisfaction with the organization of teaching through e-learning, and on the identification of the elements of electronic study materials preferred by the students, are the subject of this study.*

**Key words:** e-learning, e-learning support, nonparametric statistical methods, pedagogical research, survey research, tertiary education.

## Introduction

As education has accompanied mankind from the earliest times, it has continually been developed and subject to gradual innovation. The absolute phenomenon of the late 20th and early 21st century has been e-learning, which consists of many sub-elements, often interlinked to form a comprehensive integrated system allowing for effective learning. On the one hand, these may be large-scale, fully distance courses using sophisticated cooperative learning tools, and on the other hand, they may in the nature of a mere complement to full-time study courses.

E-learning has become an area with good prospects for growth, and as such has been continuously, systematically and extensively dealt with at the international level, as confirmed by the works stated below:

Eom, S. B., Arbaugh, J. B. (2011), Clark, R. C., Mayer, R. E. (2011), Joo, Y. J., Lim, K. Y., Kim, E. K. (2011), Mauthe, A., Thomas, P. (2004), Anderson, J., McCormick, R. (2005), Bennett, S., Maton, K., Kervin, L. (2008), Kluge, S., Riley, L. (2008), Möhlenbrock, R. (1982), Paulsen, M. F. (2003), Smith, D., S., Caruso, J., B. (2010), Tapscott, D. (1998), Bates, A., Poole, G. (2003), Ramanau, R., Hosein, A., Jones, Ch. (2010), Zounek, J. (2009), Barešová, A. (2003), Nocar, D. (2004), Eger, L. (2002), Zlámalová, H. (2002), Bednaříková, I. (2008), Kopecký, K. (2006), Květoň, K. (2004), Průcha, J., Míka, J. (2000), Šimonová, I. (2010).

Since the concept of e-learning is perceived and defined in different ways, our definition shall be unambiguous and in conformity with the context of the study. In Anglo-Saxon countries, the notion of e-learning (Lowenthal, Wilson, 2009) with respect to education activities supported by ICT (e-support) is often replaced by relatively steady concepts of Computer-

Based Training (CBT), Internet-Based Training (IBT) or Web-Based Training (WBT) (Zounek, 2009). In general, e-learning is understood as a type of learning, within the framework of which the acquisition and the use of knowledge is distributed and facilitated by electronic devices (Průcha, 2009).

E-learning comprises not only a number of tools that are used for the presentation and the transfer of the educational content, and for the management of the studies, but also an entire spectrum of communication channels. The tools can be used thanks to the Learning Management System (LMS), which is a prerequisite for a truly effective learning process using e-learning. LMS therefore represents a virtual “classroom”, where learning supports, examination papers, learning instructions, exercise plans or discussion forums are placed (Mauth, Thomas, 2004). Apart from LMS, among the basic tools of implementation of e-learning are properly structured and didactically adapted educational texts, abbreviated as e-learning supports or just learning supports (see Paulsen, 2003; Gray, 2010; Kopecky, 2006). Electronic study supports are specific in many aspects; as they are intended for a form of study, mainly characterized by a higher level of independence and individuality (Bates and Poole, 2003).

## Methodology of Research

### *General Background of Research*

The survey research was focused on the monitoring and evaluation of students' attitudes to the education realized through e-learning, based on the use of multimedia-enriched electronic study supports (Klement, 2010). Each electronic study support comprised a static part (verbal component of the text), an image part (visual component of the text) (see Möhlenbrock, 1982; Prucha, 1988), and a dynamic part in the nature of multimedia extension elements, animated solution processes, and/or interactive simulations of particular tasks (Chudy, Čandík, 2004).

### *Research Sample*

The research sample consisted of a total of 501 first-year students at two universities (Faculty of Education, Palacký University of Olomouc and Moravian College Olomouc), who carried out a part of their studies through e-learning.

**Table 1. Structure of the research sample.**

Year	2007	2008	2009	2010	2011	Σ	Σ <sub>in %</sub>
Σ Women	40	39	46	56	39	220	<b>43.9</b>
Σ <sub>Men</sub>	53	63	59	48	58	281	<b>56.1</b>
Σ Total	93	102	105	104	97	501	
Σ <sub>% per year</sub>	18.6	20.4	20.9	20.8	19.4		<b>100,0</b>
<b>Students satisfied with the organization of the education through e-learning</b>	95.7	92.2	94.3	94.2	94.8	472	<b>94.2</b>
<b>Students dissatisfied with the organization of the education through e-learning</b>	4.3	7.8	5.7	5.8	5.2	29	<b>5.8</b>

*Instrument and Procedures*

The main aim of the research was to determine the attitudes of the students toward the education through e-learning. Every particular part of the research was formalized into questions, which were then put together to create a non-standardized structured anonymous questionnaire. The research assumptions were subject to verification based on the use of a static nonparametric method, i.e. Pearson's chi-squared test. Its aim was to determine the level of dependence of the outcomes of the research on the particular significant features of the particular groups of respondents (gender, age). To calculate the software statistical system, Statistica 9.0 was used.

Based on the theoretical study, research investigations carried out in the field of interest (Schank, 2005; Anderson, McCormick, 2005; Fox, Česal, 2008), and our own research, a conclusion was reached by us that distance learning implemented through e-learning is significantly different from the classical education. The basic presumptions are:

- The students were satisfied with the education through e-learning because the fully electronic learning environment in the form of LMS met all their needs. We supposed that their interest was a long-term one.
- The students preferred multimedia elements of interactive character. Their interest was presumed to be a consistent one.

**Results of Research**

The initial analysis was focused on the level of students' satisfaction with the organization of the teaching through the use of e-learning. A research assumption was set that *the students were satisfied with the arrangement of teaching through the use of e-learning, within the framework of which the educational content is provided mainly via electronic study supports and the communication, evaluation and managerial aspects of the study are ensured by the LMS system.*

After the analysis of the results obtained, it could be stated that the above mentioned assumption proved to be true, as 94.2% of all the respondents gave an affirmative response to the aforementioned question, whereas only 5.8% replied negatively. Moreover, it is possible to conclude that *the level of the students` satisfaction with the organization of the teaching was a permanent one* (see Table 1). The validity of the outcomes was subject to verification by means of an additional analysis, the aim of which was to determine the possible dependence of the result on the gender of the respondents. The chi-square test was applied for this purpose (Table 2).

**Table 2. Level of satisfaction with the organization of education through e-learning - women vs. men.**

Contingency table, cell frequency > 10 marked in italics			
Pearson`s chi-square > 1202, degrees of freedom: 1, significance = 0.0424			
Gender of the respondents	I am not satisfied	I am satisfied	Line sums
Female	18	202	220
Male	11	270	281
Both groups	29	472	501

Since the calculated level of significance is 0.04, as shown in Table 2, it can be stated that the frequency of the responses given by men and women with respect to the level of their satisfaction with the organization of the teaching through the use of e-learning are different.

The evaluation is partly dependent on the gender of the respondents. A possible interpretation of the result may be that the frequency of dissatisfied women is higher than the frequency of dissatisfied men. As the frequency of the dissatisfied respondents in general is rather low (the dissatisfied women among the students interviewed represent only 3.6% of all the respondents, as regards the men, a very low percentage of 2.2% was achieved), it can be stated that the dependence of the results on the gender was rather remarkable and called for further investigation. Another research assumption was therefore stated, i.e. that there was a group of students who clearly refused distance learning and definitely preferred full-time teaching. Another analysis, a comparative one this time, followed, based on the comparison of the positive and the negative answers given by the respondents throughout partial investigations which were aimed at the determination of the level of students' satisfaction with the organization of the teaching through the use of e-learning. The comparative analysis consisted in analysing the above mentioned results and in their evaluating via the chi-square test (Table 3).

**Table 3. Level of satisfaction with e-learning as a teaching method versus the level of satisfaction with the organization of e-learning.**

Contingency table, cell frequency > 10 marked in italics Pearson's chi-square: 155.5761, degrees of freedom: 1, significance = 0.00001			
	I am not satisfied with the organization of e-learning	I am satisfied with the organization of e-learning	Line sums
I am not satisfied with e-learning as a teaching method	<i>21</i>	<i>23</i>	44
I am satisfied with e-learning as a teaching method	<i>8</i>	<i>449</i>	457
Both groups	<i>29</i>	<i>472</i>	501

The calculated level of significance, as shown in Table 3, is 0.001, which indicates a high-level dependence of the ratings in both areas analysed. The interpretation of the result might be that there exists a group of students not satisfied with e-learning itself, which is identical with the group of students who are not satisfied with the structure of e-learning. No matter how small (21 students only, which is 4.2% of the total of 501 respondents), there *exists a group of students, who reject all educational activities whatsoever carried out through e-learning.* In order to specify this group of students, yet another, statistical analysis, aimed to determine the possible dependence of the results on the gender of the respondents, was carried out. The outcomes were verified by means of the chi-square test (Table 4).

**Table 4. Level of satisfaction with e-learning as a teaching method versus the level of satisfaction with the organization of e-learning, men versus women.**

Contingency table, cell frequency > 10 marked in italics Pearson's chi-square: 178.9271, degrees of freedom: 4, significance = 0.0001				
		Women	Men	Line sums
I am not satisfied with e-learning as a teaching method	I am not satisfied with the organization of e-learning	13	8	21
I am not satisfied with e-learning as a teaching method	I am satisfied with the organization of e-learning	10	13	23
Total		23	21	44
I am satisfied with e-learning as a teaching method	I am not satisfied with the organization of e-learning	5	3	8
I am satisfied with e-learning as a teaching method	I am satisfied with the organization of e-learning	192	257	449
Total		197	260	457
Column totals		220	281	501

According to the calculated significance level, which in this case again reaches a very low value of 0.0001, it is possible to conclude that *within the framework of the group of the students, who reject training through e-learning, there is a high level of dependency on the respondents' gender*. In fact, the ratio of women (a total of 192 students) to men (total 257 students) who did express their satisfaction with e-learning as an appropriate form of teaching and with its arrangement, corresponds to the value of 0.74 within the framework of the whole research sample (total of 501 male students and female students). It is possible to deduce from this result, and from Table 4, that within the group of students who reject teaching through e-learning, there is a greater percentage of women than men. In fact, from the group of objectors, representing a total of 4.2%, the majority are women, who represent 61.5%.

First of all, a research assumption that *within the framework of the teaching with the use of electronic study supports, the dynamic element in the nature of an interactive educational animation was the favorite one among the students* was subject to verification. We hereby reacted to the fact that the classical approach to the evaluation of electronic study supports (Schank, 2005), (Anderson, McCormick, 2005) does not accent all of the contemporary trends in the implementation of e-learning.

The research assumption stated above proved to be true, i.e. the dynamic element in the nature of an interactive educational simulation and animation did take the first place as regards the popularity among the students; the static element in the form of the written text came second only. Based on the assessment of the students' opinions on the research issues, it can be stated that the development trend in this area, i.e. the views and attitudes of the students, is consistent and shows neither increase nor decrease (see Table 5).

**Table 5. Students` opinions of the most suitable structural element of electronic study supports (percentage).**

Students` opinions of the most suitable structural element of electronic study supports (percentage)						
	2007	2008	2009	2010	2011	Average
Static textual information (%)	36.6	30.4	37.1	30.8	39.2	34.7
Static visual information (%)	25.8	23.5	21.0	19.2	19.6	21.8
Dynamic visual information (%)	37.6	46.1	41.9	50.0	41.2	43.5

The partial results were put to yet another statistical analysis aimed at determining whether there existed any differences in the assessment given by men and women. As the verification tool, the chi-square test was used again (Table 6).

**Table 6. Students` opinions of the most suitable structural element of electronic study supports (women versus men).**

Contingency table, cell frequency > 10 marked in <i>italics</i> Pearson`s chi-square: 0.9986, degrees of freedom: 2, significance = 0.6067				
Gender of the respondents	Favourite elements- text	Favourite elements- pictures	Favourite elements - animations	Line sums
Male	72	47	101	220
Female	102	62	117	281
Both groups	174	109	218	501

The calculated level of significance being 0.61, it can be concluded that the frequency of the individual responses given by men and women with respect to their views of their favorite presentation element of the curriculum within the framework of the teaching process with the use of e-learning are identical. This particular evaluation can thus be characterized as independent of the gender of the respondents.

## Discussion

Thanks to the research survey carried out, it was possible to design a tool for the evaluation of distance education implemented through e-learning. The emphasis was put on assessing the quality of electronic study materials. Even though the latter only represents one component of distance education through e-learning, their quality is crucial, which was also proved by the research survey carried out. It is clear that the quality of the LMS, applied on a large scale, is similar, however, it is necessary to monitor the educational content they provide and the effectiveness of learning they make for. Nevertheless, the other components of the LMS are of high importance, too, that is to say tutors or a space for discussion launched by the students are crucial.

According to the modern approach applied in the evaluation of e-learning courses and/or study materials, *“there are two very important criteria with respect to the quality of e-learning: it should work without problems for all participants as regards the technical aspect, and a straightforward application of pedagogical principles shall be evident”* (Eger, 2004). Scientists who have treated the problem of e-learning, such as Horton (2011), only approached it in general terms, without paying attention to specific, practically applicable and validated assessment

systems, see Tham (2004), Cotton (2006), Ardito (2006). An example of a precisely elaborated system for the evaluation of the quality of distance education implemented through e-learning is the one developed by a Professor at the Department of Education of Northern Regional College, Newtownabbey, J. Anderson. This system aimed at the assessment of electronic study materials represents a high quality tool, which comprises criteria for assessing not only psychological and didactical attributes, but also the technical aspects of the educational process. The whole rating system operates with five basic categories of criteria and sixteen sub-categories (Anderson, McCormick, 2005). They are as follows:

1. Provision of infrastructure:
  - a) requirements for network infrastructure;
  - b) requirements for equipment;
  - c) specification of availability;
  - d) mutual cooperation.
2. Technical standards:
  - a) functionality;
  - b) design principles;
  - c) the quality of activities.
3. Content and its development:
  - a) adaptation to curriculum requirements;
  - b) the proposed content;
  - c) planning.
- 4 Pedagogical and didactical aspects:
  - a) self-learning;
  - b) evaluation and self-evaluation;
  - c) implementation of teaching.
5. The needs of the institution:
  - a) planning and management;
  - b) distribution within the institution;
  - c) the accessibility and location.

Despite its comprising highly important areas of evaluation, the system cannot be described as complex, since it omits some important attributes, such as psychological requirements of the student, distance learning patterns, ergonomic aspects of working with computers, etc. However, it is possible to trace efforts toward the evaluation of individual sub-elements of the whole educational system in the form of e-learning, whereby not only the general properties and overall results of the implemented course, but also individual sub-elements concerning the content or the structure, are taken into account.

The practical application of the system of distance education designed and assessed by us consists in creating a software application that allows a fast and efficient evaluation of electronic study materials. The application contains a total of 42 evaluation criteria distributed in 6 areas in accordance with the findings of the evaluation system verification. The whole situation is presented in the following table number 7.

**Table 7. The final structure of the system for the evaluation of study supports.**

<b>Evaluated area O1: Student's personality and distance education (DIV)</b>	
Criterion 1	Inducement of an emotional reaction by the student.
Criterion 2	Creation of real concepts with respect to the phenomena demonstrated.
Criterion 3	Provision of several solutions (if possible).
Criterion 4	Provision of a sufficient number of strong impulses for the student to remember.
Criterion 5	Creation of real concepts with respect to the phenomena demonstrated.
<b>Evaluated area O2: Student's learning and distance education (DIV)</b>	
Criterion 1	Classification of the contents into appropriate steps with respect to the target group of students.
Criterion 2	Putting emphasis on the practical application of acquired knowledge.
Criterion 3	Possibility of verifying in practice of acquired knowledge.
Criterion 4	Presence of learning tasks.
Criterion 5	Presence of the learning objectives from the emotional and psychomotor domains.
Criterion 6	Factual and terminological accuracy.
Criterion 7	Adequacy with respect to the target group of students.
Criterion 8	Sufficient number of practical tasks.
Criterion 9	Presence of ideas for independent work.
Criterion 10	Interconnection between the learning objectives and the student's final level of knowledge, skills or attitudes.
Criterion 11	Presence of learning objectives from the emotional domain.
Criterion 12	Presence of learning objectives from the psychomotor domain
<b>Evaluated area O3: Educational content and its form with respect to distance education (DIV<sup>□</sup>)</b>	
Criterion 1	Appropriate frequency of abstract concepts.
Criterion 2	Interpretation and demonstration in a static image format (pictures).
Criterion 3	Interpretation and demonstrations in a dynamic image format (simulation, animation, etc.).
Criterion 4	Clear and concise definition and description of the terms.
Criterion 5	Links between the concepts explained and the previous subject matter.
Criterion 6	Possibility of a separate application of the concepts and the content related thereto.
Criterion 7	Visualization of abstract and concrete concepts.
<b>Evaluated area O4: Particularity of distance education DiV<sup>□</sup></b>	
Criterion 1	Presence of navigation icons.
Criterion 2	Presence of a summary of keywords
Criterion 3	Appropriate number of key words and their meaning with regard to the interpretation.
Criterion 4	Objectivity and brevity of the study guide.
Criterion 5	Number of terms to remember, and their importance with regard to the interpretation.
Criterion 6	Presence of the elements for an interim evaluation - short tasks (verbal response).
Criterion 7	Presence of the elements for a continuous self-evaluation - long tasks (file).
Criterion 8	Presence of the elements for a continuous self-evaluation - control questions.
<b>Evaluated area O5: Technical aspects of distance education (DIV)</b>	
Criterion 1	Fast navigation through the text (hypertext links).
Criterion 2	Method for the assessment of the partial results achieved (interim - final).
Criterion 3	Possibility of an on-line testing by means of electronic tests.
Criterion 4	Possibility of an on-line communication via discussion groups (chat).
Criterion 5	Possibility of an on-line communication by means of a videoconference.
<b>Evaluated area O6: Ergonomic aspects of distance education (DIV)</b>	
Criterion 1	Presence and the adequacy of the approximate time limit designed for individual study chapters.
Criterion 2	Graphical and declarative value of the icons.
Criterion 3	Length and the declarative value of marginalia.
Criterion 4	Color layout of the text and the text hyperlinks.
Criterion 5	Adequate length of the study support up to 60 pages.



## Conclusion

The outcomes stated above, which to some extent confirmed the development trends, required a response in the form of an analysis of the existing systems of evaluation of distance education implemented through e-learning, not only with respect to the overall learning outcomes, but also in terms of partial outcomes. The analysis of the existing rating systems would facilitate the assessment of the extent to which the detected and confirmed trends are incorporated into them, and whether or not they react to the dynamic changes influencing the concept of distance education, i.e. its full electronization, primarily based on electronic study supports incorporated in the LMS system. The former include structural elements allowing for the achievement of a wider range of learning objectives and they use interactivity as one of the basic principles of individuation and self study.

Although being only partial, as the research investigation was carried out on an even larger scale, the above stated results show some trends which should modern education, using distance study texts in the electronic form and the LMS system, definitely take into account. That is why the aforementioned investigation research findings should be respected throughout further considerations with respect to the creation of the appropriate e-learning tools, when finding about the students` attitudes and views in relation to the teaching with the use of e-learning, and/or within the framework of the researches focused on the issue of the evaluation of electronic study materials.

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## References

- Anderson, J., & McCormick, R. (2005). *A common framework for e-learning quality education*. *European Schoolnet*.
- Ardito, C., Costabile, M. F., De Marsico, M. Lanzilotti, R., & Levialdi, S. (2006). An approach to usability evaluation of e-learning applications. *Universal Access in the Information Society*. p. 270-283.
- Barešová, A. (2003). *E-learning ve vzdělávání dospělých*. Praha: VOX.
- Bates, A., & Poole, G. (2003). *Effective Teaching with Technology in Higher Education*. San Francisco: Jossey-Bass/John Wiley.
- Bednaříková, I. (2008). *Role tutora distančního vzdělávání – reflexe aktérů této činnosti*. In *Distanční vzdělávání v České republice-současnost a budoucnost*. Praha: NCDiV.
- Bennett, S., Maton, K. & Kervin, L. (2008). The ‘digital natives’ debate: A critical review of the evidence. *British Journal of Educational Technology*, 39 (5).
- Chudý, Š., & Čandík, M. (2004). *Výuka multimédií a multimediálních technologií v učitelství informatiky*. In *e-PEDAGOGIUM* 4 (3), pp. 22-33.
- Clark, R. C., & Mayer, R. E. (2011). *E-Learning and the Science of Instruction: Proven Guidelines for Consumers and Designers of Multimedia Learning*. San Francisco, CA: Pfeiffer.
- Cotton, D., & Gresty, K. (2006) Reflecting on the Think-Aloud Method for Evaluating E-Learning. *British Journal of Educational Technology*, 37 (1), 45-54.
- Eger, L. (2004). *Evaluace e-learningu se zaměřením na pedagogickou stránku*. In *E-learning - případová studie z projektu Comenius*. Plzeň: ZČU Plzeň.
- Eger, L. (2002). *Příprava tutorů pro distanční výuku s využitím on-line formy studia*. Plzeň: ZČU, 2002,

- Eom, S. B., & Arbaugh, J. B. (2011). *Student Satisfaction and Learning Outcomes in E-Learning: An Introduction to Empirical Research*. Hershey PA: Information Science Reference.
- Horton, W. (2011). *Evaluating e-learning*. Alexandria, VA: American Society for Training & Development.
- Joo, Y. J., Lim, K. Y., & Kim, E. K. (2011). Online university students' satisfaction and persistence: Examining perceived level of presence, usefulness and ease of use as predictors in a structural model. *Computers & Education*, 57 (2).
- Klement, M. (2010). Možnosti evaluace vzdělávacích materiálů určených pro distanční vzdělávání a e-learning. In M. Chráska (Ed.), *Trendy ve vzdělávání 2010*. Olomouc: Votobia.
- Kluge, S., & Riley, L. (2008). Teaching in Virtual Worlds: Opportunities and Challenges. *Issues in Informing Science and Information Technology*, 4 (5), 127-135.
- Kopecký, K. (2006). *E-learning (nejen) pro pedagogy*. Olomouc: Hanex.
- Květoň, K. (2004). *Technologie pro distanční vzdělávání*. Ostrava: Ostravská univerzita, 2004.
- Liška, V., & Česal, J. (2008). *Postoje studentů vysokých škol k E-learningu*. Praha: vydavatelství ČVUT.
- Lowenthal, P. R., & Wilson, B. (2009). A description and typology of the online learning landscape. In: M. Simonson (Ed.), *32nd Annual proceedings: Selected research and development papers presented at the annual convention of the Association for Educational Communications and Technology*. Washington D. C.: Association for Educational Communications and Technology.
- Mauthe, A., & Thomas, P. (2004). *Professional Content Management Systems: Handling Digital Media Assets*. John Wiley & Sons.
- Möhlenbrock, R. (1982). *Modellbildung und Transformation*. Bad Salzdetfurth: Verlag Barbara Franzbecker.
- Nocar, D. (2004). *E-learning v distančních vzdělávání*. Olomouc: UP.
- Paulsen, M. F. *Online Education and Learning Management Systems - Global eLearning in a Scandinavian Perspective*. Oslo: NKI Forlaget.
- Průcha, J., & Míka, J. (2000). *Distanční studium v otázkách*. Praha: NCDV.
- Průcha, J., & Walterová, E. - Mareš, J. (2009). *Pedagogický slovník*. Praha: Portál.
- Průcha, J. (1988). *Učebnice: teorie a analýzy edukačního média*. Brno: Paido – edice pedagogické literatury.
- Ramanau, R., Hosein, A., & Jones, Ch. (2010). Learning and living technologies: a longitudinal study of first-year students' expectations and experiences in the use of ICT. In *7th International Conference on Networked Learning*. Aalborg: Open University Business School, p. 627 – 634.
- Schank, R. (2005). Lessons in Learning. In *e-Learning, and Training: Perspectives and Guidance for the Enlightened Trainer*. New York: Pfeiffer Publishing.
- Šedá, J. (2010). *E-learning – tvorba studijních opor*. Praha: Vysoká škola ekonomická.
- Šimonová, I. (2010). *Styly učení v aplikacích eLearningu*. Hradec Králové: M&V Hradec Králové.
- Smith, D. S., & Caruso, J., B. (2010). *The ECAR study of undergraduate students and information technology*. EDUCAUSE, 118 p. <http://net.educause.edu/ir/library/pdf/ers1006/rs/ers1006w.pdf>.
- Tapscott, D. (1998). *Growing Up Digital: The Rise of the Net Generation*. New York: McGraw-Hill.
- Tham, Ch. M., & Werner, J. M. (2004). Designing and Evaluating E-Learning in Higher Education: A Review and Recommendations. *Journal of Leadership & Organizational Studies*, 11 (2), 15 - 25.
- Zlámálová, H. *Principy distanční vzdělávací technologie a možnosti jejího využití v pedagogické praxi na technických vysokých školách*. 2002. Dostupné na WWW: <http://icosym.cvut.cz/telel/zlamalova.html>.
- Zounek, J. (2009). *E-learning – jedna z podob učení v moderní společnosti*. Brno: Masarykova univerzita.
- Zounek, J. (2009). E-learning ve školním vzdělávání. In *Průcha, J. (Eds.). Pedagogická encyklopedie*. Praha: Portál.

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