

Effective E-learning applied to foreign language teaching

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Abstract

This paper presents the results of comparative research carried out at the Institute of Technology and Business in České Budejovice (ITB) into the foreign language knowledge of students according to different teaching methods. At the Institute, traditional teaching methods (with a real teacher) are applied, supported by the use of information and communication technologies. The research demonstrated that the results from both forms of teaching were comparable, thereby proving that ICT can contribute positively to the development of the professional language skills of students in higher education. The latest technologies have the capacity to influence both the learning environment and the learners themselves, including the way they collect and process information and form new knowledge. If applied appropriately, new technologies can substantially support this process.

Keywords: efficiency, effective teaching, e-learning, traditional teaching

Introduction

The question of what behaviour leads to effective teaching was already being discussed in the second half of the 20th century. The discussions, both at international and domestic levels, were connected with the search for so-called "good teachers". Examples of international authors active in this field include Flanders, who published his book entitled "Analyzing Teaching Behavior" in 1970. On the domestic side the issue started coming to the fore even before the revolution in 1989. Of particular interest are the works of V. Kulič ("Effective management of learning activities"), J. Skalková and F. Bačík ("Increasing the efficiency of the educational process in the classroom"), J. Manak ("The effectiveness of educational videos ") and Z. Macek ("Research into the effectiveness of training videos"). J. Průcha in his book entitled "Educational Evaluation" (1996) presents an empirical model of the effectiveness of education. The author calls it "empirical"

because, rather than being purely theoretical, it is based on actual empirically observed data on the determinants of efficiency.

Research into how effective the work of teachers is has primarily focussed on the procedural aspects of teaching and the outcomes of that process. Researchers such as Nezvalová, Mužík and Janík are currently actively engaged in looking into this issue. They highlight the development abroad of some major research paradigms dealing with efficiency. Investigations of this type are included in the "process – product", alternatively "context/presage - process - product" research models.

The basic principle behind these paradigms is the processual product characteristics of the teaching relationship (process - teaching and product - learning outcomes). "In common teaching practice, this means, we investigate what skills students have or do not have, their motivation and their previous knowledge, what teacher they have and what they do during the lesson – structure of the learning time, working with the content, the climate in the classroom and the interaction and communication among the teacher and students" (Hrušková 2008). One of the essential determinants of the quality and effectiveness of the educational process is the time factor. In the Pedagogical Dictionary (Průcha, Walter, Mareš) two distinctions are made with regards to education time: planned - as determined under educational standards and regulations; real - the actual educational process. The time factor differs between countries according to social, political and economic circumstances, between schools in the tertiary sector in the Czech Republic according to the specifics of individual study programs and curricula, and is very closely linked to the graduate profile and the conditions the student is supposed to fulfil during their study.

Today, computer literacy is considered to be a basic training requirement through which people can comfortably handle increasing amounts of information. E-learning and online education via the internet, as a method for teaching vocational subjects and languages at a distance, promotes autonomous learning, as well as mobilizes and supports students in their self-directed learning.

Computer supported learning is a complex form of education. The role of students in education has changed with the increasing openness to technical innovation. The use of ICT in tertiary education, by both teachers and students alike, is now commonplace and obligatory. Modern teaching techniques which incorporate computers, create a richer sensory space in which students can receive and process information. In the process of pedagogical interaction and communication, technology increasingly serves as a mediator between the teacher and the student, but it should never replace human contact and weaken social bonds.

In this paper the focus is on the real-time factor within the educational process in the tertiary sector. Průcha (2002) understands the educational process to be a form of social interaction which "takes place in an interacting space-time".

Research goals, methods and organisation

The goal of the research was to empirically compare the success of e-learning to traditional teaching methods on the development of language knowledge on the basis of specific variables. The primary reason for the research was to establish whether e-learning, as part of bachelor degree programs, extends knowledge. The potential impact and benefits of utilizing electronic language achievement tests, which focus on professional, economic and technical vocabulary, are large.

Materials and methods

In this section the method of data collection and processing, basic data file and research sample are described.

Basic data file and research sample

The research focused on the specialized language education of bachelor degree students attending the Institute of Technology and Business in České Budějovice (ITB). The basic data file consists of bachelor students of whom the majority are 21 years old. Their studies are either oriented towards the economics (Economics and Management) or technical (Construction) fields. The questionnaire survey was conducted under five hundred students. In total 483 questionnaires were returned (96,6 %). Čaha (2015) presents the system of language education at ITB in detail.

The educational research began in the academic year 2011/2012 and was completed in 2013/2014. Language testing has formed a standard part of the language teaching methodology at ITB for several years. The testing is only carried out electronically. Čaha (2014) deals with advantages and possible problems of electronic testing at ITB. Every form of test has a guarantor; the evaluation is processed automatically in the ITB Information System.

The survey was carried out on the basis of the concept of fringe and control groups. This approach is analyzed in specialist sources, for example by Pelikan (1998), Gavora (2000), Kerlinger (1972), Chrástka (2007), and Hendrich (1988). The comparison of two education methods is based on the idea that one group of students is taught according to one method and another group of students by a different method.

The fringe group i.e. those students who studied specialized language through e-learning, consisted of 148 students (number F105/M43). The control group i.e. students who were taught foreign languages the "traditional" way (face-to-face), consisted of 335 students (F178/M157). Of these students, 277 were following the Economics and Management (EKO) program (186 traditional method; 91 e-learning) and 206 students the Construction (TECH) program (149 traditional method; 57 e-learning). The fringe group consisted of 43 men and 105 women aged 19-52 years ($\bar{x}$ 24,7). The control group consisted of 157 men and 178 women aged 19-33 years ($\bar{x}$ 21,7). Both groups

consisted of students in the 2nd and 3rd years of their studies at ITB. The experiment lasted for two years.

Fringe group education

The foreign language education for students in this group started at the same time as for the students in the control group i.e. in the second year according to currently recommended plans. During the research, the fringe group was evaluated, as were the study topics and assigned tasks, which were discussed during seminars on the basis of electronic materials made available through the ITB Information System and other websites recommended by the tutor or through individual choice. During seminars, students were encouraged to exchange website addresses, work together on exercises or tasks on key issues, to consult in small cooperative groups or individually with the tutor of the foreign language through chat rooms and e-mail communications, and to fulfil listening tasks involving specialized texts recorded by native speakers. Students were advised to focus mainly on the use of e-learning study materials and online materials in the ITB Information System. The fringe group were aware of the existence of websites focused on the teaching of economic and technical English and German. Students chose the learning materials themselves. The study topics were evaluated according to the syllabi tailored to the individual subjects.

The prerequisite for the successful completion of the course was achieving a pass for First English I and First English II (AJP_1, AJP_ II), or First German I and First German II (NJP_1 and NJP_2). This is equivalent to CEFR B1 level for languages. The e-learning site of the ITB Information System focuses on all four language skills: listening and reading - through the provision of e-learning modules which consist of a transcript of a text for listening and key questions to assess understanding; writing – tutors give feedback on writing exercises (e.g. placing orders, complaints, etc.) through electronic communication, webinars, or vaults; speaking - skills are "trained" through live chat, videoconferencing or consultations and workshops in small groups.

Control group education

English and German language education begins in the second semester and lasts two years. The students in the control group learned the same topics as those in the fringe group. The majority of the time they were taught the traditional way with preference given to group and cooperative language education, project education and brainstorming. The aim of the specialized language education during the bachelor's degree program at ITB is to manage complex specialized knowledge and skills in a foreign language at CEFR B1 level, as defined in the syllabus on the ITB Information System. There is a clear definition of what the education involves and the evaluation thereof (basis, evaluation criteria, final rating). Students work with obligatory and recommended literature "face-to-face" at seminars.

Research design

The educational research took place in a natural environment. It can therefore be considered to be either “natural” or “experimental”. This form of experiment can link the natural conditions associated with specialized language education with the aim of the research.

Research methods

The research methods consisted of a combination of quantitative steps. The main reason for this choice was to establish the frequency of the effect occurrence, to gain numeric data and then calculate the statistical results.

- The success of e-learning was investigated through the experiment. The efficiency was compared between education on the basis of e-learning and that of traditional teaching methods.
- Students’ specialized language skills and knowledge were investigated through the use of electronic specialized language tests, oral presentations and projects. Summative evaluations were carried out at the end of the subject program and at the end of each school term (in 3rd, 4th and 5th semesters). The aim was to evaluate students’ insights and the skills they had acquired.
- Statistical methods were used to evaluate the results of the experiment. The collated data from the didactical tests were analysed. Correlative analysis was undertaken, as was analysis for the verification of differentiation.

Experiment, experimental method

This research method provides the opportunity to manipulate variables in order to discover deeper causality. We used a variety of data collection methods (e-tests, standardized questionnaire) as part of the experimental procedure. It is therefore a research method which utilizes synthetic options from other research methods.

The independent variable is considered to be the e-learning for specialized language education, whereas the results of term tests and oral presentations are considered to be the dependent variable.

E-tests

At the beginning of the research we used the well-known questionnaire method. The questionnaire helped to establish a number of key factors, namely the type of secondary school the student had graduated from (secondary language school, grammar school, etc.), their gender, study field, and their chosen foreign language for further study. Didactic tests were used to evaluate the output of the specialized language education as taught through traditional teaching methods and through e-learning. The tests were modified standardized (normalized) term tests in electronic form (e-test) used for the

teaching of Professional English and German at ITB in České Budějovice (see links below):

NEP_1

https://is.vstecb.cz/auth/el/5610/leto2014/NEP_1/odp/NEP1_29_5_8_00_D215_Lejskova.qref?info

NEP_2

https://is.vstecb.cz/auth/el/5610/leto2014/NEP_2/odp/NEP_2_LS2014_1.qref

AEP_1

https://is.vstecb.cz/auth/el/5610/leto2014/AEP_1/odp/AEP_1_18_6_11_40.qref?info

AEP_2

https://is.vstecb.cz/auth/el/5610/leto2014/AEP_2/odp/AEP_2_21_6_8_00_JS.qref?info

ATP_1

https://is.vstecb.cz/auth/el/5610/leto2014/ATP_1/odp/CAP_ATP_1_17_6_13_15.qref?info

ATP_2

https://is.vstecb.cz/auth/el/5610/leto2014/ATP_2/odp/ATP_2_24_6_8_45.qref?info

NTP_1

https://is.vstecb.cz/auth/el/5610/zima2013/NTP_1/odp/NTP_1_11_2_11_30_D315.qref?info

NTP_2

https://is.vstecb.cz/auth/el/5610/leto2014/NTP_2/odp/NTP_2_14_6.qref?info

Some authors (Hambleton, Eigner, Rovinelli 1980) also use the term “quazistandard tests”. When compared to the tests at ITB, these “quazistandard tests” are often more accurate than teaching tests because they include assessment standards, however the standardization is not complete. Didactic tests help to determine the level of knowledge of one subject in multiple parallel groups, classes in one school, or even in several schools. Quazistandard tests were used to identify and assess the performance of individual students at ITB following the second and third year degree programs of Economics and Management, and Construction. The tests examined the "output" level of the professional and linguistic knowledge of the students of English and German. They also provided valuable information on the effectiveness of the teaching of the individual language subjects.

Oral presentation

The close of the third and fourth semesters was marked by oral presentations by students on a professional topic (economic or technical). Caha (2011) analyzes and summarizes the most common mistakes in the oral presentations. The students are required to prepare a given topic in PowerPoint (content, form) and present it to a Commission. They must also be able to answer follow-up questions as necessary. The

required level of oral expression corresponds to the CEFR B1+ level for productive skills. The oral presentation should last 15 minutes (Economic topics for oral presentation include: Banking sector; Money; Euro; History of the Euro; Payments; Marketing and its tools; etc.; Technical topics for oral presentation include: Building materials and their typical properties; Buildings; Dams and their Significance; Preparation and construction; etc.). The preparation and implementation of the presentation may be a part of a project whose output is a comprehensive set of skills and competencies that students should be able to apply successfully in their future professional careers (Caha 2012; Caha, Šulistová 2011).

Course

Individual performance evaluation took place in the academic years 2012/2013 and 2013/2014. The points awarded for the written tests ranged from 0 to 70 points. The valid ratio for the final result, based on the assessment of the final written (e-test) and oral tests, was 70 % and 30 % respectively. For the purpose of the survey, respondents were required to provide a certificate at CEFR B1 level to prove their initial "input" language skills.

Processing and data analysis

Identification data and data from the achievement tests were assigned to tables in Excel. The basic descriptive statistics were determined and the hypothesis tested using the T-test, the most widely used test for middle values. The method of analysis was subsequently refined to work with all the variables for the analysis of variance with repetition (ANOVA). A regression model and "Normal Q-Q Plot" were also utilized.

Results

The results of the statistical processing of the data collated from the research are presented in this section. For clarity, charts and tables are used.

The H1 hypothesis will be tested. To do this, the null hypothesis must be established and tested too. The null hypothesis is in the form of the two middle value consensus. Such hypotheses are tested by t-test, whereby, in a more general form, a match is sought in two middle values without the presumption of conformity variances. This testing is done without any extra assumption that the selections come from a normal distribution (Reif 2000). For sufficiently large samples the corresponding percentile for the critical field is 0,025 and 0,975 of normal distribution. For low ranges that are approximately normal, it is better to use percentiles of student distribution, whereby the number of degrees of freedom is equal to the less extent of choice minus one. These percentiles are therefore used for the results. The null hypothesis is rejected if the absolute value of the test criteria is greater than 97,5 %-quantile of the division.

Research question no. 1:

For a given set of bachelor's degree students, was it preferable to follow contemporary foreign language teaching in the form of e-learning or was it preferable to follow traditional teaching methods?

For this research, we focused on professional language teaching and the learning styles of students at the Institute of Technology and Business in České Budějovice. The basic package consists of bachelor degree students at public universities aged 19 years old and older.

The experimental group i.e. those students who studied vocational language education through e-learning, consisted of 148 students (number F105/M43). The control group i.e. students who were taught foreign languages using traditional education methods, consisted of 335 students (F178/M157). In the experimental group, there were 43 men and 105 women aged 19-52 years ($\bar{x}$ 24,7). In the control group, there were 157 men and 178 women aged 19-33 years ($\bar{x}$ 21,7). Both groups consisted of students in the 2nd and 3rd years of their studies at ITB. The experiment lasted for two years.

Research question no. 1: e-learning versus traditional education

H0: The same average score is attained for e-learning language teaching as traditional language teaching.

H1: A different average score is attained for e-learning language teaching than for traditional language teaching.

Table. 1: Comparison of traditional and modern teaching methods

Form of teaching	VSH	VR	RV
e-learning	78,78	20,37	150
Traditional teaching	78,90	21,34	335
Total	78,86	21,04	485

Source: author

Legend: VSH - selective median, VR - sample variance, RV - sampling frequency (i.e. the number of items in the selection)

From this table we can deduce two things:

1. both groups (traditional education and e-learning) achieve a 79 % rating and the groups are very alike (see the selection median);

2. according to sample variance (VR), the majority of students received ratings of between 65 % and 95 %.

According to the theory, almost all the values are within the range from

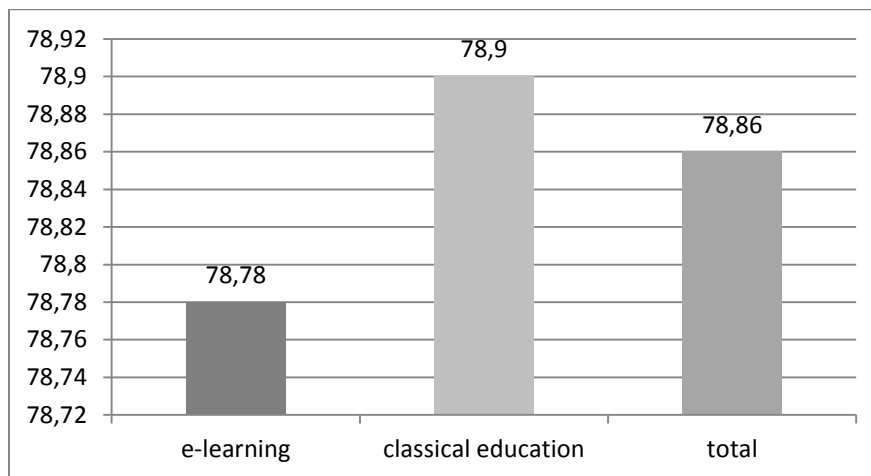
$$78,78 - \sqrt{20,37}$$

to

$$78,78 + \sqrt{20,37}$$

We cannot say what proportion of students achieves results in this period, but it is expected that only a statistically insignificant part of the value is outside this interval.

Graph 1: Average score according to teaching method



Source: author

Conclusion: e-learning vs. traditional education

Is it better for students of bachelor degree programs to receive language education through e-learning or through traditional teaching methods?

The results of the research were not entirely consistent with the assumptions that were made. As can be seen in Table 2, no significant difference between these methods was found. Therefore the nul hypothesis was not rejected.

Table 2: Summary of statistical values for testing H0 vs. H1.

Tested value	0,269
Lower limit of the critical interval (normal distribution)	1,960
p-value (normal distribution)	78,8 %
Lower limit of the critical interval (student distribution)	1,976
p-value (student's distribution)	78,9 %

Source: author

On the basis of the data in Table 2, the test value was calculated according to the generalized two sample T-test. This value was then compared with the critical interval. In this case the values were significantly below the limit and therefore the hypothesis was not rejected. It should be noted that the corresponding values of the normal distribution show how close they are, for large selections, to the values for the student's distribution.

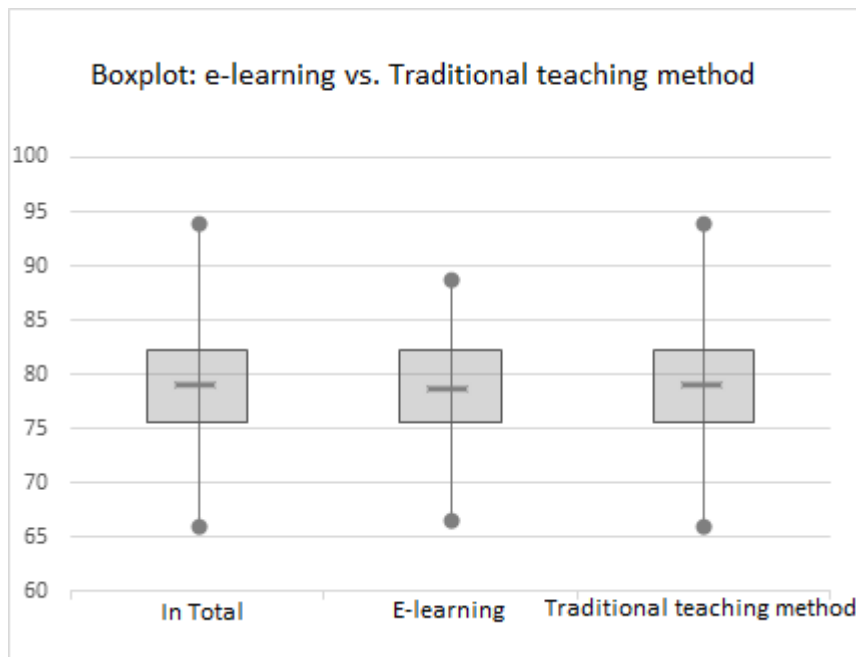
On the basis of the research results it is possible to conclude that computer-aided teaching of foreign languages is an option that can run parallel with traditional teaching methods, but that the positive aspects thereof are no greater than those for traditional teaching methods. In terms of the vocational knowledge of foreign languages, the students of bachelor programs showed comparable outcomes. Computer-aided teaching cannot therefore be considered to be any better or less suitable than traditional teaching methods for the teaching of foreign languages. A combination of both forms is most probably the most efficient, dependent on the aforementioned determinants, and taking into account the personality of the teacher, the student's own personality, and the teaching time (morning, afternoon hours, block teaching, etc.). The list of factors that can affect the use of computer-aided teaching for foreign language teaching is much longer. We believe that it is necessary to use the strengths of e-learning (e-learning on the one hand, leads the student in the learning process, which is a positive aspect, but on the other hand, offers only a relatively small space for their creativity, different ways of thinking and avenues of research) and traditional teaching methods to eliminate weak points. However, finding a suitable balance between e-learning and traditional teaching methods in today's technological times is a difficult task for any teacher.

Based on the statistical evaluation of the data set it is possible to state with a 95 % confidence rate that both teaching methods - e-learning and traditional - lead to the same successful outcome.

From the statistical results and the boxplot below it is not possible to clearly determine the success of e-learning for foreign language teaching. Seeking depending came either

statistically insignificant or even slightly bad for e-learning of foreign languages. The statistical analysis did not show that there was a significant difference between effectiveness of traditional teaching methods and e-learning. The null hypothesis was therefore not rejected.

Figure 1: Boxplot



The conclusions of this research complement those of, for example, Eger, which were presented in "E-learning Evaluation of Case Studies from the Comenius Project" (the material is part of the Socrates Comenius Virtual further education, p. 18). He says "nothing is against the fact, that for a variety of content of various forms and methods using specific funds were achieved the same goals as in a classical education." The combined use of the Internet and textbooks is a suitable tool by which students can access sources of information and is the ideal combination for some degree programs and extension courses. Current teaching methods emphasize independent work and self-study, thereby supporting autonomous, self-directed learning. In this sense, ICT has great potential. This was confirmed by Warschauer (1995) who states, "in an electronic environment the dominance of some individuals in a discussion decreases, the various active students participate equitably in communication, and the language used in the electronic environment is more normal and more complex." Fernandez (2002) in his study analyzes the creation of the learning environment on the Internet for university students, which highlights the potential of the Internet for the development of learning autonomy whilst remaining open to handling the large quantities of material on the Internet.

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