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Aims and Scope

The Journal on Efficiency and Responsibility in Education and Science aims to publish perspectives of authors dealing with issues of efficiency and/or responsibility in education and related scientific disciplines. The focus is on topics such as:

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- theory and methodology of science;
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GENDER AND SYLLABUS BASED STUDY APPROACHES AND ACADEMIC PERFORMANCES

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Abstract

The objective of the study was to examine the impact of gender-wise and syllabus-wise study approaches in academic performances of high school students. Study involved ninety high school students (45 girls, and 45 boys) randomly selected from two high schools in Galle, and Gampaha, Sri Lanka. Study process of respondents was measured by employing the 'revised two-factor Study Process Questionnaire' of Biggs et.al (2001). Descriptive and inferential analyses of data were conducted by using the SPSS software. The Study Approaches (including study motives, and study strategies) employed by respondents during the study process were examined. Relationships were tested among study process variables pertaining to the gender, and syllabus of respondents and their academic performances. High School girls have indicated deeper study methodologies in comparison to the boys. Science stream students recorded deeper study methodologies, and Arts stream students recorded surface study methodologies. Girls recorded superior examination results over boys. A positive relationship was found between the surface study approach and Academic performances of girls. Study highlights the necessity of defining, and applying integrated study process approaches, and evaluation techniques for the vitality of education.

Key Words

Study Process Approaches, Gender, Syllabus, Academic Performances, High schools

Introduction

Success in higher education is an effective way of securing gainful employments, and career development for the youth. Bowles and Gintis (1999) have mentioned Education as an effective process of replicating work in producing future employees. Poropot (2011) has suggested 'integrating employability skills into education' as an important component 'of an overall agenda to groom students to become easily-integrated employees'. He has cautioned that the above efforts intended to promote the employability of students' could be misguided. Porpot (2011) elaborated further: 'if education is to fulfill its role in preparing students for work then employability should be integrated into normal educational practice, rather than added to it". He has further argued that the differences between the assessment of academic performances and workplace performances could diffuse the focus on employability through education. It would be pertinent to discuss about 'Teaching' and the role of teachers' in this respect. Schmulian and Coetzee (2011) have emphasized the importance of teaching style, and accountability of the 'appropriateness of their style of pedagogy' for the results tro ascertain the 'value addition' in classroom. They highlighted the vested interests of the stakeholders in a student's academic performance and that they pay attention to the "indicators demonstrating the possible value being added by a student's class attendance'. Marburger (2001) has emphasized the importance of guidance provided by a lecturer in facilitating the critical thought process. Thereby, the resultant line of questioning (and thinking) is facilitated in classroom learning. Class notes also provide a useful information source making attendance rewarding to the participants.

Learning Styles

Armstrong (1999) found a relationship between students' academic performances, and their stylistic preferences. In his study, analytic students have obtained superior grades over intuitive students. An association has been observed between the levels of individualism of students and their preferred learning styles (Sugahara and Boland, 2010). A study was conducted by Whitmire (2001) in regarding the performance measures of academic library performance, and the usage of library by undergraduates. Study did not reveal a strong relationship between the usage of library and students' academic performances. Cassidy and Eachus (1999) conducted a study among 130 undergraduates specialised in Health and social Policy. Study revealed relationships between students' approaches to achievement with their learning approaches. 'Strategic' learning approach correlated positively, and 'surface' approach correlated negatively with achievement. Van Zwanenberg et al. (1999) did not report relationships between academic performance and learning styles. Spicer (2004) has underlined the importance of providing the opportunity to students to explore individual cognitive style and learning approaches. He further elaborates' this, itself, is the first step to individuals gaining a potentially much deeper awareness and control of their approaches to learning and cognition, and thereby achieving a truly meta-cognitive understanding'.

Study Process

There are many theories about studying and learning. It has been common understanding that studying is a process, involving steps. 'Students approaches to learning' (SAL) theory (Entwistle, and Waterson, 1988 and Biggs, 1993) is a meta-theory conceptualizing both teaching and learning. The '3P'

model of teaching and learning (Biggs, Kembler, and Leung, 2001) consists of three levels, viz. a Presage, Process, and a Product. Presage level describes the individual differences within a given teaching context, focused on 'Student factors' and the 'Teaching Context'. Process signifies the handling of specific tasks, based on 'learning focused activities'. Product level describes the differences of teaching contexts from each other. 'The heart of the teaching/ learning system is at the process level, where the learning related activity produces or does not produce the desired outcomes'(Biggs, Kembler, and Leung, 2001). In a study environment the roles of both the teacher and the student are vital for effectiveness. Researchers suggest that the involvement (and the output) of the student is more important than the teachers role, and the significance of the study approaches is focused. Biggs (1999) has elaborated on Deep, and the Surface Study approaches: 'A generic way of describing 'what the student does' is precisely in terms of their ongoing approaches to learning'. A student who a chance out likely items for assessment and rote learns them may fail in his strategy for portfolio assessment. Another student, who usually interacts deeply, may decide to go surface in a module overloaded with content and assessed by poorly constructed MCQs. The study approach is closely linked to the 'motive', and the 'strategy' chosen by a student.

Scope of the study

The research questions of the study posit; Are there relationships between the gender-wise study processes, and syllabus-wise study processes with students' academic performances? Overall objective of the study was to examine the gender-wise and syllabus-wise relationships of Sri Lankan high school students' with their study process and academic performances. The specific objectives of the study were to assess and analyze the impact of gender, and syllabus (offered by students) to the study approaches, motives, and strategies, and to the effectiveness of academic performances of high school students. Conceptual framework of the study is shown in Figure 1. By conducting this study in Sri Lanka, an attempt is made to extend the theory to a culture that is more collectivist in nature than that of the west. Herein the Hofstede's cultural dimensions theory (Wikipedia, 2012) enhances the validity of the research. Study also adds value for the vitality of educational systems.

Figure 1. Conceptual framework of the Study

Major Variables of Study

Study consisted of two independent variables (e.g. Gender-wise, and subject streams/syllabus-wise study approach of respondents), and the dependant variable, being the Academic Performance of the respondents (e.g. examination results). Study approach has been sub-divided into two levels; viz: Surface study approach, and Deep study approach. Further, each of these two study approaches consists of study motives, and study strategies.

Sri Lankan Education System

Sri Lanka education system derives from the British educational system introduced in the 19th century. British colonial government established colleges for boys and girls separately. These colleges consisted of Primary Schools, Lower Secondary and Higher Secondary Schools. In 1938 the education in

Government schools were made free of charge as a consequence of the Universal Franchise granted in 1931. As shown in Table 1, Primary education lasts for five years, followed by the Junior Secondary, and Secondary education lasting for four, and two years, respectively. Next, students appear for the government examination namely G.C.E. ordinary level. Senior Secondary education is followed by for two years. Students then sit for the competitive university entrance examination, called G.C.E. Advanced level (A-Level) examination. Those who are not admitted to the universities can either enter vocational technical schools or be employed in companies or in government departments as apprentices or trainees.

Stage	Grades	No of years
Primary	1-5	5
Junior Secondary	6-9	4
Secondary (GCE / Ordinary Level)	10 - 11	2
Senior Secondary/ Collegiate (GCE / Advanced Level)	12 -13	2

Table 1: Time structure of school education structure in Sri Lanka (Source: National Report, 2004, Ministry of Education, Sri Lanka pp. 1-3.)

High School Education Structure in Sri Lanka

Senior secondary education in Sri Lanka serves in preparing students for a very competitive examination in selection to state universities at the end of two years. General Certificate of Education (GCE/ AL) qualification is conducted by the Department of Examinations of the Ministry of Education. It is similar to the British Advanced Level, and is usually taken by students at the end of the final two years of Collegiate level (Grades 12, and 13). A student has three attempts and they can face the exam as an external (non-school) candidate also. A-Level examination serves as an entrance qualification to state universities, practicing free education. Examinations are held in the three mediums of Sinhala, Tamil and English. Students usually sit the examination in first attempt at the age of 19.

A-Level examination diversifies over 4 major fields of study, namely:

1. Physical Science Stream (Combined mathematics, Physics and Chemistry)
2. Biological Science Stream (Biology (Botany and Zoology), Physics and Chemistry)
3. Commerce and Accounting Stream, and 4. Arts Stream

In each stream, students have to take 3 subjects. Additionally there is a General English test and a Common General test, and students have to ensure obligatory passes. (Wikipedia, the free encyclopaedia, 2012)

Materials and Methods

The Study Process Questionnaire

The Study Process Questionnaire (SPO) had been developed, based on a Study Behaviour Questionnaire by the author (Biggs, 1993). It has focused on three dimensions of learning: viz; Surface, Deep, and Achieving (refer Table 2). Each 'study approach' has a specific 'motive', and an underlying 'strategy'. The revised two-factor SPQ (Revised-SPQ-2F) is an established measure developed by Biggs, Kembler, and Leung in 2001. It has focused on 'surface', and 'deep' approaches, having 10 items to focus on each approach. The two main factors (e.g. deep and surface) have distinguished the motive, and strategy sub components.

Parameter	Surface	Deep	Achieving
Motive	Fear of failure	Intrinsic interest	Achievement
Strategy	Narrow target, rote learn	Maximise meaning	Effective use of space and time

Table 2. The Study Process Questionnaire: Dimensions, motives and strategies (Source: Study Process Questionnaire, Biggs et al., 2001)

Operationalisation of the Study

Two high schools situated in the cities of Galle, and Gampaha in Sri Lanka were selected for the study. Ninety high school students, (45 girls, and boys each) were randomly selected. They were preparing to sit for the A-Level examination in August this year (2012). These students have selected three different syllabuses (subject streams); viz: Science, Commerce, and Arts. There were thirty (30) respondents each following these subject streams. Revised-SPQ-2F instrument was employed to compile the questionnaire, for its merit and simplicity of the construct. Respondents' academic performance was measured based on their results at the 2011 December examinations. Statements (of the Revised-SPQ-2F) were translated into Czech language, and slight modifications were made (after pre-testing) to improve clarity. Authors (native Sinhala language speakers) were available for clarifications. Students were briefed of the purpose of research, and the confidentiality of their responses was assured. Questionnaires were administered in groups for self responses on the basis of anonymity. SPSS computer software was used for the descriptive and inferential data analysis. Regression and Correlation analysis were conducted to test the relationship among the study variables.

Results and Discussion

Respondents' age ranged from 17 years to 19 years, and the majority was 18 years old. Thirty respondents each belonged to three different subject streams/syllabus, namely Science, Commerce, and Arts, and they were equal (fifteen each) in gender proportions.

Study approach of students

Respondents scores for the two major independent variables, namely Surface Study approach (SA), and Deep Study approach (DA) using the Revised-SPQ-2F are depicted in Table 3.

Parameter	Overall	Boys	Girls	Science stream students	Commerce stream students	Arts stream students
Mean	30.18	31.64	28.68	28.93	29.53	32.14
Std. Deviation	6.70	5.68	7.36	7.41	6.12	6.26

Table 3. Surface study approach of respondents (Source: Authors')

A Mean (M) value of 30.18 has been recorded for SA. Boys have scored a higher M value of 31.64 than girls (28.68) for SA. Arts stream students had recorded the highest scores for SA compared to the students of Science and Commerce streams.

Parameter	Overall	Boys	Girls	Science stream students	Commerce stream students	Arts stream students
Mean	32.02	33.02	31.00	32.33	32.17	31.55
M (DSA-SSA)	1.84	1.38	2.32	3.40	2.64	-0.59
Std. Deviation	5.71	4.04	6.92	5.49	5.68	6.13

Table 4. Deep study approach of respondents (Source: Authors')

A Mean value of 32.02 has been recorded by the respondents for DA (refer Table 4). Boys have recorded a higher value for DA 33.02 (M) over girls 31.00 (M). However, girls indicated a higher net value (2.32) for the use of DA over SA in comparison to Boys (1.38). This may have been reflected in the higher number (and percentage) of female students securing university admissions in Sri Lanka. Science stream students recorded the highest net value of 3.40 (M) for the use of DA over SA in compared to others. It was followed by the Commerce stream students' net value of 2.64 (M). Arts stream students' – 0.59 (M) indicated a reliance on SA over DA. It was note-worthy that the Arts stream students were the only notable exception. This could be an indication of the nature and demands of those subject streams.

Study Motives of Respondents

The sub variables of the study process (motives, and strategies) were measured. Study motives were further sub divided as Surface study motive, and Deep study motive.

Parameter	Overall	Boys	Girls	Science stream students	Commerce stream students	Arts stream students
Mean	13.09	13.44	12.73	13.10	12.40	13.79
Std. Deviation	3.63	3.19	4.03	3.68	3.22	3.94

Table 5. Surface study motive of respondents (Source: Authors')

Table 5 depicts the Surface Study Motives (SSM) of the respondents. Mean values of 13.44, and 12.73 were recorded by the boys, and girls for the SSM. Arts streams students recorded a higher M value for the SSM over those following Science and Commerce subject streams.

Parameter	Overall	Boys	Girls	Science stream students	Commerce stream students	Arts stream students
Mean	15.62	15.71	15.52	16.00	15.67	15.17
M (DSM-SSM)	2.53	2.27	2.79	2.90	3.27	1.38
Std. Deviation	3.39	2.46	4.17	3.56	2.82	3.80

Table 6. Deep study motive of respondents (Source: Authors')

Table 6 depicts the scores for the Deep Study Motive (DSM) of respondents. Boys have recorded a M value of 15.71 for DSM. Girls have recorded a M value of 15.52 for same. Girls have shown a slightly higher net value of 2.79 (M) for deeper study motive (DSM-SSM) over boys. This was in agreement with the findings depicted in Tables 3, and 4. Respondents following Arts subject streams showed the least M value (1.38) for DSM over SSM. This may again indicate the perception among the Sri Lankan adolescents of Arts stream subjects.

Study Strategies of Respondents

Study Strategies employed by the respondents during study process were measured. Strategies were sub divided as 'Surface' and 'Deep'.

Parameter	Overall	Boys	Girls	Science stream students	Commerce stream students	Arts stream students
Mean	17.09	18.20	15.95	15.83	17.13	18.34
Std. Deviation	4.04	3.33	4.40	4.42	4.26	2.98

Table 7. Surface study strategy of respondents (Source: Authors')

Study Strategies of the respondents were assessed. As depicted in Table 7, boys recorded a higher value 18.20 (M) over girls 15.95 (M) for Surface Study Strategies (SSS) adopted in the study process. Arts stream respondents recorded the highest value of 18.34 (M) for SSS over Science and Commerce stream students. This was more aligned with the scores recorded by Arts stream students for Study Motives.

Parameter	Overall	Boys	Girls	Science stream students	Commerce stream students	Arts stream students
Mean	16.40	17.31	15.48	16.33	16.50	16.38
M (DSS-SSS)	-0.69	-0.89	-0.47	0.50	-0.63	-1.96
Std. Deviation	3.44	3.04	3.60	2.80	3.90	3.65

Table 8. Deep study strategy of respondents (Source: Authors')

Mean values of 17.31 and 15.48 were recorded by Boys and Girls respectively for Deep Study Strategy (DSS) (Refer Table 8). It was note-worthy that respondents (both by girls and boys) recorded negative values for DSS over SSS. This suggested a dependence in surface study strategies, despite expressing a liking towards Deeper study motives. Arts stream students indicated the highest dependence on SSS with a negative net value of 1.96 over DSS. This was affirmative of the inclination indicated by them compared with other stream students.

Academic Performance of respondents

Academic performances of the respondents were assessed based on the marks obtained by them at the end of year examination in December, 2011. Students have faced three subjects from their major stream; viz: Science, Commerce, Arts. Respondents' marks for the three main subjects have been averaged and shown as a percentage in Table 9. Girls have scored higher 64.34 (M) than boys 58.80 (M) at the examination.

Parameter	Boys	Girls	Science stream students	Commerce stream students	Arts stream students
Mean (M)	58.80	64.34	62.00	57.89	64.30
Std. Deviation	9.39	11.12	7.38	8.71	13.96

Table 9. Marks obtained by respondents as a percentage (Source: Authors')

Marks of respondents were analysed based on their respective subject streams. Arts stream students scored the highest value 64.30 (M). This was seemingly in contrast to their scores recorded for Study process variables. This indicated that the Arts stream students' reliance on surface study approaches has been more effective in contrast with the study approaches adopted by the Science and Commerce stream students. It may also suggest that rote learning approach has been more effective to secure better results for Arts stream subjects. Whereas, this may be the opposite to secure better grades in other streams, especially of Science-based.

Significant Relationships

Relationships of the respondents between Gender-wise study approaches and Academic Performances, and Subject stream-wise (Syllabus) study approaches and Academic performances were tested using two nested models of linear regression. Study approaches were analyzed for Deep Approach and Surface Approach. Accordingly, the following relationships were tested. Deep Study Approach (DSA), and Surface Study Approach (SSA) of boys and girls with their Academic performances (AP). Deep Study Approach, and Surface Study Approach of subject stream-wise respondents with their Academic performances.

In the accompanying equation of Yi = bo + biXi, for linear regression, Y was the Academic performances of respondents, and X was the Study Apparoach used by them..

I.) Nested Model: Gender-wise Study Approaches and Academic Performances

a) Surface Study Approach of boys and their academic performances: There was no significant relationship. The Pearson correlation value (r) was 0.159.

b) Surface Study Approach of girls and their Academic performances: There was a positive relationship, which can be summarized by the following equation: Academic Performances of girls = 47.973 + 0.578 * SSA of girls. The Pearson correlation value (r) of 0.359 between SSA and AP, and the corresponding R^2 value of 0.129 indicated that SSA of girls contributes to 12.9% of their AP. F value of 5.48 confirmed the strength of this model. The gradient of the regression line was a moderate 0.578, with a corresponding t value of 2.342 significant at 0.025 level (2-tailed).

c) Deep Study Approach of boys and their academic performances: There was no significant relationship. The Pearson correlation value (r) was 0.103.

d) Deep Study Approach of girls and their academic performances: There was no significant relationship. The Pearson correlation value (r) was 0.111.

II.) Nested Model: Subject stream-wise Study Approaches and Academic Performances

a) Surface Study Approach of Science students and their Academic performances : There was no significant relationship. The Pearson correlation value (r) was 0.059.

b) Surface Study Approach of Commerce students and their Academic performances: There was no significant relationship. The Pearson correlation value (r) was 0.003.

c) Surface Study Approach of Arts students and their Academic performances: There was no significant relationship. The Pearson correlation value (r) was 0.065.

d) Deep Study Approach of Science students and their Academic performances: There was no significant relationship. The Pearson correlation value (r) was 0.016.

e) Deep Study Approach of Commerce students and their Academic performances : There was no significant relationship. The Pearson correlation value (r) was 0.129.

f) Deep Study Approach of Arts students and their Academic performances: There was no significant relationship. The Pearson correlation value (r) between DSA and AP was 0.134.

The Academic performances of respondents were tested for relationship with the following study process dimensions; viz: a.) Study Approach, b.) Study Motive, and c.) Study Strategy. Significant relationships were not recorded between Academic Performances of Respondents and any of the abovementioned study process dimensions. Following correlations were noted. However, they were of moderate strength.

Marks obtained by Sri Lankan Girls with their Surface Study Approach (Pearson Correlation coefficient 0.359, at 0.025), Correlation is significant at the 0.05 level (2-tailed).

Marks obtained by Sri Lankan Girls with their Surface Study Strategy (Pearson Correlation coefficient 0.434, at 0.006), Correlation is significant at the 0.01 level (2-tailed).

Conclusion

Respondents (Sri Lankan high school students) had expressed a liking to 'Deep' study approaches, and motives over 'Surface' study approaches, and motives. However, they were over dependant (slightly) on 'Surface' study strategies. Herein, the study's findings are bit paradoxical. The Hofstede's cultural dimensions theory (Wikipedia, 2012) may have an impact in this context. The adoption of deeper study process methodologies by the high school girls (compared with the boys) may have resulted in their superior academic performances. It is noteworthy that a positive relationship was found between the Surface Study Approach and academic performances of girls. This makes an interesting finding. However, the absence of details of assessment techniques employed by the teachers and education systems, does not warrant further inferences. Science stream based students had adopted deeper study methodologies and the Arts stream based students were most dependant on surface study methodologies. This could depend on the nature, and demands of subject streams/syllabuses, and evaluation schemes as per the Bloom's Taxonomy of Learning (Forehand, 2005). It will make little practical sense to discuss the respondents' choice of 'Study Process approaches'in isolation sans abovementioned details. Study highlights the necessity of identifying, and applying appropriate study processes (Motives and Strategies) for the growth and effectiveness of education. It is recommended to have an integrated focus in designing syllabuses, teaching methods and evaluation techniques for greater sense and vitality of education.

Limitations and Further research

Study was conducted only among two groups of Sri Lankan high school students. Further research is recommended to be conducted among larger numbers of students in different phases of education, across geographical regions for generalization of findings. It is also suggested to conduct research having a study process approach to education, with focussed evaluation techniques (based on the curricula), especially at secondary and tertiary levels.

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RELATION BETWEEN RESULTS OF THE LEARNING POTENTIAL TESTS AND STUDY RESULTS

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Abstract

The paper deals with one of problems of universities education – with problem of admission process. The classical entrance examinations, common in the last years, were nowadays substituted by modern method – by learning potential tests (LPT). The question whether it is possible to forecast the study results on the base of the LPT results arises at this moment. Two samples of students are analysed in this paper, students who were admitted in the years 2010 and 2011. The relation between study results and results of LPT provided by the private company Scio is analysed in this paper. The hypothesis, that the better results in learning potential test are the warranty of better study results at the university, was examined. To verify this hypothesis both correlation and regression analysis were used. The insignificant correlation was detected between results in learning potential test and study results. Similarly the regression coefficient had value close to zero. The relevant dependence between the learning potential test and study results haven´t been demonstrated and the hypothesis showed to be quite incorrect.

Key Words

Admission process, Gama correlation, grade average, Kendal´s correlation tau, Learning potential tests (LPT), regression coefficient, Spearman´s correlation coefficient

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Introduction

Each university and each educational institution strives to gain the best candidates for study. One important step is to set correctly the condition of the admission procedure. The practice that was realised many years ago was that the students, who were interested to study at any faculty, had to pass the entrance examination just at the concrete selected faculty. This entrance examination was in relation with the subjects studied at the faculty, they were different for philosophical faculties, different for economical, mathematical, technical faculties and so on. The contemporary trend is to substitute the classical entrance examinations by any complex test – by the tests that should check up the student´s disposition and ability for successful study. Such kind of test is called learning potential tests (LPT). These tests are provided, among other organisations and companies, by the private company Scio. It seems to be very comfortable to transfer a lot of work connected with preparation, own realisation and last but not least responsibility connected with admission process on other subject, at this case the private firm. The other visible advantage for the university is that the financial costs bear especially the applicants; the university contributes by negligible amount of money.

On the other hand it is necessary to verify the quality of the tests, their validity and reliability. The promotional materials (see www.scio.cz) of above mentioned company declare that there is the statistically significant relation between the learning potential test results and study success, which should indicate the required validity. They published, among other things, the following graph as verification of their statement.

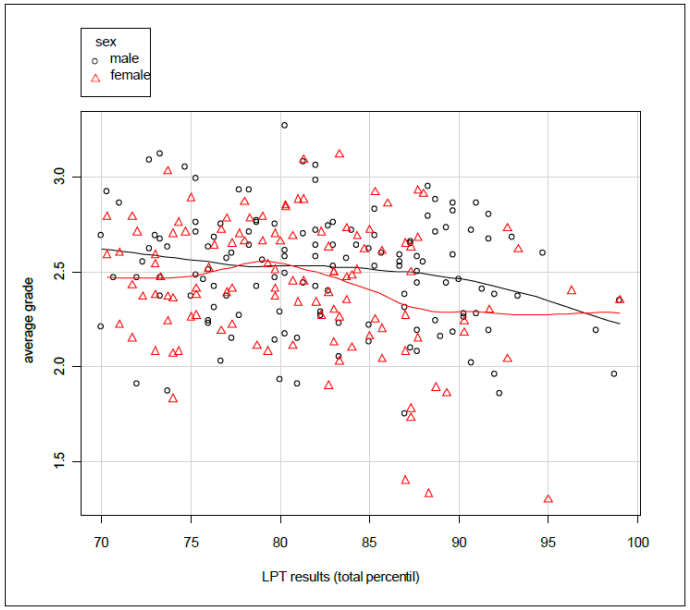

Fig. 1: Relation between the results of LPT and study results during 1st till 5th term at the Faculty of Economics, University of Economics, Prague. Source: www.scio.cz, s.r.o. (14.11.2011).

The fig. 1 presents study results of the students with LPT results between 70th and 100th percentile. It is evident that average grade is between 2,0 and 3,0 almost equally distributed. This figure and our experience evoked our intention to study this problem in a more detailed way. Our experiences with students, who were taken to study according LPT criterion are rather different than it is described in above mentioned study. The goal isn´t also to compare the results at the Faculty of Economics, University of Economics, Prague and University of

Pardubice, but to solve the question whether exist any relevant relation between LPT results and study results.

The question of learning potential assessment is discussed for a long time. A great number of written scientific studies and a lot of developed tests relate to solution of this problem. The measurement of learning potential requires a number of investigations, the accurate methodology and wide theoretical background not only in psychology. For example a number of techniques to assess learning potential, basis of the construction of the learning potential tests, their validity and methodology have already been described by Hamers, Ruijssenaars and Sijtsma (1992).

The complex view to knowledge is given in the book System Approach to knowledge modelling, resulting from research of the authors Dömeová, Houška and Beránková Houšková (2008). The book shows the presents state of knowledge science, different definitions of knowledge, and requirements of changes in managerial behaviour. The knowledge supporting the decision making process is emphasized. The positive evaluation and review of this book is given by Mildeová (2008).

The preferences and ideas of potential applicants for university education are solved by Husák, Volkánová (2011). The authors use the quantitative empirical research to examine the main factors which influence the decision-making process of potential applicants for university education.

The problem of distinction between conventional academic predictors and performance-based tests is solved by authors Tanilon, Vedder, Segers, Tillema (2011). The incremental validity of a performance-based test over conventional academic predictors is presented. The result of this study is that the performance-based test has incremental validity in predicting academic performance. The performance-based tests demonstrate potential as an academic predictor.

This paper follows up with investigation presented by Kubanová, Linda (2012), the authors extended their work for the results of the LPT from the year 2010. It enables to monitor the assumed relation during a longer period.

Materials and Methods

The investigation of the relation between results of the learning potential tests and study results was realized in two successive years, after the students were taken to study according to the results of the LPT test. The first data file is created by the results of 812 students of the Faculty of Economics and Administration of the University of Pardubice, who were taken to study after LPT and entered university in 2010 (the data file is marked I/2010). The lower limit for student´s admission was 20th percentile. That limit is usually stated by the dean of the faculty. During two years long period the study results as

- grade average after the first term,
- grade average after the second term,
- grade average after the third term,
- result from the subject mathematics 1,
- result from the subject microeconomics,
- result from the subject mathematics 2,
- result from the subject microeconomics

were observed and processed.

The grade average describe the study results in a sufficient way, the reason of selection of four last items is that microeconomics and macroeconomics are the subjects of general basis at all economical faculties, mathematics 1 and mathematics 2 are the

subjects, that cause the biggest problem for students and set of all these items reflect the study potential of students.

The second file has been created by the results of 552 students of the same faculty, who were taken to study after LPT and entered university in 2011(the data file is marked II/2011). The lower limit for student´s admission was 16th percentile. The result of investigation started to be analyse during spring 2012, for this reason we kept at disposition only study results as

- grade average after the first term,
- result from the subject mathematics 1,
- result from the subject microeconomics.

The statistical methods, used for processing and evaluation of the statistics data, are described in Hendl (2004) and Kubanová (2008).

The original intention of this paper was to test hypothesis about Pearson´s correlation coefficient and hypothesis about the coefficients of the regression lines. The assumption for application of these tests is normal distribution of population as pointed by Pacáková et al (2012). Both histograms in the figure 2 present frequencies of the students who were taken to study according to the points obtained in LPT in the year 2010 and 2011. The shape of both of them is very similar. The histograms suggest that the data are not from population with normal distribution. This assumption was verified both chi-square, the p values were 0,00012 and 0,00016. The Lilliefors test showed similarly small p-value.

For this reason we could not use the methods based on the assumption of normal distribution of data. That is why the nonparametric methods and the methods of descriptive statistics were used for evaluation of the stated problem.

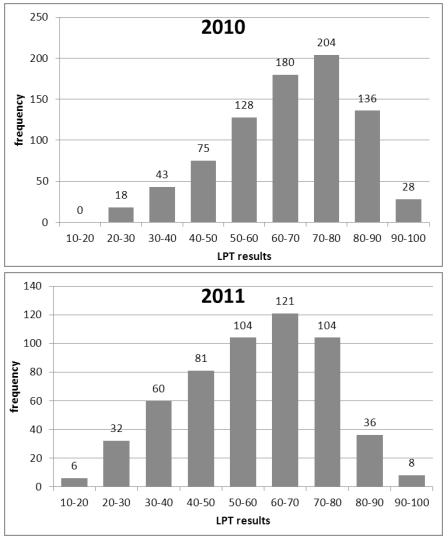

Fig. 2: Histograms – numbers of students that were admitted to the study according to the LPT in the year 2010 (the left histogram) and in the year 2011 (the right histogram)

Results and Discussion

Correlation

The relation between the results of LPT and study results is presented in the correlation coefficients. Four different ways of correlation coefficient calculation were used; the first three are nonparametric due to the character of data (Spearman´s correlation coefficient, Gama correlation, Kendal´s correlation tau), the fourth one is the classical Pearson´s correlation coefficient. This last mentioned Pearson´s correlation coefficient

was calculated with cognizance that the assumption of normality is not satisfied, but this coefficient is the mostly presented correlation coefficient used by many authors and it can help to compare the results. On the other hand 812 and 552 observations are enough to get reliable conclusions.

The stated table of the correlation coefficients include the correlation coefficients that express the relation between following items in the data file I/2010:

- the LPT results and the grade average after the first term of study (average 1),
- the LPT results and the grade average after the second term of study (average 2),
- the LPT results and the grade average after the third term of study (average 3),
- the LPT results and results of the examination of the mathematics 1 (mathem1)
- the LPT results and result of the examination of the microeconomics (microec)
- the LPT results and results of the examination of the mathematics 2 (mathem2)
- the LPT results and results of the examination of the macroeconomics (macroec)

for the students, who entered to university in the year 2010.

Regarding to the shorter period of investigation for the second group of students, who entered university in the year 2011, the correlation matrices include the correlation coefficients that express the relation between items in the data file II/2011:

- the LPT results and the grade average after the first term of study (average 1),
- the LPT results and results of the examination of the mathematics 1 (mathem1)
- the LPT results and result of the examination of the microeconomics (microec)

	n	Spearman	*p*	Gama	*p*	Kendal	*p*	Pearson
average 1	714	-0,123	0,001	-0,091	0,001	-0,086	0,001	-0,128
average 2	498	-0,267	0,000	-0,187	0,000	-0,182	0,000	-0,278
average 3	387	-0,181	0,000	-0,125	0,000	-0,123	0,000	-0,196
matem1	688	-0,166	0,000	-0,192	0,000	-0,131	0,000	-0,175
microec	711	-0,130	0,001	-0,123	0,000	-0,098	0,000	-0,135
matem2	178	-0,095	0,250	-0,078	0,180	-0,067	0,180	-0,132
macroec	498	-0,194	0,000	-0,177	0,000	-0,147	0,000	-0,204

Tab. 1: The correlation coefficients - relation between items of the sample I/2010

	n	Spearman	*p*	Gama	*p*	Kendal	*p*	Pearson
average 1	502	-0,105	0,014	-0,079	0,007	-0,076	0,007	-0,116
matem1	442	-0,129	0,002	-0,149	0,000	-0,102	0,000	-0,147
microec	465	-0,168	0,000	-0,159	0,000	-0,128	0,000	-0,161

Tab. 2: The correlation coefficients - relation between items of the sample II/2011

The number of students (tables 1 and 2) is different for each pair of observed variable, because we considered only students, who had any results. The results of the students, who finished their studies during the first term without any grade or students who never tried to pass the exam, are not included in this calculation.

We can see in the tables 1 and 2 the calculated values of the Spearman´s, Gama, Kendal´s and Pearson´s correlation

coefficient between LPT and the grade average respectively between LPT and selected study subjects. All used methods of the correlation coefficient calculation show that the correlation dependence nears the zero, even though the corresponding *p*-values suggest that the zero hypothesis (that the correlation coefficient equals to zero) should be rejected at the usual significance levels. It should be noted, however, the wellknown statistical fact that when the great number of data is processed then the zero hypothesis (i.e. $\varrho = 0$) is rarely, almost never, cancelled. The fact that the correlation coefficient differs from zero needn´t indicate the existence of the relevant relation between investigated variables. In our case the calculated correlation coefficients lie with two exceptions from -0,067 to -0,196, which signify according to accredited statistical literature very weak correlation relation.

Hendel (2004) states that values 0,1 – 0,3 predicates of very week correlation relation, 0,3-0,7 of middle relation and 0,7-1,0 strong relation (page 246). When the values of the correlation coefficient are close to zero, we can make conclusion, that there is no correlation relation between the results of the LPT and study results. It means that the excellent results in LPT don´t guarantee that the student will have good results in his/her study and that the LPT result can´t reliably forecast the study success, as pointed by Hendl (2004). The relation between LPT and study results expressed by the grade average and study subjects is considered as insignificant.

Study failure and LPT results

The first group, that was analysed, was compounded of 812 students, who started their study at the University Pardubice in 2010 (group I/2010). 155 students finished their study even in the year 2010. 248 students had to finish their studies after the first year from the reason of bad study results (during September and October 2011). 16 students had to finish their study during January and February 2012, the reasons of all of them were the bad study results. Generally, only 393 students (48%) continue their study at the university till now from the total number 812, who were accepted after the LPT.

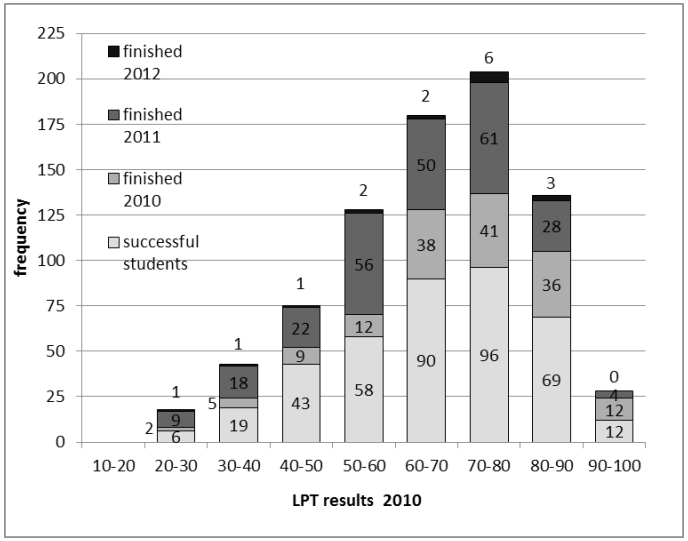

Fig. 3: Histogram – numbers of the successful and unsuccessful students who finished their study in 2010, 2011 and 2012 according to the LPT

It was the reason why we analysed the number of the unsuccessful students depending on the results of LPT. This reality is presented in the figure 3. We can see the small number of unsuccessful students in the interval 20 – 30 LPT points (2 in 2010, 9 in 2011, 1 in 2012) and similarly 90 – 100 (12 in 2010,

4 in 2011, 0 in 2012). The most unsuccessful students were absolutely from the group with LPT result 70-80 points (41 in 2010, 61 in 2011, 6 in 2012, totally 108, which are more than one half). The group of 155 students (finished in 2010) is discussible, because some individuals finished their study at the University of Pardubice in order to study at any other university, in which were probably additionally accepted. But the majority of these students finished, because they found that this study is out of their capabilities.

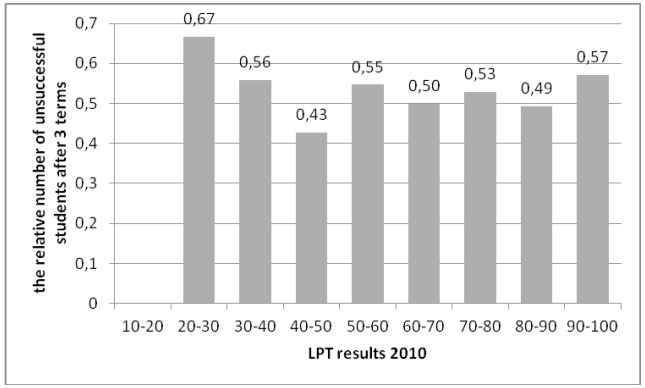

Fig. 4: Histogram – relative values of the unsuccessful students after 3 terms

The relative numbers of unsuccessful students (see figure 4) are very similar for all LPT results range. This relative value seems to be higher for 20-30 LPT points (0,67), but it was only 18 students in this group (12 unsuccessful), which is not significant with regard to all group of 812 students. We can see from the figure 4 that the better result in LPT doesn´t mean the bigger success in study, it means that there is not any relation.

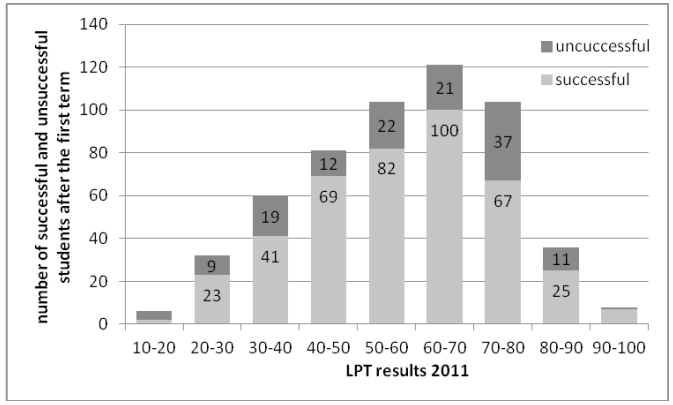

Fig. 5: Histogram – numbers of the successful and unsuccessful students after the first term according to the LPT in 2011

The second group of 552 students, that was analysed, started their study at university in 2011 (group II/2011). 136 students had to finish their studies after the first term from the reason of bad study results. This reality is presented in the figure 5. We can see the small number of unsuccessful students in the interval 10 – 20 LPT points (4) and similarly 90 – 100 (only 1). But it is not significant, because a small number of students with this LPT result were admitted to the study (6 in the interval 10 – 20 LPT points and 8 – in the interval 90 – 100 LPT points). On the other hand there were 37 unsuccessful students who reached 70-80 LPT points. This discrepancy led us to consider the relative values. The first and the last interval, containing the small number of data, are not illustrated in the histogram.

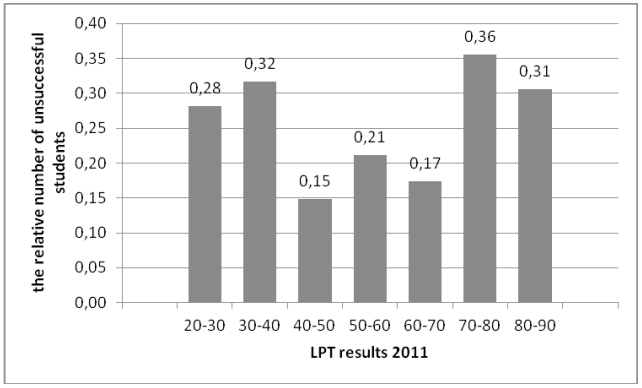

Fig. 6: Histogram – relative values of the unsuccessful students (number of the unsuccessful students/number of admitted students to the study) according to the LPT

We can see in the figure 6 that the worse result in LPT doesn´t mean the bigger failure in study, it means that there is not any relation.

The number of unsuccessful students, who were accepted after good results of LPT seems to be too high, that is why we solve the question, whether good result of LPT is connected with good study results. Unfortunately, the answer is evidently negative; the percentage of unsuccessful students don´t systematically differ on various results of LPT.

Regression analysis

We saw in the previous paragraph that the LPT results can´t be by far considered to be the important factor for study success. It was demonstrated by the help of sample correlation coefficient. Even this mentioned fact we dealt with the regression analysis. We can see in the figure 7 four scatter charts that express the relation between the LPT results and study results – concretely the grade average after the first, second and third term for the students who were accepted in 2010 and the grade average after the first term for the students who were accepted in 2010. In the case of the linear dependence the points should be distributed along the regression line. We can see for the first sight that the values (points) are almost randomly distributed in the rectangle defined by20th and 90th LPT point on the x-axis and by 1,5 and 4 value on the y-axis and they don´t show any clear tendency. It means that there is not systematically difference in study results in dependence at LPT results. We can reach the similar conclusion when we try to fit a regression line through measured data.

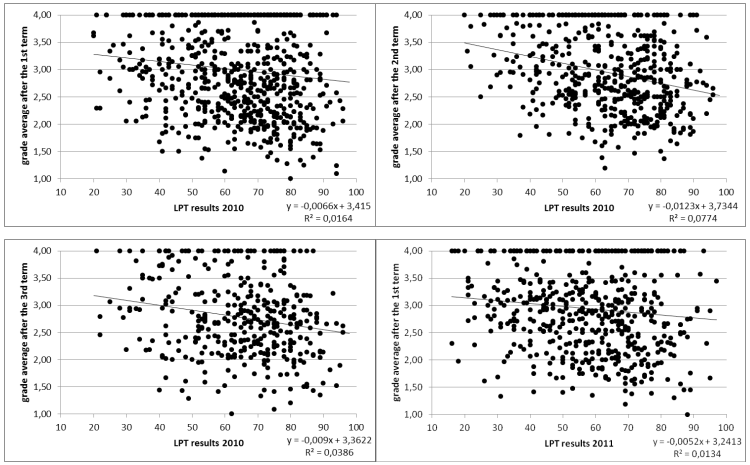

Fig. 7: The scatter chart– relation between LPT results and the grade average

The equation of the linear regression functions are

- $y = -0{,}0066x + 3{,}4150$
- $y = -0{,}0123x + 3{,}7344$
- $y = -0{,}0090x + 3{,}3622$
- $y = -0{,}0052x + 3{,}2413$

Parameters of the regression line were calculated by the help of the least square method. The results concerning the regression coefficient are only stated, not tested, so it wasn´t made the obligatory step checking the fulfilment of required assumptions. The slopes of all stated regression lines (-0,0066; -0,0123; -0,009; -0,0052) are so small, that we can say that they are almost equal to zero. Then the regression line seems to be the constant function and the study results don´t differ for individual values of LPT. The presented determinacy index is close to zero as well, it shows that the linear regression function is improper for this relation, but it is complicated, but even impossible to find any meaningful relation, when we observe the scatter diagram.

Although the relation between the LPT results and grade average was not found, we analysed results of individual subject in relation to LPT results.

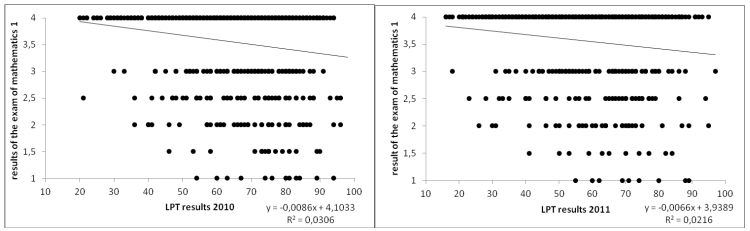

Fig. 8: The scatter chart – relation between LPT results 2010 and 2011 and mathematics results

The figure 8 describes results in the examination from mathematics in relation to LPT results for both examined groups of students. We can see that results 1 and 1,5 could be connected with LPT result over 50, but it is lack of data with this result (2010 only 12, 2011 only 9 excellent evaluation of students). The other results (2; 2,5; 3) are almost randomly distributed among LPT results from 20 till 90. The special attention can be given to the result 4 from mathematics, it means to the not successful students. These results are again almost randomly distributed between 15 and 95 values of LPT. It is evident that classifications "failed" get students with bad LPT result the same way as students with excellent LPT result. Very interesting is as well the concordance rate of both charts, although two different samples (groups of students) were analysed. It gives impression as if the samples had been selected randomly even though they were actually selected according to the result of the LPT provided by Scio company.

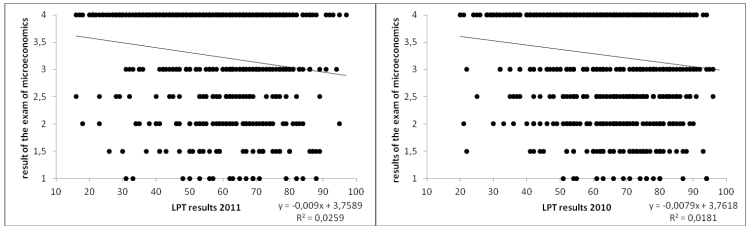

Fig. 9: The scatter chart - relation between LPT results 2010 and 2011 and subject microeconomics

The figures 9 and 10 are very similar to the figure 8, the conclusions can be quite identical, in neither case we found reason to claim that the result of any exam is connected with any result of LPT.

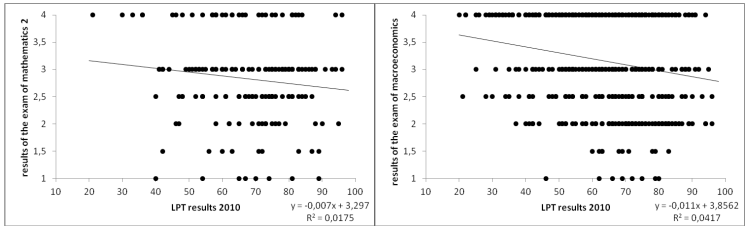

Fig. 10: Relation between LPT results 2010 and subjects mathematics 2 and macroeconomics

Conclusion

The above stated results show that it is not possible to predict reliably the study results on the base of the LPT results. It is not possible to claim that the learning potential tests (LPT) detect the real assumption for study, also study potential.

It means that the similar results would be got by the random sampling; also the educational institution would select the candidates for study quite randomly and the final results wouldn´t be probably different.

It is possible to recommend in the end of this study that the universities should analyse the success of their students in dependence of LPT and in the case of the similarity to these presented results they should try to find any different way of admission process or to go back to the classical entrance examination.

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STRESS COPING STRATEGIES AT UNIVERSITY STUDENTS - PART I: GENDER DIFFERENCES

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Abstract

The aim of present study is to investigate the particularities of using various stress coping strategies by undergraduate students at the Czech University of Life Sciences (CULS) with a special regard to the balance between positive and negative stress coping strategies, and resulting consequences. Authors focused on comparing differences in the use of coping strategies between standardized scores of the Czech population and student population, as well as on identifying differences in the use of coping strategies between both genders. The data were collected using the standardized stress coping strategies questionnaire - SVF 78. Of the total number of 177 students, 63 were male and 114 were female undergraduate students of Faculty of Economics and Management (FEM) at CULS. The most important outcome of the current study research is a proven significant distinction between the positive-negative stress coping strategies employed by CULS undergraduate students and those of the Czech population sample. From the global point of view, the use of positive stress coping techniques seems comparatively high and might therefore be considered as satisfactory. However, significantly lower use of the most constructive and, in longer prospective, most approved group of strategies is rather disappointing.

Key Words

Coping strategy, Czech population sample, gender, stress, university education

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Introduction

University studies place numerous demands on students´ personality – their cognition, character, motivational processes, etc. Naturally, during their studies a number of various stress situations occur, especially in connection with achievement expectations, stress reduction, interpersonal relationships, solving personal problems in relevant levels of corresponding developmental stage. The associations of personality, affect, trait emotional intelligence and coping style measured at the start of the academic year with later academic performance were examined in a group of undergraduate students by Saklofske et al. (2012). Modelling for stress and life satisfaction showed relationships with personality, affect, and the task focus and emotion regulation factors. The high levels of demands put on students often lead into a high level of perceived distress and difficulties. Topics on such problematic area were presented at the ERIE conference by studies conducted by Chamoutová and Chýlová (2008) or Millerová, Michálek and Franco Ruiz (2007). Studies focused on relation between the uses of different stress coping strategies by full-time university students. Results showed that students´ lives were perceived as highly demanding and stressful. These findings required further investigation, which created a baseline for the currently presented study. The study focuses on a comparison of stress coping strategies at university students in contrast to the Czech population sample. The comparative analysis is complemented by an analysis of gender differences in a use of stress coping strategies. The comparative analysis of other variables in relation to stress coping strategies will be presented in the Part – II of this paper.

Czech as well as foreign academic literature usually describes coping strategies as strategies used for coping with stress (e.g. Aldwin and Yancura, 2011; Kebza, 2005; Janke and Erdmann, 2003). Authors follow the classical concept of stress proposed by Hans Selye (1950). We may come across the following description of coping: "…coping denotes the psychological operations, both conscious and unconscious, being applied by an individual in order to manage demands of stressful situation or event" (Balcar, Trnka and Kuška, 2011, p. 27). The same authors believe that coping strategies comprise of cognitive, emotional, behavioural, and physiological processes implemented in various combinations that are selectively and purposefully effective in order to ease individual´s demand overload.

Next to the term „coping strategies´ there is a frequently used term „coping styles´; both of which have been used in similar sense. According to Aldwin and Yancura (2011, p. 267) coping style approach assumes that "…there is an intra-individual stability in the use of coping styles throughout various situations." Therefore, we may assume that tendencies to employ similar coping strategies throughout different lifetime events might be considered an invariable characteristic, detectable within individual psycho-diagnosis (Janke and Erdmann, 2003). Authors (in accordance with Aldwin and Yancura (2011) perceive coping styles in a broader sense (related to personal characteristic) than coping strategies (related to actual behaviour, for further information see for example Eduardo Piemontesi et al., 2012; Shankland et al., 2010). However, especially in the context of the stress coping strategies questionnaire SVF 78 by Janke and Erdmann (2003), which is in detail described in the Method section, the term stress coping strategies is considered to be adequate.

As defined by researchers, there are distinct typologies within the field of stress coping strategies; such as active and passive coping (Gerin, 2011) or strategies leading towards

stress reduction – positive stress coping strategies, in contrast to strategies leading to increase of stress – so called negative strategies (Weyers, Ising and Janke, 2005).

There are undoubtedly various approaches to coping with distress and yet, it is possible to distinguish, at least, the two major strategy groups – the positive and negative ones. However, the choice of applied coping strategy may differ in relation to specific factors, e.g. demographic indicators – gender, education level, age – or personal characteristics (namely neuroticism mentioned in Horáková, 2009 or anxiety, as Eduardo Piemontesi et al. state, 2012). Lukavský, Šolcová and Preiss (2011) came to similar findings while exploring proactive stress coping strategies; according to their research women show higher need for emotional support while men tend to apply reflective solution to a problematic situation. Research results point out gender differences in search for an instrumental support angle, even though the statistical significance of this trend has not been fully validated (also in Šolcová, Lukavský, and Greenglass, 2006). On the contrary, according to Contrada and Baum (2011) coping strategies, in general, might be considered being male-female dependent. Coping strategies have been clustered into distinct categories based on a variety of conceptual and empirical considerations, perhaps the most influential distinction for investigations of gender differences is the one proposed by Lazarus and Folkman (1984). They classified coping responses as either problem focused coping or emotion focused coping. Women reported significantly greater use of problem focused (active coping) and emotion focused strategies (rumination) as well as social support seeking in comparison to men. Women endorse more strategies to cope with stress than men do, including those considered gender-role consistent (emotion oriented, support seeking) and inconsistent (active, problem focused). In connection with university education, Shankland et al. (2010, p. 354) state that „…problem-focused coping strategies are more effective in facing controllable situations, like coping with the demands of student life, while the emotion-focused strategies are more effective in facing unmanageable events".

The aim of present study is to investigate the particularities of using various stress coping strategies by undergraduate students at the Czech University of Life Sciences (CULS) with a special regard to the balance between positive and negative stress coping strategies, and resulting consequences. Authors focused on comparing differences in the use of coping strategies between standardized scores of the Czech population and student population, as well as on identifying differences in the use of coping strategies between both genders. One way to measure coping, as mentioned earlier, is when considered a habitual trait, characterizing the individual's reaction, independently from the kind of stressful situation (Ising et al., 2006). Inventories following this approach are, for example, the COPE inventory (Carver, Scheier and Weintraub, 1989), the Stressverarbeitungsfragenbogen SVF 120 (Janke and Erdmann, 2005) and its variant SVF 78 (Janke and Erdmann, 2003). Authors of this study followed this concept too. The data were collected using a standardized method - SVF 78 (Janke and Erdmann, 2003). The questionnaire consisted of 13 scales - 7 scales for positive stress coping strategies, 2 neutral, and 4 negative strategies. Each one of the scales can be interpreted on its own and compared to the Czech standardized tables, which enable researchers to assess the differences in using coping techniques within the specific group of CULS undergraduate students.

The SVF 78 questionnaire, focusing at the mapping of stress coping strategies, has proved to be highly useful instrument,

especially in the contemporary information society with incessantly increasing level of stress. In addition, the ways of coping with stress are nowadays frequently not the constructive ones. The population of university students is very illustrative example of both mentioned cases – of high level of stress and in the same time of high level of non-constructive ways of coping. From the point of view of the psychological counsellor, the qualified and reliable description of contemporary trends in stress coping strategies within the youth population is most welcome (it is necessary, for example, for prevention of the drug and alcohol abuse and more tailored aiming of respective psychological lectures and seminars) and is well in accord with responsible system of education.

Materials and Methods

Group of respondents

The data were collected during autumn/winter semester of academic year 2011/2012 on a sample of first and second year undergraduate students of Faculty of Economics and Management (FEM) at CULS (N = 177). Students in our group of respondents represent both forms of studies – 75 students were full-time students, 102 students were part-time students. Of the total number of 177 students, 63 were male and 114 were female students, within the study programmes Public Administration and Regional Development and Business and Administration. The average age was 26 years. Descriptive characteristics of our respondent group are shown in more detail in Table 1, below.

Respondents	N	Meanage	Min.age	Max. age	Women (N)	Women (%)	Men (N)	Men (%)
Part-time students	102	30,17	20	49	52	50,98	50	49,02
Full-time students	75	20,89	19	26	62	82,67	13	17,33
Total	177	26,24	19	49	114	64,41	63	35,59

Tab. 1: Descriptive characteristics of group of respondents.

Respondents participated voluntarily, and were not paid. The testing via SVF 78 questionnaire was positively accepted, as students get immediate feedback on their results, receiving this way (anonymously) the comments and recommendations on their stress coping behaviour together with experience with the use of psychological instrument of high psychometric quality. The issue of stress is quite popular and there are, in general, no obstacles to imagine and describe real life situations of stress events and coping with them.

The method

SVF 78 (Janke and Erdmann, 2003) is a German questionnaire based on a trait approach, fully standardized into Czech language and cultural environment. This method was used to obtain data on different stress coping strategies. The standard Czech version of the aforementioned questionnaire was applied with the following instruction: *"When I am disturbed, irritated, or upset by something or someone…. "*

Subtest	Description of subcategories	Name of strategy	Abbreviated name of strat.	Sample-item
Positive strategies 1	Devaluation / Defence	Minimi-zation	MIN	*I tell myself that everything will turn out all right.*
		Denial of guilt	DENGU	*I think that I am not responsible for the situation.*
Positive strategies 2	Distraction	Distraction	DISTR	*I try to distract myself.*
		Substitute gratification	SUB	*I grant myself something I've desired for a long time.*
Positive strategies 3	Control / Constructive	Response control	RECON	*I tell myself not to lose my temper.*
		Positive self-instructions	POSI	*I tell myself that I can cope with it.*
Neutral strategies	Neutral / Situation dependent	Need for social support	SOCSUP	*I try to talk with someone about the problem.*
		Avoidance	AVOID	*I resolve to avoid such situations in the future.*
Negative strategies	Negative	Negative	ESC	*I tend to run away from the situation.*
		Rumination	RUMI	*I keep on thinking about the situation for a long time, afterwards.*
		Resignation	RES	*I tend to give up.*
		Self-blame	SEBLA	*I blame myself.*

Tab. 2: SVF 78 Subtests and Categories (Weyers et al, 2005).

Stress coping techniques were assessed according to two major groups of subtests (for details see Table 2): The first seven subtests, which in principal can be considered to reduce stress, are grouped under the category of Positive strategies total and can be divided into following subcategories: Devaluation/ Defence (Positive strategies1, from Minimization to Denial of guilt), Distraction (Positive strategies 2, from Distraction to Substitute gratification) and Control (Positive strategies 3, from Situation control to Positive self-instructions). The four remaining subtests ranging from Escape to Self-blame are considered to augment rather than reduce stress; these subtests are grouped under the category of Negative strategies total. There can be identified two more strategies, which are referred to as Neutral strategies, as no definite affiliation towards positive or negative side can be identified, these strategies must be, in all cases, viewed as situation dependent.

From the psychometric characteristics´ point of view, the SVF 78 provides high level of reliability and time stability, consistent construct validity, and considerable external validity in regards to other stress coping inventories (Janke and Erdmann, 2003; Weyers et al, 2005).

Statistical Analyses

Next to the descriptive analysis, of which the main aim is to describe the field of interest and to classify respective items (Disman, 2008), a thorough examination of relation between variables was executed. The independent variables are: the Test values (the Mean value of SVF 78 found in the standardized table outputs for each Subtest for the whole Czech population sample and separate scores for males and females). The dependent variable was the stress coping strategy usage measured by the SVF 78 on a sample of CULS students.

In order to ascertain the nature of relation between the two variables, authors decided to test the null hypothesis to find out whether the sample comes from a population with the same Mean value as the Test value - therefore one sample t-test was computed, using SPSS 19 statistics software (Norušis, 2011). For additional assessment of the differences in usage of stress coping strategies at males and females, we have formulated a hypothesis on the statistically significant differences in the use of coping strategies between the group of male students and the group of female students, identified through the SVF 78 questionnaire. To test this second null hypothesis of non-existence of a significant difference between the two groups, we used a t test for two independent samples (Norušis, 2011), and before each testing, the null hypothesis of no difference in the variance of the evaluated variable values in both groups was adopted based on Levene´s test for equality of variances.

Results

Results of the most important descriptive statistics of the observed subcategories – Positive strategies 1, Positive strategies 2 and Positive strategies 3 and categories – Positive strategies in total, Negative strategies in total, as well as the results of the computation of one-sample t-test (data obtained from CULS students compared to Test value of Czech population sample in respective categories and subcategories) are displayed in Table 3, below.

Strategy	Mean	Std. dev.	Std. error mean	Test value	t	**Test value**	Mean diff.	95% Confidence interval of the difference	
								Lower	Upper
Positive strategies 1	11,10	3,76	0,28	10,09	3,58	**0,00****	1,01	0,45	1,57
Positive strategies 2	12,26	3,54	0,27	10,37	7,1	**0,00****	1,89	1,37	2,42
Positive strategies 3	15,57	3,59	0,27	16,19	-2,3	**0,02***	-0,62	-1,15	-0,09
Positive strategies total	13,35	2,74	0,21	12,22	5,48	**0,00****	1,13	0,72	1,53
Negative strategies total	12,04	4,16	0,31	10,52	4,86	**0,00****	1,52	0,9	2,13

Tab. 3: Results – descriptive statistics and one sample t-test

Table 3 illustrates that Means of the data from our group of respondents differ from those of the Czech population sample (Test value); in all five cases there is a variation within one standard deviation from the Mean in question. In order to test the null hypothesis of non-significance in variation between the two Means, one sample t-test was computed and its results are displayed in Table 3. Results demonstrate the significance level to be, in one case, less than 0, 05; in other cases less than 0, 01. Our observed results are very unlikely in all five cases; therefore the null hypothesis was rejected. Our sample probably comes from a population with a larger Mean than the examined Test value; except for the Positive strategies 3, where the computed

t-test is negative, and therefore it is expected for the mean value of our sample to be lower than the population sample.

These results indicate tendency towards increased usage of most stress coping technique subcategories, in general, both positive as well as negative ones.

The results also show some differences in preference of employing specific subcategories of positive stress coping strategies, especially those connected to devaluation, defence and distraction in contrast to low level usage of constructive positive strategies.

Presumably influenced by relatively low age, the considered group of participants is still indecisive when it comes to choosing a stress coping strategy; together with large group of students, who employ positive, but in a long term view short-sighted stress coping strategies. Detailed analysis of the results shows further possibilities when it comes to strengthening the positive strategies and forming more suitable strategies compared to the currently preferred ones. Targeted influence and training might help to form more resistant stress coping individuals, able to better sustain permanent stress induced by highly demanding work environment.

Let us have a closer look on comparison of differences in the use of coping strategies by male-students and female-students compared with the values of the Czech standardization sample. More details are shown in Table 4, below.

Strategy	Gender	Mean	Std. dev.	Std. error mean	One sample t test			Mean diff.	95% Confidence interval of the difference	
					test value	t	Sig.		Lower	Upper
MIN	Male	13,3	4,92	0,62	10,67	4,25	0,00**	2,63	1,4	3,87
	Female	9,49	4,96	0,46	8,18	2,82	0,01**	1,31	0,39	2,23
DENGU	Male	11,78	3,56	0,45	11,41	0,82	0,42	0,37	-0,53	1,27
	Female	11,13	4,25	0,4	9,99	2,85	0,01**	1,13	0,35	1,92
DISTR	Male	12,33	4,01	0,51	11,69	1,27	0,21	0,64	-0,37	1,65
	Female	13	4,06	0,38	11,97	2,71	0,01**	1,03	0,28	1,78
SUB	Male	11,19	4,2	0,53	8,42	5,24	0,00**	2,77	1,71	3,83
	Female	12,08	4,34	0,41	9,42	6,54	0,00**	2,66	1,85	3,46
SITCON	Male	15,87	4,18	0,53	16,84	-1,84	0,07	-0,97	-2,02	0,08
	Female	15,82	4,09	0,38	16,72	-2,36	0,02*	-0,9	-1,66	-0,14
RECON	Male	16,16	3,82	0,48	15,27	1,85	0,07	0,89	-0,07	1,85
	Female	15,11	3,79	0,35	15,56	-1,28	0,2	-0,45	-1,16	0,25

Strategy	Gender	Mean	Std. dev.	Std. error mean	One sample t test			Mean diff.	95% Confidence interval of the difference	
					test value	t	Sig.		Lower	Upper
POSI	Male	15,84	5,03	0,63	16,71	-1,37	0,18	-0,87	-2,13	0,4
	Female	15,14	4,58	0,43	16,02	-2,05	0,04*	-0,88	-1,73	-0,03
SOCSUP	Male	13,83	5,06	0,64	11,57	3,54	0,00**	2,26	0,98	3,53
	Female	16,29	4,77	0,45	14,23	4,61	0,00**	2,06	1,18	2,94
AVOID	Male	14,97	4,42	0,57	11,44	6,33	0,00**	3,53	2,41	4,64
	Female	15,13	4,3	0,4	12,51	6,51	0,00**	2,62	1,82	3,42
ESC	Male	10,78	4,37	0,55	7,35	6,22	0,00**	3,43	2,33	4,53
	Female	11,86	4,49	0,42	9,16	6,42	0,00**	2,7	1,87	3,53
RUMI	Male	13,76	5	0,63	13,61	0,24	0,81	0,15	-1,11	1,42
	Female	16,2	5,35	0,5	16,68	-0,95	0,34	-0,48	-1,47	0,52
RES	Male	8	4,87	0,61	7,17	1,35	0,18	0,83	-0,4	2,06
	Female	10,67	4,99	0,47	8,93	3,71	0,00**	1,74	0,81	2,66

Strategy	Gender	Mean	Std. dev.	Std. error mean	One sample t test			Mean diff.	95% Confidence interval of the difference	
					test value	t	Sig.		Lower	Upper
SEBLA	Male	10,67	4,6	0,58	9,81	1,48	0,14	0,86	-0,3	2,02
	Female	12,16	5,23	0,49	11,48	1,38	0,17	0,68	-0,29	1,65
Positive strat. 1	Male	12,54	3,2	0,4	11,08	3,62	0,00**	1,46	0,65	2,27
	Female	10,31	3,83	0,36	9,09	3,4	0,00**	1,22	0,51	1,93
Positive strat. 2	Male	11,76	3,35	0,42	10,06	4,03	0,00**	1,7	0,86	2,54
	Female	12,54	3,63	0,34	10,69	5,44	0,00**	1,85	1,18	2,52
Positive strat. 3	Male	15,96	3,63	0,46	16,27	-0,68	0,5	-0,31	-1,23	0,6
	Female	15,35	3,56	0,33	16,1	-2,24	0,03*	-0,75	-1,41	-0,09
Positive total	Male	13,78	2,45	0,31	12,47	4,24	0,00**	1,31	0,69	1,93
	Female	13,11	2,87	0,27	11,96	4,28	0,00**	1,15	0,62	1,68

Strategy	Gender	Mean	Std. dev.	Std. error mean	One sample t test			Mean diff.	95% Confidence interval of the difference	
					test value	t	Sig.		Lower	Upper
Negative total	Male	10,8	3,8	0,48	9,49	2,74	0,01**	1,31	0,35	2,27
	Female	12,72	4,2	0,39	11,56	2,95	0,00**	1,16	0,38	1,94

**α ≤ 0.05; ** α ≤ 0.01; N = 177; df = 176; abbreviations of coping strategies are explained in Table 2.*

Tab. 4: Results – descriptive statistics and one sample t-tests for male and female students vs. respective test value from Czech population sample.

We can see several significant differences in Table 4. In female students we find a significant difference in the use of the strategies Denial of guilt, Distraction, Situation control, Positive Self-instruction and Resignation compared to women from the regular Czech population sample. Male students´ scores in these coping strategies were similar to those demonstrated by men in the standardization sample. This more detailed perspective shows that female students more frequently use coping strategies oriented to obtaining social support or denying guilt which are among emotion-focused strategies, but they also more frequently than women in regular population use two of the most appropriate coping strategies, namely Positive self-instruction and Situation control. Male students only differ from men in the standardization sample of the Czech population in categories in which we also find significant differences in female students compared to women in the standardization sample.

The last part of results presented in this paper consists of a comparison of male students and female students in our university students´ sample. The comparison of male students and female students using two adequate sample t-tests is offered in Table 5, with Levene´s tests´ results assuming equal variances of samples.

Strategy	Levene´s tests		t tests		Mean diff.	Std. error diff.	95% Confidence interval of the difference	
	F	Sig.	t	Sig.			Lower	Upper
MIN	0,07	0,80	4,91	**0,00****	3,81	0,78	2,28	5,34
DENGU	0,93	0,34	1,04	0,30	0,65	0,63	-0,59	1,90
DISTR	0,24	0,62	-1,05	0,30	-0,67	0,63	-1,92	0,59
SUB	0,62	0,43	-1,32	0,19	-0,89	0,67	-2,22	0,44
SITCON	0,13	0,72	0,09	0,93	0,06	0,65	-1,22	1,33
RECON	0,08	0,78	1,77	0,08	1,05	0,60	-0,12	2,23
POSI	1,19	0,28	0,94	0,35	0,70	0,74	-0,77	2,17
SOCSUP	1,12	0,29	-3,22	**0,00****	-2,46	0,77	-3,97	-0,95
AVOID	0,01	0,91	-0,24	0,81	-0,16	0,68	-1,51	1,18
ESC	0,00	0,98	-1,55	0,12	-1,08	0,70	-2,46	0,30
RUMI	0,19	0,66	-2,97	**0,00****	-2,44	0,82	-4,06	-0,82
RES	0,09	0,77	-3,43	**0,00****	-2,67	0,78	-4,20	-1,13
SEBLA	1,28	0,26	-1,89	0,06	-1,49	0,79	-3,05	0,06
Positive strategies 1	2,72	0,10	3,93	**0,00****	2,23	0,57	1,11	3,35

Strategy	Levene´s tests		t tests		Mean diff.	Std. error diff.	95% Confidence interval of the difference	
	F	Sig.	t	Sig.			Lower	Upper
Positive strategies 2	0,86	0,35	-1,40	0,16	-0,78	0,55	-1,87	0,32
Positive strategies 3	0,25	0,62	1,07	0,29	0,60	0,56	-0,51	1,72
Positive total	0,92	0,34	1,58	0,12	0,67	0,43	-0,17	1,52
Neutral total	2,34	0,13	-2,32	0,02*	-1,31	0,57	-2,43	-0,20
Negative total	1,10	0,30	-3,01	0,00**	-1,92	0,64	-3,18	-0,66

**α ≤ 0.05, ** α ≤ 0.01, N male = 63, N female = 114, df = 175 for each t test; descriptive statistics is shown in Table 4; abbreviations of coping strategies are explained in Table 2.*

Tab. 5: Results – descriptive statistics and two independent samples t-tests for each coping strategy, with Levene´s tests for equality of variances.

Results presented in Table 5 show a significant difference in the use of the strategies Minimization, Social support, Rumination and Resignation. Looking at average values, we can also observe direction of the difference, and it is obvious that the Minimization strategy is more frequently used by male students in our sample, while the remaining strategies – Social Support, Rumination and Resignation are more frequently used by female students. Like in the previous case, these results correspond with the concept mentioned by Lazarus and Folkmann (1984), partially also by Lukavský, Šolcová and Preiss (2011). The coping strategies results also manifested in the comparison of different groups of positive coping strategies (Positive strategies 1, Positive strategies 2 and Positive strategies 3), as well as in the comparison of positive, neutral and negative strategies in total. Similarly as with individual coping strategies, also in this case we can see significant differences in the first group of coping strategies (probably significantly influenced by the Minimization strategy), in the group of neutral strategies (probably influenced by a significant difference in the Social support coping strategy), as well as in the group of negative strategies (particularly due to significant differences in the strategies Rumination and Resignation).

Discussion

According to Dömeová, Vostrá and Jindrová (2011) most graduates and students of the Faculty of Economics and Management (FEM) are women; the question for further research should be, that this fact might be associated with men and women using certain strategies which are likely to be more effective with respect to their studies. Our student sample is not representative in this regard – both genders were almost equally represented in part-time students, which does not correspond with the actual situation at FEM – the proportion of full-time male and female students better captures FEM.

Some contemporary stress researchers view the role of gender as follows: it may come into play at each phase of the stress experience, determining exposure to events and appraisal of those events as stressful as well as influencing physiological responses and coping efforts. It also may moderate the relation between stress and health outcomes, such that even when

stress is comparable, one gender is more vulnerable to negative outcomes (Davis, Burleson and Kruszewski, 2011).

Authors of this study are aware, that following the modern stress science research methods, other, alternative psychometric tools could also be used to identify coping strategies. Shankland et al. (2010) assessed students´ adaptation to a different type of education with the use of a test battery containing the Coping Inventory for Stressful Situations by Endler and Parker as one of the tools Šolcová, Lukavský and Greenglass (2006) used for their research of proactive stress coping strategies the Proactive Coping Inventory. In an earlier research of stressogenic situations in university students in the Czech environment, Millerová, Michálek and Franco Ruiz (2007) used an adapted version of the Stress Profile questionnaire. As mentioned above, authors of this study chose the questionnaire tool SVF 78 as the primary method for measuring coping strategies in students (similarly to Janke and Erdmann, 2003 or Balcar, Trnka and Kuška, 2011). In addition to other advantages, such as group administration and prompt, well-arranged assessment, authors also opted for this questionnaire with respect to topics discussed in contact lessons, with the analyzed coping strategies smoothly following the lessons´ content concerning Mental hygiene, health psychology and Personality psychology lectures.

Conclusion

The most important outcome of the current study research is a proven significant distinction between the positive-negative stress coping strategies employed by CULS undergraduate students and those of the Czech population sample. Although authors suggest further study on a larger, and especially in gender and educational background better balanced sample of respondents, high number of negative stress coping techniques used by undergraduate university students in this study undoubtedly requires certain measures to be taken into consideration. From the global point of view, the use of positive stress coping techniques seems comparatively high and might therefore be considered as satisfactory. However, significantly lower use of the most constructive and, in longer prospective, most approved group of strategies is rather disappointing. It seems highly sensible to offer students alternative strategies of coping with stress emerging from work, family, and school demands. Cohen et al. (1993) stresses stress-elicited changes in health practices such as smoking and alcohol consumption, which may represent an obvious danger to the students. Coping styles are generally considered to be environmentally driven. Up to now, research has mainly focused on family influences. However, some studies (Shankland et al., 2009) underline the effect of educational settings on the development of problem-focused coping strategies. Presently, there are Mental hygiene seminars accessible to full-time students, where they may be given a chance to experience and try out different relaxation techniques. Authors believe that such option should be offered to all students of the Czech University of Life Sciences.

For students in acute distress situations Department of Psychology offers free counselling services.

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ASSESSING STUDENTS' LEVEL OF KNOWLEDGE IN PROFILE COURSES OF CHOSEN ECONOMIC STUDY PROGRAMMES AT THE FEM CULS PRAGUE

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Abstract

To increase the educational attainment of the population is a priority that has arisen also from the pro-growth strategy of the European Union. In this regard, the quality of the teaching process in tertiary education and subsequent graduates' employability are paid substantial attention. However, the quality of knowledge and skills acquired and presented by the graduates on the labour market has not been observed so closely. The focus on quantitative aspects implies a significant risk of lowering qualitative standards. The present paper strives to analyze the development and structure of students' results within the framework of economic study programmes at the Faculty of Economics and Management CULS Prague in five consecutive academic years. Based on the analysis, the differences in study results, study skills and approaches are specified and compared between and among the individual study programmes and forms of study.

Key Words

Educational attainment of the population, forms of study, higher education, students' knowledge, study programmes, study results, success rate, universities

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Introduction

In 2010, the EU summit of high member countries representatives set targets related to secondary and in particular tertiary education within the framework of "Supporting growth and jobs strategy". This strategy stems from the assumption that a highly skilled and creative population, i.e. high quality human capital, leads to economic development and prosperity. The 2020 education target stipulates that 40% of the age group 30-34 should successfully complete higher education or equivalent studies (Strategic framework for education and training, 2012).

Most EU countries, including the Czech Republic, record the highest and ever-growing share of higher education students within the age group of 25-34. According to the Eurostat, there are only three countries where higher education attainment falls into the age group of 35-44 – these exceptions comprise Finland, Germany and also Austria where the two age groups are more or less equal.

Having the above facts in mind, higher education institutions, primarily colleges and universities, are at the centre of attention. The quality of teaching process in Bachelor and Master study programmes at particular universities and faculties is observed and discussed. A wide range of Czech authors, e.g. Mareš (1991), Šmelová (2002), Šabatová (2009), and foreign authors - Seldin (1990), Abari (2011) deal with the issue of teaching process quality and its assessment. At the same time, detailed analyses concerned with the relationship between the number of graduates and their employability have been carried out, sorted by the individual higher education institutions and also by the study programmes (Koutský, Zelenka 2011). Graduates' employability and career path on the labour market is influenced, besides other factors, by the teaching process quality. Nevertheless, it is quite hard to measure the knowledge and skills applied by students in practice at their workplaces (Mareš, 1990).

The educational attainment process involves not only schools (faculties, departments) and the quality of their pedagogues but at the same time the students themselves. Students' academic performance is influenced by a wide range of factors, above all by their study potential and willingness to acquire new knowledge and skills. The individual "talent" or "gift" can be already traced in the secondary school results (but not as a rule). The relationship between secondary school study results and subsequent university results has been dealt with e.g. by Kuncel (2001), Zwick (2006) or Rubešová (2009).

The above-mentioned studies infer that study results at university, especially in the first freshman year, are determined by the quality and demandedness of the secondary school. General study skills, self-study skills, self-organisation, ability to both team work and work independently, ability to search for and process information, to differentiate key pieces of information from the unimportant ones, capability of using common sense and logical thinking rather than pure memorizing – these constitute key prerequisites to good university performance. Current researches conducted at foreign universities prove that the quality of students, i.e. their study results, influences retroactively the quality of the educational process, e.g. Hassanbeigi (2011). Last but not least, factors related to acquiring new knowledge and skills also include motivation, socio-economic study conditions etc.

Materials and Methods

The ***paper aims*** at several topical issues related to assessing the quality of higher education graduates and their level of knowledge. The results of FEM CULS students (Faculty of Economics and Management, Czech University of Life Sciences in Prague), namely the students of the Economics and Management study programme and Business and Administration study programme have been analyzed. Both study programmes are realized under both full-time and distance form. The analysis has been carried out on the example of two profile courses (both prerequisite for the final state examination): the "Agrarian Sector Economy" course taught within the framework of the Economics and Management study programme and the "Business Activity Assessment" course taught within the Business and Administration programme. The two courses are incorporated in the last year of study of the respective study programme; "Agrarian Sector Economy" in the Bachelor degree programme and "Business Activity Assessment" in the Master degree one. Both subjects are economy-related (substantial for the graduates' profile), identical in their form and scope and also identical in view of the course requirements and grading system. As far as the form and scope of teaching are concerned, both courses entail lectures and seminars. Full-time study programmes are given a 90-minute lecture per week and a 90-minute seminar every two weeks. Distance study programmes require a substantial load of self-study, accompanied by 12 hours of face-to-face sessions per term (Curricula of the FEM 2009/2010, 2009).

The analysis was supposed to answer the following questions:

- Can we assume that FEM students (regardless to the form of study and study programme) record a low rate of high grades (excellent results)? In other words, is the level of knowledge acquired by the graduates in these profile courses low?
- Are there any significant differences in study results between and among the individual study programmes and forms of study?
- Do students record better results while retaking the examination (thanks to more studious preparation)?
- Have the study results been generally deteriorating?
- Which factors influence the study results recorded?

The following ***methodical approach*** has been adopted in order to analyze students' level of knowledge:

- The results in five consecutive academic years were recorded and analyzed, involving the the total of 2,072 (two thousand and seventy-two) full-time students and 1,563 (one thousand five hundred and sixty-three) distance students.
- Only those students who actually took part in the examination were included in the sample. It means that the sample did not integrate those students who registered for the examination but finally did not turn out. In accordance with the Study and Examination Rules of the Czech University of Life Sciences in Prague of 15th July 2010, these students are classified with a "fail" grade. Due to their absence at the examination, these students were not able to demonstrate their knowledge. If we included them in the sample analyzed, i.e. calculate the "fail" grades, the results would be biased.

- The results were recorded on the basis of the grade attained (excellent, very good, good and fail) at all examination sessions the students took; i.e. if a student failed at the first session, his/her performance at the second session (i.e. first retake), or as the case may be at the third session (i.e. second retake) were monitored.
- In order to determine an average result for the individual examination sessions and also for the whole examination period, the weighted arithmetic mean has been used while the value corresponded to the grade attained and the weigh equalled to the total of students who achieved the respective grade.
- Elementary analytical methods (horizontal and vertical analysis) and comparison have been employed. The study results have been compared between and among the individual study programmes (Economics and Management, Business and Administration), the two years of study (3rd year of the Bachelor programme and 2nd year of the Master degree programme) and last but not least both forms of study (full-time, distance).

As far as the software is concerned, the MS Excel, version 2007 has been used for calculations.

Results and Discussion

The following outcomes stemmed from the analysis of the examination results attained in the two aforementioned courses:

- As we can see from Table 1, the grades attained in both forms of study (full-time and distance) and courses (Agrarian Sector Economy, Business Activity Assessment) are far from being satisfactory. As for the „Agrarian Sector Economy" course, the frequency of „excellent" grade in the whole examination period (i.e. for all three eligible sessions) ranges from 0.48% to 7.49% in the distance study programme, and from 4.82% to 8.90% in the respective full-time one. The „Business Activity Assessment" course showed „excellent" grades in the interval from 0% to 21.09% in the distance form while the percentage recorded in the full-time form averaged between 1.07% and 12.08%. On the other side of the scale, we can observe that the frequency of failures is high. As for the „Agrarian Sector Economy" course, the distance form failures ranged from 7.87% to 26.99% and the full-time ones from 38.66% to 49.05%. The „Business Activity Assessment" course recorded the failure percentage between 22.66% and 57.53% in the distance study form and from 24.15% to 47.43% in the full-time one.

It clearly stems from the analysis that the „core" of the results attained at both examinations is the „good" passing grade. There are two different reasonings to be raised at this point. Firstly, we can suppose that students achieving worse results are not sufficiently devoted to the preparation even if they do evince the skills and potential needed. These students' priority is to pass the examination regardless of the grade and therefore to be content with a worse result. On the other hand, there are students who do a very thorough preparation but their general learning potential, capabilities or „talent" do not allow them to meet the requirements and achieve a better result.

Agrarian Sector Economy Distance studies	2006/2007				2007/2008				2008/2009				2009/2010				2010/2011			
	Session				Session				Session				Session				Session			
	1st	2nd	3rd	Σ	1st	2nd	3rd	Σ	1st	2nd	3rd	Σ	1st	2nd	3rd	Σ	1st	2nd	3rd	Σ
Excellent (%)	3.74	1.72	11.36	7.49	3.85	2.50	2.50	5.50	0	0.96	0	0.48	0.62	1.04	4.00	2.45	2.36	3.64	13.04	6.30
Very good (%)	10.16	14.66	22.73	24.60	15.93	12.50	20.00	25.82	11.43	3.85	6.52	14.76	5.52	3.13	4.00	8.59	11.81	16.36	39.13	25.98
Good (%)	17.65	31.90	34.09	45.45	25.82	20.00	50.00	46.60	34.29	38.46	60.87	66.66	28.83	33.33	44.00	61.97	37.01	36.36	39.13	59.85
Fail (%)	68.45	51.72	31.82	22.46	54.40	65.00	27.50	23.08	54.28	56.73	32.61	18.10	65.03	62.50	48.00	26.99	48.82	43.64	8.70	7.87
Agrarian Sector Economy	**2006/2007**				**2007/2008**				**2008/2009**				**2009/2010**				**2010/2011**			
	Session				Session				Session				Session				Session			
Full-time studies	1.	2.	3.	Σ	1.	2.	3.	Σ	1.	2.	3.	Σ	1.	2.	3.	Σ	1.	2.	3.	Σ
Excellent(%)	7.75	13.89	10.00	8.69	9.82	7.92	7.14	8.90	9.40	4.50	5.49	7.12	7.03	4.24	2.35	5.36	7.32	2.88	2.17	4.82
Very good (%)	25.25	26.39	28.00	23.76	18.41	23.27	21.43	20.38	17.55	13.51	18.68	16.30	14.38	18.22	14.12	15.77	14.29	18.52	25.00	17.52
Good (%)	23.00	46.53	54.00	28.89	22.08	27.72	37.50	25.51	25.71	27.48	34.07	27.53	24.92	30.51	57.65	31.39	21.95	34.57	52.17	31.36
Fail (%)	44.00	13.19	8.00	38.66	49.69	41.09	33.93	45.21	47.34	54.51	41.76	49.05	53.67	47.03	25.88	47.48	56.44	44.03	20.66	46.30
Business Activity Assessment	**2006/2007**				**2007/2008**				**2008/2009**				**2009/2010**				**2010/2011**			
	Session				Session				Session				Session				Session			
Distance studies	1.	2.	3.	Σ	1.	2.	3.	Σ	1.	2.	3.	Σ	1.	2.	3.	Σ	1.	2.	3.	Σ
Excellent(%)	23.60	10.34	30.00	21.09	4.05	11.11	16.67	6.54	1.28	2.22	5.56	2.13	3.53	0.00	0.00	2.06	0.00	0.00	0.00	0.00
Very good (%)	19.97	17.24	30.00	18.75	10.81	11.11	16.67	11.21	6.41	13.33	22.22	10.64	2.35	11.36	17.62	6.85	7.00	22.22	21.05	13.74
Good (%)	37.08	37.94	40.00	37.50	45.95	48.15	50.00	46.73	34.62	33.33	61.11	37.59	34.12	31.82	35.29	33.56	22.00	44.44	52.63	32.96
Fail (%)	21.35	34.48	0.00	22.66	39.19	29.63	16.66	35.52	57.69	51.12	11.11	49.64	60.00	56.82	47.09	57.53	71.00	33.34	26.32	53.30
Business Activity Assessment	**2006/2007**				**2007/2008**				**2008/2009**				**2009/2010**				**2010/2011**			
	Session				Session				Session				Session				Session			
Full-time studies	1.	2.	3.	Σ	1.	2.	3.	Σ	1.	2.	3.	Σ	1.	2.	3.	Σ	1.	2.	3.	Σ
Excellent(%)	15.19	2.86	0.00	12.08	1.15	7.46	8.34	3.16	3.48	2.50	4.16	3.29	0.75	1.08	6.67	1.07	4.91	1.85	0.00	3.75
Very good (%)	24.68	11.43	50.00	24.15	8.62	16.42	41.66	12.25	22.61	22.50	12.50	21.86	11.32	27.96	46.67	16.89	18.59	9.26	32.35	17.33
Good (%)	37.90	42.86	50.00	39.62	32.76	47.76	41.66	37.16	34.78	43.75	70.84	39.52	48.68	44.08	26.66	46.65	35.44	52.78	52.94	41.22
Fail (%)	22.23	42.85	0.00	24.15	57.47	28.36	8.34	47.43	39.13	31.25	12.50	35.33	39.25	26.88	20.00	35.39	41.06	36.11	14.71	37.70

Table 1: Structure of the examination results (grades)

- When observing the grades in the order of individual examination sessions, we can say that the highest rate of „fail“ (see Fig. 1 and Fig. 2) is recorded at the first attempt. The number of students who fail the examination at this stage is very high. In the sample, one of the academic years even saw a failure rate of 71% (Business Activity Assessment – distance form, academic year 2010/2011). As the students themselves admitted in an anonymous opinion poll, they either decided to „come and give it a try“ or underestimated the preparation and therefore failed. After the first failure, some students give up and do not even keep on trying; the others register for the retake sessions. However, a high percentage of „fail“ grades also occurs at the second examination session (i.e. first retake). Furthermore, the results at the third attempt (i.e. second retake) shown in Table 1 are again far from reaching a high success rate. This is quite astounding as the motivation to pass the examinations in question should be very high (in case of failure, a student has to retake one year, cannot register for the final state examination and, in the worst possible case, can even be offloaded from study). Taking the above facts into account, it can be assumed that these failing students are simply not capable of efficient preparation. This is quite obvious at the oral examination where these students merely reproduce without understanding the point or the problem. Moreover, it can be observed that the students are not able to use specialist literature/resources independently – they memorize the content of lectures or textbooks and then „reproduce“ it at the examination.

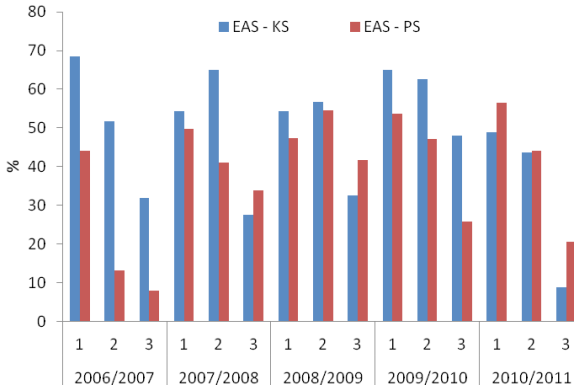

Figure 1: Overview of “fail” grades at the individual examination sessions of the Agrarian Sector Economy course (distance form shown in blue, full-time in red)

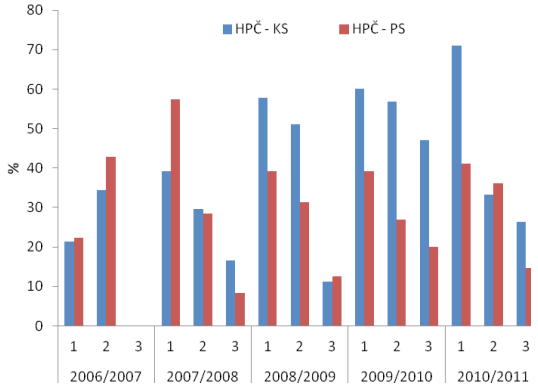

Figure 2: Overview of “fail” grades at the individual examination sessions of the Business Activity Assessment course (distance form shown in blue, full-time in red)

- As we can see from the five-year interval shown in Fig. 1 and Fig. 2, there are some differences in the average study results attained not only between the two study programmes but also between the two forms of study. The results in the distance form were fluctuating, however, the overall results have been deteriorating in both subjects surveyed (Agrarian Sector Economy, Business Activity Assessment). The results in the full-time form were also very volatile – nevertheless, compared to the distance form, they were generally more positive in some years. Anyway, also the average results recorded in the full-time form of study have been generally deteriorating. This very likely reflects recent situation when more and more students who lack higher education prerequisites (knowledge, skills, motivation to study) are admitted to universities. On the other hand, there is undoubtedly a certain share of students who have the potential and capabilities to perform better but employ it more in various after-school or extra-curricular activities.
- It can also be stated that the more students in the year, the worse average study results attained. For instance, in the academic year 2006/2007, the 158 Business and Administration students (full-time) recorded the average grade of 2.76 in the Business Activity Assessment course whereas in 2010/2011, 285 students recorded the average result of 3.13. Within the Economics and Management study programme (full-time), the 410 students of the Agrarian Sector Economy course attained the average grade of 3.26 in the academic year 2008/2009. However, in 2010/2011, 379 students recorded the average of 3.19. This is indicative of the fact that the quantitative aspect of the entrance examination procedure outweighed the qualitative standards of applicants.

Academic year	*Agrarian Sector Economy*							
	Full-time studies				*Distance studies*			
	session			total average	session			total average
	1st	2nd	3rd		1st	2nd	3rd	
2006/2007	3.03	2.59	2.60	2.89	3.51	3.34	2.86	3.37
2007/2008	3.12	3.02	2.98	3.07	3.31	3.48	3.03	3.32
2008/2009	3.27	3.28	3.14	3.26	3.43	3.51	3.26	3.43
2009/2010	3.25	3.20	3.07	3.21	3.58	3.57	3.36	3.54
2010/2011	3.28	3.20	2.91	3.19	3.32	3.20	2.43	2.19

Table 2: Examination results in relation to the individual sessions (attempts) – Agrarian Sector Economy, Bachelor degree, Economics and Management study programme

Academic year	*Business Activity Assessment*							
	Full-time studies				*Distance studies*			
	session			total average	session			total average
	1st	2nd	3rd		1st	2nd	3rd	
2006/2007	2.67	3.26	2.50	2.76	2.56	2.96	2.10	2.62
2007/2008	3.47	2.97	2.50	3.29	3.20	2.96	2.67	3.11
2008/2009	3.10	3.04	2.92	3.07	3.49	3.33	2.78	3.34
2009/2010	3.26	2.97	2.60	3.16	3.51	3.45	3.29	3.46
2010/2011	3.13	3.23	2.82	3.13	3.64	3.11	3.05	3.39

Table 3: Examination results in relation to the individual sessions (attempts) – Business Activity Assessment, Master degree, Business and Administration study programme

Conclusion

Based on the analysis of study results attained by 3,635 (three thousand six hundred and thirty-five) students at the examinations of chosen FEM core subjects, the following conclusions can be made:

- ***Can we assume that the level of knowledge acquired by the graduates in the core courses is low*?** This question can be answered quite decidedly – the study results attained do not prove satisfactory mastering of core economic subjects. Even if only two of these courses have been analyzed, similar results can be expected also in other subjects. Based on the long-term pedagogical experience, we can say that not all students with excellent grades become excellent professionals and vice versa, an average student recording average or even poor study results can become a successful specialist in the field. However, this cannot be generalized. As we have already mentioned, there are two main reasons behind poor study results. The students either prefer a mere passing of the examination regardless of the result (i.e. grade) or lack the respective higher education prerequisites and therefore should not be admitted to the university at all. As stated in the introduction to this paper, the European strategy is to increase the share of higher education graduates in the age group 25-34 to 40%. Nevertheless, this quantitative expansion in tertiary education sector could lead to a potentially risky situation (Koutský, Zelenka, 2011) when the percentage of university graduates in the population will grow but not hand in hand with the quality knowledge. This was proven by analyzing the sample of FEM CULS students. While the number of students has been growing, the study results attained have been deteriorating at the same time. It has to be mentioned in this connection that the quality of students does not result only from the quality of the teaching process; the interdependence between the quality teaching process and students'/graduates' performance is not so straightforward (which is quite a common simplification of the problem).
- Even if one logically assumes that ***students who fail the examination would prepare more studiously for the retake session,*** this is not often true. On the contrary, 3rd year students of the distance Bachelor degree programme recorded even worse results (from a viewpoint of "fail" grades frequency) at the first retake of the "Agrarian Sector Economy" examination. This paradox sometimes occurred also in the full-time form of study. The situation in the "Business Activity Assessment" course, taught in the second year of the Master degree programme, is, generally speaking, a little more positive since the students already "keep their eyes on the diploma" and are therefore more motivated. However, also the results in some years disproved this logical assumption.
- As for ***whether there are any significant differences in study results between the two forms of study,*** we can say that these differences certainly exist. The results attained by the students of distance study are generally worse than those recorded by full-time students within both Bachelor and Master programme. There are likely to be more reasons for this structure of study results. Above all, the time-demandedness of distance study that mainly arises from the fact that these students are supposed to balance their occupational duties, school duties and often also family commitments. Furthermore, some students are forced to acquire a university degree/higher qualification by their employers (in order to retain their current position) and

would not otherwise evince strong inner motivation to study. Another decisive factor (having a substantial impact) lies in the fact that distance forms of study are actually based on self-study. However, most students "cannot" study independently; on their own. They usually prefer memorizing textbooks or other resources and do not use other references and specialist literature. This then results in "reproducing" the texts without really understanding and grasping the essence of the problem, the context and other relations.

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ICT SPECIALIST SKILLS AND KNOWLEDGE – BUSINESS REQUIREMENTS AND EDUCATION

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Abstract

This paper describes partial results of surveys realized among Czech universities and business units which aim has been to analyze current situation in demand and supply side of ICT (Information and Communication Technologies) specialists at the labor market in the Czech Republic. The demand and supply side are compared through their requirements on knowledge of ICT specialists. The results present typical "product" of Czech education system in ICT competencies. General conclusions show that majority of undergraduates do not have appropriate knowledge profile to enter ICT corporate business as qualified employees - ICT specialist - without further additional training. The same fact is valid for a little less than a half of graduates at master level. During quantitative analysis, we have identified that at about 60 per cent of ICT specialists did not pass a formal ICT education. These facts show lacks in ICT oriented study programs and provoke requirement on further development of ICT oriented curricula in accordance to business requirements and needs.

Key Words

ICT specialist, education, business requirements

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Introduction

The contemporary economic environment (Saee, 2004) places elevated emphasis on ICT skills in various fields on human activities. The same is also valid in the area of Information and Communication Technologies (ICT). For example increase of managerial abilities and skills in the area of ICT improves possibilities introduction and using of ICT in everyday economic practice and their subsequent operation. In 2010, almost 5.4 % of the employed global population was working in positions of ICT professionals (OECD, 2010) in 2008, (Doucek et al, 2011). Their knowledge have to be constantly expanded and, simultaneously, the typical knowledge of ICT professionals (Frinking et al, 2005) have to be increasingly combined with other "non- ICT" knowledge, such as marketing, business, etc. (OECD, 2010), (EC, 2010). Similar conclusions were drawn by (Fernandez, 2006), who states that a combination of ICT and "non-ICT" knowledge is more important for enterprises in selecting employees than only specific ICT knowledge.

Impact of ICT on the whole economy is evaluated as positive in majority of cases. These findings were approving by numbers of studies (Brynjolfsson & Hitt, 1996; Jorgenson & Stiroh, 1999). The impact of ICT has been also approved by econometrics and statistical analysis for example in (Hanclova & Doucek, 2011; Fischer & Vltavska, 2011; Delina & Tkac, 2010; Dorcak & Delina, 2011). These studies prove that the economic boom at the end of nineties was subsequence of new ICT that were generally implemented and putted into use. Together, Delina (Vajda & Delina, 2009) presents the results of ICT usage study in Slovakia based on European methodology, where weak ICT solution adoption relates to low level of e-skills and e-knowledge. In study by Delina from 2010 (Delina & Tkac, 2010) he also revealed interesting relations between e-skills and trust into ICT. It means higher e-skills have positive impact on ICT usage through increased trust into these new technologies.

Mentioned studies lead us to reflection how is this supported by the education at the universities.

The best way how to identify the "extent of support" that universities devote to the ICT education is execution of survey among them. Really important is that we have to take into account level of studies. We have divided studies in two levels at the universities in the Czech Republic – bachelor and master study. From this paper´s point of view is really important that this division is not adequately respected as by the universities so as by the enterprises.

The aim of this paper is **finding and highlighting the gap between requirements of enterprises on ICT specialists´ knowledge and really taught university ICT study programs**. This distance is identified as the gap that should be reduced by universities based on the communication between enterprises´ and universities 'representatives. Current situation at the labor market can be described as discrepancy between requirements of enterprises on ICT specialists´ knowledge with knowledge that offers university ICT study programs.

This finding is confirmed by another research made by the research team at the University of Zagreb (Varga, Stiffler, Lužar-Stiffler, 2004) and by research team in Saudi Arabia (Al-Jabri, Fraihat, 2005). These teams in their research conclusions confirm our results that there is a big discrepancy between companies' expectations about graduates real knowledge and potential knowledge that offer the university ICT oriented study programs. From our point of view is really important that (Varga, Stiffler, Lužar-Stiffler, 2012) use in their research similar knowledge structure as has been applied in our survey (Varga, Stiffler, Lužar-Stiffler, 2012). The same approach and principles

are applied only with little different domains in new proposal of Computing Curricula (Strawman, 2012) of the ACM.

Materials and Methods

We have defined the methodology of our survey and it was compared with methodologies other institutions or authors (CEPIS, 2012; Fernandez, 2006; Strawman, 2004; etc.).

Methodology has been divided into the following sections:

- Definition of ICT roles, particular jobs and key competencies.
- Definition of knowledge domains and knowledge profiles.
- Definition and measurements of knowledge level.
- Definition and calculation the difference between university graduates´ knowledge profile and business knowledge profile.
- Methods of subject's selection (universities and economic subjects) for data collection.
- Methods used to questionnaires evaluation.

ICT Roles

We have defined six essential ICT roles (Business Analyst, Manager of ICT development, IS/ICT dealer, Developer – IS Architect, Administrator, Advanced User) in year 2005 and seven roles (Business Analyst, Manager of ICT development, IS/ICT dealer, Developer – IS Architect, Administrator, ICT Lecturer, Enterprise Architect) in year 2010. Changes were set up by changes on the labor market. All of these roles have the same definition in both surveys. New roles defined for the survey in year 2011 replaced the role Advanced user analyzed in the first survey.

There are presented only these five roles included in both surveys (**Business Analyst, Manager of ICT development, IS/ICT Dealer, Developer, Administrator**) in this paper. These roles were described by key knowledge, key activities and professions usually included in the role.

The envelope of **Business Analyst** contents in majority of business units jobs as knowledge engineer, business consultant, standard SW implementer, information broker, competitive intelligence specialist.

Business Analyst is expected usually to dispose knowledge in:

- Modeling of enterprise processes changes, in order to make them more rapid, more effective and less costly in order to produce quality products/services.
- Optimum use of knowledge and competence of employees and business partners.
- Planning, which ICT services/applications are advantageous to use for business processes support.

Business Analyst is usually responsible in business unit for:

- Analysis, design, standardization and optimization of enterprise processes and organizational structures (financing, trade, production etc.).
- Analysis and planning of business effects resulting from IS/ICT.
- Analysis and design of knowledge management at organization.
- IS/ICT risk analysis, business continuity.
- Proposal of ICT services supporting enterprise processes.
- Implementation and customization of standard software.

- Proposal, design and search of information content (information services, portal, and web) needed for management support.

ICT Development and Operation Manager role contents following jobs in business: ICT Manager, Chef Information Officer, Project Manager, Operation Manager, Security Manager etc. These persons' key knowledge is mainly focused on:

- Business/ICT relations management – the role of ICT in supporting business goals.
- ICT services, processes and resources organization and management.
- Management and coordination of ICT projects.

ICT Development and Operation Managers are responsible for a lot of tasks in a unit. The most important tasks of ICT Development and Operation Manager are:

- ICT project management.
- Information strategy working-out.
- Sourcing strategy working-out.
- ICT services delivery management.
- IS/ICT enterprise operation management.
- Problem and change management.
- Risk management.
- Security management.
- IS/ICT economics management.
- Quality control and IS audit.

In time of economic crisis, every company needs the role **Businessperson in ICT products and services** (ICT Dealer, ICT Relationship Manager, Account Manager, Relationship Manager, etc.). This role is responsible for:

- Marketing of ICT products and services.
- ICT products and services sales.
- ICT products and services purchase.
- Preparation of agreements on supply of ICT products and services (SLA).
- Management of relationship between supplier and customer (sourcing strategy principles).
- Negotiation with partners (respecting different national and cultural environment).

To be able to work in this role employee has to know:

- Knowledge of global and local ICT markets.
- Knowledge of existing/potential partners/customers.
- Legal aspects of ICT trading.
- Negotiation strategy and tactics.

The fifth role is **Developer/IS Architect** which is usually working as a developer, programmer, tester, system integrator, ICT architect, systems development manager. This role has to be familiar with:

- Technologies and procedures needed for design, integration and operation of applications.
- Design and development of user-friendly applications with simplified operational requirements.
- Design of suitable technological and application architecture of IS/ICT organization.
- Management of the team of designers and developers.

Developer/IS Architect is usually responsible for:

- Analysis and design of ICT applications (on-line services, BI, effectiveness of business processes, personal/tailored application. entertainment).

- Database design.
- Data mining.
- Programming of client, server, database and web applications.
- Grid programming.
- Application testing.
- Application documentation (design, program, operational, users).
- Maintenance and administration of application versions.
- Integration of applications.
- Design of hardware, software and data architectures.

The last role that is presented in this paper is **Administrator of Applications and of ICT Infrastructure**. This role is usually set up in every company which uses ICT. Administrator has to know:

- How to acquire, maintain, operate and terminate ICT infrastructure components.
- How to scale up and down the ICT infrastructure.
- How to support users of IS/ICT.

Administrator´s key activities are:

- Application administration, training and support of users.
- Database administration.
- Administration of data content.
- Administration of computer network and of basic SW.
- Administration of configurations.
- Web administration.

More detail description of all identified ICT roles is presented for example in (Maryska & Novotny, 2012).

Knowledge Domain and Knowledge Level

Main part of each survey have been aimed on detection of knowledge that enterprises requires from ICT specialists and on contrary the level of potential knowledge that universities provides students by force of their studies. This aim has been filled up through definition of 16 knowledge domains and 6 knowledge levels that are specified and described in the Table 1.

We have defined 16 knowledge domains for our survey. More detail description of these domains is provided in the following Table 1.

Domain ID	Name of the Knowledge Domain and Description
MS01	**Process Modeling and Optimization** – process description, analysis and design or re-design of a process, usage of selected modeling tool, and practical experience in process modeling.
MS02	**Functionality and customization** –this domain contents namely deployment of software applications in order to support business processes, function requirements analysis, business models interpretation etc.
MS03	**Management ICT in organizations.** The definition of ICT services and decision about ICT operation and operation of ICT services (internal, Business Process Outsourcing (BPO), outsourcing, Software as a Service, etc.), management of corporate ICT processes (COBIT, ITIL, etc.), ICT services (internal, BPO, outsourcing, Application Service Providing (ASP), etc.).
MS04	**Analysis and design** of corporate ICT architecture, ways and types of communications among applications in enterprise information system and communications with other enterprises (Electronic Data Interchange (EDI), XML, etc.).

Domain ID	Name of the Knowledge Domain and Description
MS05	**Software engineering** – methods and tools for development, testing, distribution, documentation, maintenance and integration of software applications. Management of small developer units.
MS06	**Data and information engineering** – methods and tools for data analysis and database design, Data Warehouse and Business Intelligence applications design, development and improvement.
MS07	**ICT knowledge** – knowledge of ICT infrastructure (hardware, operation systems, networks, network protocols etc.).
MS08	**Operational excellence** – management of enterprise information system properties - efficiency, effectiveness, reliability and security for applications and for information system as well.
MS09	**Team leadership skills** – domain is focused on soft managerial skill as team management, project management, techniques and tools for team cooperation, risk management, management of crisis situation.
MS10	**ICT market knowledge** - structure of supply and demand on ICT market, awareness of on market available products and services, important suppliers, software license models, pricing levels, market trends.
MS11	**Organizational management methods** – management of companies and institutions, ICT governance, corporate governance
MS12	**Enterprise finance and economics** – financing, accounting, effectiveness and efficiency metrics and measurement.
MS13	**Sales and marketing** – marketing in ICT sector and products, market and customer analysis.
MS14	**Mathematics** – knowledge of mathematics and statistics methods.
MS15	**Law** – knowledge of basic act in the relation to information society – digital signature act, copyright act, personal data protection, the commercial code, code of ethics, etc.
MS16	**Knowledge in business sectors** – knowledge of appropriate business sector – for example –civil engineering, agriculture, forestry etc.

Table 1: Knowledge domains (Source: authors)

On the basis of a discussion with representatives of universities and enterprises in the ICT area, we have decided to apply this scale also for questioning enterprises. For enterprises, we have replaced the number of ECTS credits (European Credit Transfer System) for enterprises by the more comprehensible term "number intensive of training days". The recalculation mechanism was chosen as the ratio 1 ECTS credit = 1 day of intensive training. There were identified following knowledge levels: **Level 0 - No knowledge**, **Level 1 - Overview** (relevant to 1-3 ECTS credits), **Level 2 - Basic orientation and terminology** (relevant to 4-8 ECTS credits), **Level 3 - Good orientation and basic practical skills** (relevant to 9-32 ECTS credits), **Level 4 - Good orientation and good practical skills** (relevant to 33-64 ECTS credits), **Level 5 - Highest knowledge quality and advanced practical skills** (relevant to 65 and more ECTS credits).

Differences between Supply and Demand

The distance between the knowledge profile of the study field and the particular professional roles´ knowledge profile indicates the number of days that the enterprises have to invest into a newly employed ICT professional (graduate) from such a field of study for him (her) to attain the minimum required level of knowledge that the enterprises require for the particular professional role.

Distance between university knowledge profile UKP and business knowledge profile BKP is expressed by the number of additional intensive training days required for the graduate with knowledge profile UKP to fulfill the minimal requirements of business profile BKP. The smaller the distance is the "cheaper" the graduate of university for the relevant ICT role in business is. We have applied the modified method of distance from ideal variant for comparison between UKP and BKP profiles.

$$D(a) = d(UKP, BKP),$$

where

- d is the function of the distance,
- vector UKP contents evaluation of each knowledge domain of UKP,
- vector BKP contents evaluation of each knowledge domain of BKP for each ICT business role.

Function of the distance is calculated for each knowledge domain by following metric:

$d(UKP_i, BKP_i) = 0$, for $UKP_i >= BKP_i$,

$d(UKP_i, BKP_i) = BKP_i - UKP_i$ for $UKP_i < BKP_i$.

The aggregated distance between university knowledge profile and ICT business role profile is then calculated as:

$$D(a) = \sum_{i=0}^{16} d_i\,(UKP_i, BKP_i) = \sum_{i=0}^{16} d_i\,(UKP_i, BKP_i)$$

and its interpretation is number of training days that have to be invested into the new enrolled ICT professional. Following discussions with representatives of enterprises and professional enterprises, we considered that 60 days of training is an acceptable limit to the number of days of extra training (acceptable distance), where the graduate is still not too expensive for the enterprises.

Clustering

Data received from universities were evaluated trough the analytical tools provided by Microsoft SQL Server platform. We have used platform MS SQL Server 2008 R/2. Analyses have been based on the data-mining (DM) principles. In the context of the principles of cluster analysts, it should be added that we used K-means algorithms (Bilmes 1998), (MacLennan et al 2009). Our analyses have been based on clustering methods in both surveys. We have analyzed data acquired from the questionnaires sent by enterprises and universities.

Cluster analysis is a set of algorithms which gather objects in defined sample of objects into groups. Groups (clusters) are based on two basic characteristics:

- objects are the most similar in the cluster,
- clusters are the most different.

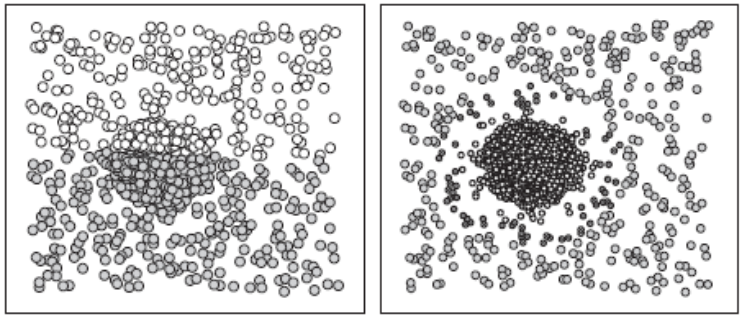

Fig. 1: Clustering based on K-means (left) and EM algorithm (right) source: (MacLennan, Tang & Crivat, 2009)

University study fields were segmented in four clusters at bachelor level and in four clusters at master level through above mentioned analytical tools. Each cluster contains ICT study fields with rather similar characteristics. Detailed information about cluster is described in (Doucek et al, 2007).

Survey Among Business Units

The survey among business units have been realized through professional agency that used the CAWI (Computer Aided Web Interviewing) and CATI (Computer-Assisted Personal Interviewing) methods. The survey has respected structure of enterprises in the Czech economy and it also took into account facts like dependence on ICT (three categories) and number of employees (six categories). Based on these criterions, we have defined sample of business units.

The basic set of economic entities was thus divided into 18 strata on the basis of six size categories and three categories based on the dependency of the sector on information technologies. Probability sampling without replacement was performed for the individual strata. There is no unambiguously identifiable subgroup of economic entities in the sample of examined economic entities. This fact is a result especially of the sizes of the economic entities, which cover a wide range of values. This is then related to the fact that the number of ICT professionals in the examined economic entities is similarly variable. We took into account all these facts in preparation of the survey in that we required a greater fraction of examined economic entities in all the entities in the given subgroup for subgroups where a smaller number of entities could be anticipated (e.g. large entities with high dependence on ICT).

In the survey in 2006, the surveyed sample was set at 1002 entities (see Table 2).

	0	1 – 9	10 – 49	50 – 249	250 – 999	1,000+	Total
MIT	56	28	28	28	37	16	**193**
SIT	56	56	56	56	71	36	**331**
VIT	56	110	160	122	26	4	**478**
Total	168	194	244	206	134	56	**1,002**

Table 2: Structure of the Observed Sample 2006 (Source: authors)

We performed the second survey at the end of 2010 and it was also carried out utilizing the experience and base of a private company that performs surveys as its sphere of business. The structure of the sample of economic entities differed slightly from the first survey in the survey performed in 2010. There was a fundamental change in the classification of the economic entities on the basis of the size. In the second survey, we distinguished only three groups of employees. We excluded the groups with 0 and 1-9 employees from the survey on the basis of experience from the first survey in 2006 and on the basis of recommendations of experts from the Czech Statistical Office. The groups with 250-999 and 1000+ employees were combined

in group 250+. The final sample of economic entities contained 1011 economic entities in the division according to Table 3.

The factor of dependence of the entities on ICT remained with the same conditions as was established in the survey in 2006.

	10 – 49	50 – 249	250 +	Total
MIT	45	46	44	**135**
SIT	57	474	98	**629**
VIT	66	142	39	**247**
Total	168	662	181	1,011

Table 3: Structure of the Observed Sample 2010 (Source: authors)

Survey Among Universities

We have selected all universities in the Czech Republic that provided study fields in the area of ICT. This condition was met in case the study field´s name containing some of following words: "information, technology, software, web, data mining" etc. Selection has been carried out at the data of the Institute for Information on Education that provides data from the Register of Students in the Czech Republic.

Each of the surveys was based on "exhaustive survey" among universities effective in the ICT education area and their study programs. There was sent standardized questionnaire to each of selected university. Universities were asked for filling in the questionnaire for each ICT related study programs they provide. After defined time the questionnaires that have been sent by universities back to researchers, were processed by tools for data processing and data analysis (ETL – Extract-Transform-Load and data-mining). (Maryska, 2009)

We monitored several variables in the survey:

- the total number of students newly registered for study in ICT fields of study, the numbers studying in ICT fields of study, the number of graduates and the number of unsuccessful students in ICT fields of study. We determined these characteristics for the 2001 – 2009 period, for which data are available in the official statistics of the Institute for Information in Education and the Ministry of Education, Youth and Sports;
- the number of credits that students can obtain in their study for each of the 16 analyzed knowledge domains;
- key identification data for the fields of study – whether this is a classical bachelor's, subsequent master's (connected two-year study after completion of bachelor's study) or five-year master's study program (five-year master's study programs are the "pre-Bologna" fields of study, whose recertification was completed in the 2006/2007 school year and which are now gradually being terminated).

Methods of school selections and methods used to questioning schools and enterprises are entailed described for example in (Doucek, Maryska & Novotny, 2012).

Results and Discussion

We performed the survey among universities repeatedly in 2006, 2009 and 2011. This article will consider only the results of the research performed in 2006 and 2011. The detail information about response rate is presented in Table 4.

	2006			2011		
	Universities	Faculties	Fields	Universities	Faculties	Fields
Identified	34	65	249	31	71	376
Answers	24	53	203	21	29	196
Response rate in %	71	82	82	68	41	52

Table 4: Response For Survey (Source: authors)

Differences among requirements of enterprises and supply of universities (through knowledge of their graduates) are presented in following parts of our article.

Other view on the data base of responses is the share of the study programs according to the types of faculties in our statistical sample.

Type of Faculty/Type of Study	Bachelor	Master 2 years	Master 5 years
Economic	15	6	4
Electro technical	5	8	8
Information technologies	15	40	39
Pedagogical	12	7	12
Other Technical (civil engineering, machinery, transport)	6	7	2
Medicine		1	
Total	53	69	65

Table 5: Number of Study Programs According to the Types of Faculties 2011 (Source: authors)

Other detail analysis according to study level is presented in following chapters.

Bachelor Study Programs

We have evaluated questionnaires from 23 faculties which provide 53 study programs on the bachelor level of study. Table 6 presents share of faculties in each cluster of the survey.

Type of Faculty/ Cluster	Bc-A 2011	Bc-B 2011	Bc-C 2011	Bc-D 2011	Total
Economic	8	2	5	0	15
Electro Technical	3	2		0	5
Information Technologies	7	0	2	6	15
Pedagogical	4	7	1	0	12
Other Technical (civil engineering, machinery, transport)	4	1	0	1	6
Total - Bachelor level	26	12	8	7	53

Table 6: Number of Study Programs According to the Type of Faculty 2011 – In Clusters (Source: authors)

Fig. 2 takes in it the information about the potential knowledge and skills offered by respondent faculties in bachelor level of study.

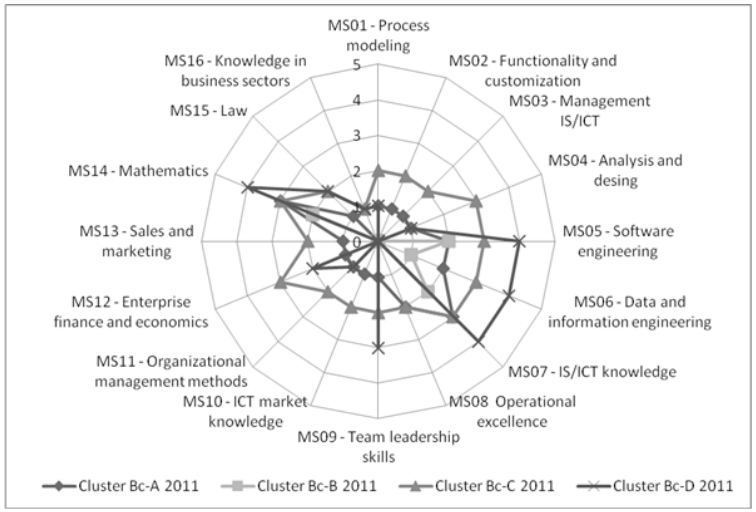

Fig. 2: Bachelors` Potential Knowledge Profile (Source: authors)

Identified clusters at bachelor level in year 2011:

- **Bc-A 2011** – consists of study programs having low level of specific ICT business education. Our work hypothesis is that ICT education is "additional" to specific knowledge from other non ICT domains (e.g. transportation or chemistry). Study programs in this segment are focused mainly on software engineering, data engineering and ICT infrastructure without any other knowledge. Such selected parts of ICT give to graduate students only briefly overview of the whole problematic and general information. The skill level three is quite low for teaching these types of skills. All the skill levels are also under the median calculated through all investigated segments. This cluster contains mainly economic faculties and information technologies faculties.
- **Bc-B 2011** - This segment offers harmonic education in "exact sciences". Education is focused on ICT area with added value in the statistics, marketing and enterprise finance and economics. This specialization gives perspective to a graduate either to be a lower level ICT manager, junior business analyst with farther master study level. This cluster contains namely pedagogical faculties.
- **Bc-C 2011** - offers common education in "classic" ICT. This kind of education represents knowledge in areas of ICT services, software engineering, data engineering and ICT infrastructure, operational excellence, communications and team leadership. Additional is provided statistics – part of "exact science". These graduates have potential for lower junior computer specialist positions. This cluster contains the rest of economic faculties.
- **Bc-D 2011** - the most complex knowledge with accent not only to ICT education, but also to general education in economics, organization and enterprise knowledge (see Fig. 2). The D segment with whole scope of taught knowledge offers potential for future graduates to enter into the level of upper management either in ICT or in other areas of business or as a business consultants or analysts (after finishing relevant master studies). This cluster is represented by information technologies faculties.

The Fig. 3 presents gaps at bachelor level in the years 2006 and 2011. The gaps are presented for each of above mentioned roles and clusters.

There is visible the small gap for the roles Administrator in Fig. 2 in year 2006, but there is only one Administrator role

(Bc-B 2006) in this Fig. 2 that meet the lowest defined level of knowledge that are acceptable by business. All other roles exceed defined limit 60 additional days and graduates in these clusters are too expensive for enterprises.

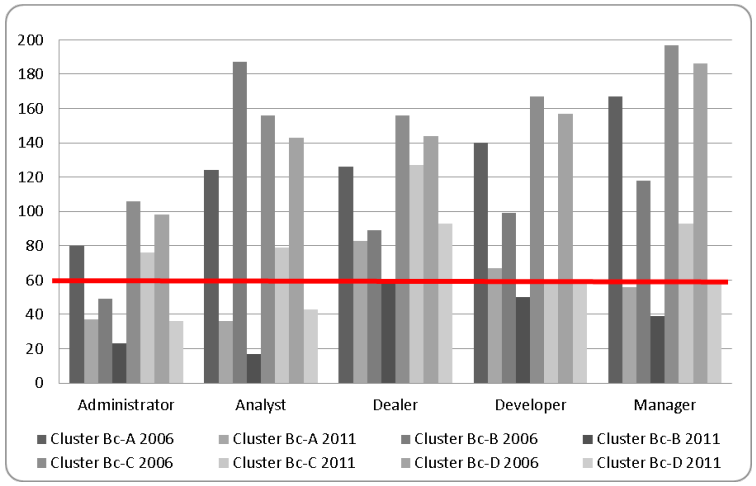

Fig. 3: The Gap 2006 and 2011 – Bachelor Studies (Source: authors)

Much better situation was detected at bachelor level in year 2011. It is clear visible, that the requirements are fulfilled at least once in all analyzed roles at bachelor level. The best situations have been detected in roles Administrator and Analyst. Graduates, entering the role Administrator and Analyst, have the structure of knowledge profile that almost corresponds to enterprises' requirements.

Master Study Programs

It was more difficult to build up a consistent picture about the master study potential knowledge and skills in ICT oriented studies. The main problem represent still running two types of master studies in our country. The ordinary two years master study according to Bologna declaration and heritage of the past education system - the five years master study. Number of study programs according to the type of faculties included into master level study survey and its shares on clusters are presented in Table 7. 65 study programs included in the survey is provided by 16 faculties.

Type of Faculty/ Cluster	Mgr5-A 2011	Mgr5-B 2011	Mgr5-C 2011	Mgr5-D 2011	Total
Economic	1	1	2	0	4
Electro Technical	1	2	5	0	**8**
Information Technologies	7	1	21	10	**39**
Pedagogical	5	5	2	0	**12**
Other Technical (civil engineering, machinery, transport)	0	1	0	1	**2**
Total - Master Level	14	10	30	11	65

Table 7: Number of Study Programs According to the Types of Faculties 2011 – In Clusters (Source: authors)

Reamark: The medicne faculty (Table 5) is not included into this presentation, because there was no bachelor study programm identified for this master study programm for aggregation.

Fig 4 presents **aggregated** (knowledge from bachelor level of study and on master level are aggregated into one summary in each domain) potential knowledge of graduates after five years

of study on appropriate faculty for Bologna stody programmes. For study programmes that do not belong to Bologna declaration are aggregated information about potential knowledge withhin the whole study programm – obviously for five years.

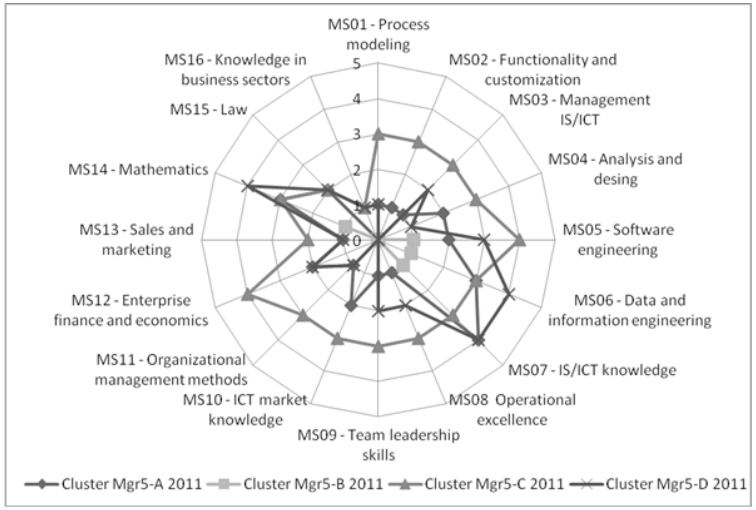

Fig. 4: Masters` Potential Knowledge Profile (Source: authors)

Identified clusters at master level in year 2011:

- **Mgr5-A 2011** – consist higher level of ICT knowledge in selected ICT knowledge domains (MS06, MS07) which are supplement to other non-ICT knowledge domain. This structure can be explained by study programs included in this cluster. This cluster contains 14 faculties. From these 14 faculties is 50% of Information technologies faculties and 35% of pedagogical faculties.
- **Mgr5-B 2011** – Study programs included in this cluster do not provide almost any ICT knowledge. The highest level of ICT knowledge is on level 1. Knowledge of ICT is probably only supplements to other primary knowledge. This cluster contains namely pedagogical faculties.
- **Mgr5-C2011**–cluster provides the most complex knowledge. Accent is not devoted only to ICT education, but also to general education in other non-ICT knowledge domains (economics, organization and enterprise knowledge). Study programs included in this cluster offers potential for future graduates to enter into the level of upper management either in ICT or in other areas of business or as a business consultants or analysts. Information technologies faculties represent 70% of all faculties included in this cluster.
- **Mgr5-D 2011** - offers higher education in selected ICT knowledge domains. The knowledge structure is similar to cluster Mgr5-A 2011. This kind of education represents knowledge especially in areas of Software engineering, Data and information engineering and IS/ICT knowledge. Additional is provided mathematics – part of "exact science". These graduates have potential for lower junior computer specialist positions. This cluster contains the rest of Information technologies faculties.

Similar results were detected at the master level, too. The difference is in the size of gap. The master level shows lower gaps than bachelor level – this was the expected result. It is worth mentioning clusters that have at master level bigger gap than at bachelor level. This is caused by fully five years studies that are not under Bologna declaration schema yet or by study fields that are in their name words like information technology, software etc. but the content of them does not contain majority of ICT business oriented courses. This fact is especially valid for cluster Mgr5-C 2011. We have identified increased gap in this cluster in comparison to year 2006.

Requirements on roles Administrator and Analyst are met in clusters Mgr-A, Mgr-B and Mgr-C in both analyzed years. On contrary role Dealer and Manager is not met in clusters Mgr-A and Mgr-C in both analyzed years. Other results are presented in Fig. 5.

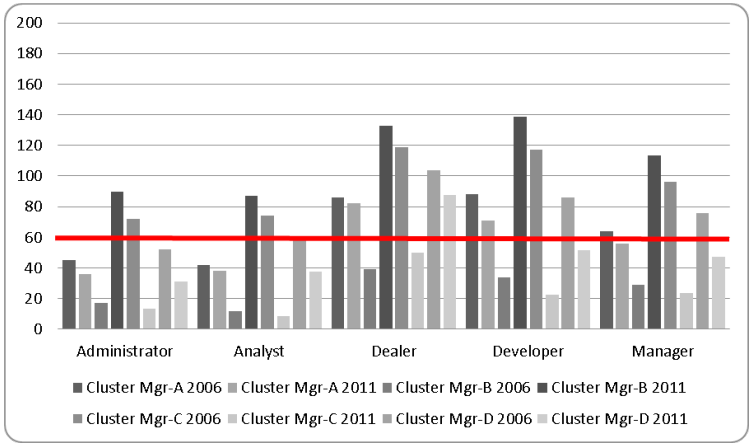

Fig. 5: The Gap 2006 and 2011 – Master Studies (Source: authors)

Conclusions

Immediate results of data evaluation of the ICT education supply side in the Czech Republic study programs are:

- ICT oriented study programs significantly differ in the level of knowledge provided to the student.
- Bachelor study programs do not provide sufficient knowledge spectrum for their graduates to enter the ICT business on leading positions without additional training in the Czech Republic. They are too "expensive" for further education in enterprises. It also depicts the situation in the Czech Republic, where only about one third of ICT graduates do not continue with the master studies (Doucek & Maryska, 2012). Bachelor study programs are then designed as not standalone, but rather as prerequisites for the master studies.
- There are not enough relevant students and graduates with required ICT knowledge profiles in the Czech Republic. Especially roles Business Analysts and IS/ICT Dealer are not covered by the actual ICT education system in Czech Republic at all. But the same situation is valid for the role Enterprise Architect as it was also presented in (Gala & Jandos, 2010).
- Although we have seen, that the gaps were changed among both surveys – the gaps are smaller in the second survey, we have to highlight, that the enterprises requirements were smaller in survey in year 2010 than in year 2006 (Doucek et al, 2012) and on the other university knowledge profiles haven´t been essentially changed in time. (Maryska & Novotny, 2012)

These findings should result into bettering up university graduates profiles. This can be achieved for example by:

- Building up the network between businesses oriented experts, universities and middle schools in order to co-ordinate the education of ICT in the whole country.
- Setting up of the methodology for evaluation of competitiveness of ICT related study programs across the country and possibility their evaluation to business requirements.
- Identification of gaps in ICT education system – missing courses and study programs for education for some specific business roles (for example IS Architect).

- All ICT oriented study curricula must be regularly maintained and evaluated by practice. To the same conclusion came also for example Varga, Stiffler, Lužar-Stiffler (2004).

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STUDY RESULTS AND QUESTIONNAIRE SURVEY OF STUDENTS IN THE LESSONS OF BUSINESS ENGLISH E-LEARNING COURSE IN COMPARISON WITH FACE-TO-FACE TEACHING

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Abstract

The paper deals with the comparison of results of students in the lessons of Business English e-learning course with face-to-face teaching at the Faculty of Economics and Management of the CULS in Prague. E-learning as a method of instruction refers to learning using technology, such as the Internet, CD-ROMs and portable devices. A current trend in university teaching is a particular focus on e-learning method of studies enhancing the quality and effectiveness of studies and self-studies. In the paper we have analysed the current state in the area of English for Specific Purposes (ESP) e-learning research, pointed out the results of a pilot ESP e-learning course in testing a control and an experimental group of students and results of questionnaires with views of students on e-learning. The paper focuses on the experimental verification of e-learning influence on the results of both groups of students. Online study material supports an interactive form of the teaching by means of multimedia application. It could be used not only for full-time students but also for distance students and centers of lifelong learning.

Key Words

e-learning, face-to-face teaching, speech skills, pretest, posttest, English for specific purposes

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Introduction

The paper deals with the comparison of results of students in the lessons of Business English e-learning course with face-to-face teaching at the Faculty of Economics and Management of the CULS in Prague. E-learning as a method of instruction refers to learning using technology, such as the Internet, CD-ROMs and portable devices like mobiles or MP3 players (Dudeney and Hockly, 2007), in our pedagogical research we comprehend e-learning as online learning which takes place via the Internet. A current trend in university teaching is the lowering of the number of contact lessons and a particular focus is put on e-learning method of studies enhancing the quality and effectiveness of studies and self-studies.

In the winter term of academic year 2011/12 we implemented a pilot e-learning course of Business English. First of all it was necessary to provide students with online material. It was carried out within the Fund of Higher Education Development of the Czech Republic. Online study support for Business English is in the form of a 14 module course and was created in the Moodle Learning Management System (LMS) which is the software with an open code and is used for study purposes on the B1 level of the Common European Framework of Reference for Languages (Kučírková, Vogeltanzová and Jarkovská, 2011). It could be used not only for full-time students but also for distance students and centers of life long learning. Online study material supports an interactive form of the teaching by means of multimedia application. Nowadays nearly every college or university uses e-learning management systems, particularly Moodle, within which each author decides how to create the main structure of the course (Vojáčková, Kuncová and Benešová, 2011).

Review of related literature

The research done in the English for Specific Purposes (ESP) e-learning field so far has been focused on piloting e-courses in order to examine the benefits of them, challenges and using it for lifelong learning. The field of e-learning is quite wide, that is why the range of issues in the following literature review is various. We have focused on how the authors comprehend e-learning and how some of them realize this in practice at higher education institutions for instance through e-learning management system Moodle, e-courses, e-portfolios etc. ESP e-learning material is also the topic of the research study concerning the pilot implementation of English for Information Technology. This material has been designed for IT working professionals, students and English language teachers. The main aim of the material is to facilitate the work of teachers, enhance self-study and encourage lifelong learning. The paper presents the background of material development and needs analysis carried out in order to decide the functionality of the material (Gridasova, Ivanovaite and Pouyioutas, 2008).

The application of new technology strategies is the main issue of another research study that is based on needs analysis questionnaire of ESP teachers in Romanian higher education and on computer-based course assessment questionnaire. The case study shows increased levels of students´ motivation, autonomy and interaction connected with computer-based instruction in opposition to the traditional face-to-face instruction. According to the empirical results, students are not prepared to be fully autonomous, therefore local solution for increased students´ autonomy can be realized through blended learning. Where an interactive online instruction may not represent the case, authors present challenges for local solutions (Pop, David and Florea 2009).

Research that investigated learners' attitudes to the application of e-portfolios in learning ESP is the topic of another research study. The authors also analyze learners' reflections on e-learning from the point of view of fostering sustainable lifelong learning. The participants of research are the students of different fields of studies who learn English for Specific Purposes at university. The study examined learners' perceptions of using electronic language portfolios for various tasks in English for Specific Purposes. Learners' experience of applying e-portfolios and learners' reflections on their benefits for improving language skills were analyzed and statistically treated using SPSS software. The results show that students are satisfied with the application of e-portfolios in the lessons of ESP. Using e-portfolios helps teachers strengthen autonomous learning, it encourages students' critical thinking, develops their creativity, motivates learners and encourages their collaboration (Kavaliauskiene and Anusiene, 2008).

Support to distance learners is presented in the research study on piloting a vocational e-course at a UK college. The course supports non-native English speaking learners to complete the essay-type questions of the e-course assignments. It suggests further improvements to the course and recommendations for further research (Bibila, 2010).

According to Fedyunina (2006) e-learning is a complex process and the core of it is special pedagogic approach to learning. Methodology of effective e-learning should be based on the following criteria: engaging learners in the learning process, encouraging independent learning skills, developing learners´ skills, motivating learners. She mentions that universities make investments in e-learning because they realize that it is borderless education, it is requirement from students and a competition for students on the global education market. E-learning is defined as learning facilitated and supported through the use of information and communications technology. It occupies the central position in self-access. E-learning can be used as *supporting learning* for existing courses, *blended learning* as combination of traditional and electronic practice and *fully on-line learning*.

Also Frydrychová Klímová (2006) in her study agrees that computers and new technologies has become an important aspect of foreign language learning. She stresses that e-learning substantially contributes to increasing effectiveness of an educational process and defines e-learning as "using new multimedia technologies and the Internet to improve the quality of learning" (pp.318).

Another research study that deals with e-learning concerns the experimental verification of theoretically suggested characteristics of students defining their individual learning styles. The objective was to prepare a learning environment in e-learning that will respect students' differences, which will be adapted to them and in which the students will learn through a self-study form in the learning management system. The authors tried to analyze dependences of chosen students' properties and to find the groups of the most frequent combinations of students' properties. The findings showed that the students could not be divided into groups according to their similar properties because the properties of individual students are very different from those of other students (Takács, Kostolányová and Šarmanová, 2011). This was an important result for the design of the adaptive learning system, however in our view personalization of teaching through e-learning and adapting the learning process to every student individually through e-learning may be a good idea but rather unrealistic under the condition of a huge number of students with different

characteristics and needs taking part in studies. Nevertheless the authors plan to do more analyses of this type.

Zounek (2009) comprehends under e-learning the theory of e-learning, empirical research the aim of which is to get to know for instance if a certain technology solution is proper or improper or what the view of students or teachers on the ICT usage in the lessons or learning is. It means that he does not narrow e-learning only on practical question of the implementation of modern technologies into education.

According to Waidah and Haliza (2006) from Islamic College University of Malaysia (KUIM), e-learning is a convergence of the Internet and learning or also seen as Internet-enabled learning. E-learning can be a powerful alternative means of learning with good design and delivery. They mention the effectiveness of learning experience gained by the learners through learner-centered design that e-learning offers. They conducted the research among the teachers at 6 different faculties in KUIM that concerned their experience and perspectives of e-learning in their classrooms. They tried to identify if the respondents (50) understand the meaning of e-learning, the extend of the sources of the Internet the lectures used in the classroom and the research, and they also tried to identify effective ways in enhancing the teaching skills, as well as the obstacles that may prevent the lectures from using e-learning. They used questionnaires and interviews as research instruments and after collecting the data, the analysis was done by calculating compliance issues by the calculation of the percentage. In conclusion they summarized the main findings that the academic staff use e-learning technology as the part of the lessons, however they prefer the ideas of group activities and find face-to-face sessions as the most effective method that supports students´ understanding in their learning. The constraints found consist in the fear of technology and the reduction of personal time - that prevents most from using e-learning.

E-learning and its realization through LMS Moodle is also the main topic of the research study of authors from Technical University of Liberec (Pavlíková and Pekařová, 2010) in which they introduced Moodle language courses, various types of e-learning material for students – Moodle resources and activities - and their experience with LMS Moodle as well. Even if the work was time-demanding, they remained positive about it and are ready to continue their work in producing more material to be used with their students. They mention positive evaluation from the side of students, nevertheless from this study it does not follow that they have conducted any questionnaire research in this field or any other research.

Material and Methods

In our pre-research we compared the results of two groups of students studying Business English through different methods. One group was taught face-to-face and the second one through e-learning in a computer laboratory. Students knowledge of the language should be on at least intermediate level. They were supposed to have mastered general grammatical principles and basic vocabulary in their previous studies.

The main objective of the preresearch was to find out if there exist statistically significant differences between the results of students learning Business English through e-learning (online learning) and those who are taught through the face-to-face method.

In the first part of the preresearch we used the experiment as a research method and pretests and postests as research tools. We compared and analysed the results of students taught through

e-learning method (experimental group) and the results of those who were taught through the face-to-face method (control group). We carried out pretests with both groups at the beginning of the lessons in the winter term of the academic year 2011/2012 in order to find out the level of input speech skills (listening, reading, writing, translating) and vocabulary of single students. After completing the course of Business English in the winter term, both groups wrote posttests where we found out the level of the skills with the focus on business and economic terminology.

As this was an online course, the development of a speaking skill was left to a regular class where a face-to-face student/teacher interaction was possible. On the contrary, the online support should emphasise the development and practice of those skills that are "neglected" in face-to-face teaching/learning in favour of developing speaking skills. The development of grammatical knowledge was not essential in the course as the students were already supposed to have a sufficient command of English grammar on B1 level within the Common European Framework of Reference for Languages. The development of vocabulary that can be applied in business and economics was of primary importance. By learning and practising specialist vocabulary the students can perform other activities like speaking, reading, writing, listening and last but not least, translating (Kučírková, Vogeltanzová and Jarkovská, 2011).

In both tests (pretests, posttests) we tested primarily specialist vocabulary, comprehension of reading, comprehension of listening, writing and translation. Each of the tests was evaluated by points, the total number of points was 60. We used existing standardized tests as pretests. Posttests, comprising specialist terminology, were created by a teacher on the basis of her experience and in the form of standardized tests. There was the exception of listening posttest that was also part of the existing standardized test. All created tests were consulted with two other teachers of Business English.

In this paper we extend the information from (Kučírková, Kučera and Vostrá Vydrová, 2012) with the results of the second part of our pre-research based on questionnaires analysis. We have chosen the method of questionnaire examination of students in both groups to round out the study further and to examine and compare to what extent these data will support our quantitative findings in tests. The pre-research was conducted after course completion in winter term in January 2012. We used non-standardised questionnaire that was composed of 11 closed questions and of one open question that meant for the respondents the necessity to think more about the course and write their comments on it. This type of open question was not used more because it is time demanding and their interpretation represents more complex and complicated analysis. All questions offered the choice from several possibilities. Questionnaires were created and used in paper form. There were distributed 40 questionnaires among students, the return was 100%. The number of respondents was not so high, nevertheless there was the possibility for data processing with quantification. The aim of this questionnaire research was to find out the views of students on the impact of e-learning method on the skills and language issues of students in comparison with face-to-face teaching and on the implementation of e-learning course for distance students.

Methodology Processing

Results of pretests and posttests were processed into tables and analyzed using the non-parametrical statistical tests. In case of the evaluation of pretests and posttests with the same

group (dependent samples), Wilcoxon pair test was used. In case of the evaluation of pretests and posttests with different groups (independent samples), Mann-Whitney test was used. Tests were carried out on the significance level 0.05. Statistical programme Statistica 10 was used for the calculation.

First of all we compared the results in the pretest and posttest separately within the control group and separately within the experimental group using Wilcoxon pair test so that we could find out whether there were statistically significant differences in single skills and whether the students improved or worsened within their groups. Then we compared and analysed the results in pretests and posttests of single skills between the control and the experimental group using Mann-Whitney test in order to find out if e-learning method could be efficient and whether there were statistically significant differences in the results of both groups.

The questionnaire examination was evaluated using the following procedure to discover to what extent the responses on single closed questions depended on student's gender, field of study and the year of study, and whether a student had taken part in the e-learning course. We computed the χ^2 tests and according to their p-values we found out cases with statistically significant dependency and the strength of this dependency was assessed using the Pearson contingency coefficients.

Results

Results of the pretests and posttests

Control Group

The results of the pretest and the posttest within the control group are presented as follows:

Listening pretest and posttest: p-value is 0.148793 - higher than the significance level 0.05. Students have improved a little in the posttest but from the statistical point of view there are not any statistically significant differences between the pretest and the posttest in listening.

Vocabulary pretest and posttest: p-value is 0.000339 – lower than the significance level. There is statistically significant difference between the pretest and the posttest. Students have improved quite a lot in the knowledge of specialist vocabulary.

Reading pretest and posttest: p-value is 0.000293. Students have improved a lot in reading comprehension. There is statistically important difference between the pretest and the posttest.

Translation pretest and posttest: p-value is 0.014098 – lower than the significance level. There is statistically significant difference in the pretest and the posttest. Students have improved a little.

Writing pretest and posttest: p-value is higher than 0.05 – 0.586175, there are not any statistically significant differences in writing. Students have not improved, neither have worsened.

As far as total results are concerned, students have improved quite a lot. P-value is 0.000151, thus the difference between the pretest and the posttest is statistically significant.

Experimental Group

The results of the pretest and the posttest within the experimental group are presented as follows:

Listening pretest and posttest: p-value is 0.049423 – lower than the significance level. Students have worsened a little but not statistically significantly because there exist statistically significant difference between the pretest and the posttest.

Vocabulary pretest and posttest: p-value is 0.001089, it means lower than the significance level. There is statistically significant difference between the pretest and the posttest. Students have improved in the knowledge of vocabulary quite a lot.

Reading pretest and posttest: p-value is 0.012111, so the difference between the pretest and the posttest is statistically significant. Students have improved in reading comprehension.

Translation pretest and posttest: p-value is 0,012947 – lower than the significance level. There is statistically significant difference between the pretest and the posttest in translation. Students have improved.

Writing pretest and posttest: p-value is 0.740368 – higher than the significance level, it means that there is not statistically significant difference between pretest and posttest and students have not improved in writing.

Total results in the pretest and the posttest: p-value is 0.001163, so it means that there is statistically significant difference between total results in the pretest and the posttest. In general, students have improved quite significantly.

Finally, in both groups students have improved and there were statistically important differences between the total results in pretests and posttests.

Comparison of the results between control and experimental group

For the evaluation, non-parametrical analogy of a two-sample t-test was used.

Listening pretests: From the comparison of the results in listening pretests it follows that there is not any statistically significant difference between the groups – p-value is 0.069932, even though students of the experimental group were a little better.

Vocabulary pretests: As far as a specialist vocabulary pretest is concerned experimental group is better than the control group. P-value is 0.036049, so there is statistically significant difference between both groups in their results.

Reading pretests: Also in the reading comprehension in pretests there is the experimental group a little better than the control group. From the statistical point of view there is not any statistically significant difference between groups: p-value is higher than the significance level. It is 0.155571.

Translation pretests: In translation, the results are nearly equal, p-value is 0.818150, so there is not any statistically significant difference in pretest results of both groups.

Writing pretests: In writing results, p-value is 0.473481, so there is not any statistically significant difference between both groups, however, the experimental group is a little worse than the control group.

Listening posttests: P-value is 0.303996, thus higher than the significance level. The control group is a little better than the experimental group, however, there are not any statistically significant differences.

Vocabulary posttests: The results of both groups are nearly equal. From the statistical analysis it came out that there is not any statistically important difference between groups, p-value is 0.616775.

Reading posttests: P-value is 0.551776, thus there is not any statistically significant difference between both groups. The results of both groups are nearly equal. Reading through e-learning method can be nearly as efficient as reading through the face-to-face method.

Translation posttests: P-value is higher than the significant level – 0.797198, so there are not any statistically significant differences between groups. Results in both groups are mostly the same.

Writing posttests: Experimental group is a little better but there are not any statistically significant differences in the results of groups. P-value is 0.860431, it means higher than the significance level.

In the total results of the pretest p-value was 0.074213, so at the beginning of the academic year there were not any statistically important differences between the groups. Experimental group was a little better but not statistically significantly.

In the posttest total results, p-value was 0.745483 – higher than the significance level. There were not any statistically significant differences between both groups in the results of posttest at the end of the winter term. It could be explained by the fact that e-learning method was in general of the same efficiency as the face-to-face method.

Results of questionnaires

Students of both groups were given questionnaires where they could express their views on the appropriateness of e-learning into the lessons of ESP within distance studies and the effectiveness of e-learning as far as the skills except for speaking and language issues are concerned. We have distributed 40 questionnaires and the return was 100%.

There were 25 men (62.5%) and 15 women (37.5%) among respondents. As far as fields of studies are concerned, Trade and Business with Technique (TBT) with 11 students (27.5%) was represented most of all, there were 9 students from the field of study of Economics and Management (EM) and from Business and Administration (BA) 9 students as well (22.5%), other fields of study were represented by 11 students (27.5%). 28 respondents (70%) were students of the first year of studies, only 2 respondents (5%) were from the second year of studies and 10 respondents (25%) were students of the third year of studies. As we have already mentioned above, half of the respondents took part in the e-learning course, and remaining half not.

32 respondents (80%) think that the inclusion of e-learning into the ESP lessons for distance studies is proper, only two respondents think that it is improper (5%), the remaining 6 respondents (15%) did not know. In remaining six questions there were evaluated the issues such as if the development of single skills (with the exception of speaking) and vocabulary can be using e-learning of the same effectiveness as face to face teaching. The frequency of single responses is shown in the Table 1:

	Yes	Rather yes	Rather not	No	Do not know
Teaching in total	3 (7.5%)	17 (42.5%)	14 (35.0%)	4 (10.0%)	2 (5.0%)
Reading with comprehension	9 (22.5%)	14 (35.0%)	8 (20.0%)	7 (17.5%)	2 (5.0%)
Listening with comprehension	13 (32.5%)	13 (32.5%)	12 (30.0%)	0 (0.0%)	2 (5.0%)
Writing	22 (55.0%)	10 (25.0%)	5 (12.5%)	1 (2.5%)	2 (5.0%)
Translation	15 (37.5%)	17 (42.5%)	2 (5.0%)	4 (10.0%)	2 (5.0%)
Vocabulary	18 (45.0%)	15 (37.5%)	2 (5.0%)	3 (7.5%)	2 (5.0%)

Tab. 1: Frequency of responses

Now we will mention the survey of cases when in responses there was proved statistically significant difference in the dependence on single qualitative signs (sex, field of study and year of study, participation in e-learning course). In all following cases the found dependence was of a medium strength with contingency coefficient from 0.3 to 0.65.

Between genders there was found statistically significant difference only in one question, i. e. appropriateness of the inclusion of e-learning into the lessons of ESP for distance students. It consisted in the fact that all who did not know were men (in total 24% of all men).

Statistically significant differences among responses of students of single fields of studies appeared in several cases. The students of the field of study TBT did not have confidence in e-learning effectiveness of the development of the skills of reading with comprehension and listening with comprehension – response 'yes' or 'rather yes' only in three cases (27.3%) for reading and in four cases (36.4%) for listening. On the other hand, the students of other fields of study responded 'yes' or 'rather yes' every time in 6 to 8 cases (63.6% to 88.9%). In the evaluation of the influence of e-learning on the development of the skill of translation there differed the responses of the students of the field of study BA, where there occurred more frequently extreme responses 'yes' (5 students, i. e. 55.6%) and responses 'no' (3 students, i. e. 33.3%), from other fields of studies, where the response 'yes' occurred in 27.3% to 44.4%, and response 'no' occurred only once in the field of study TBT (9.1%) and it did not occurred at all with other students.

If we compare the responses of students of single years, in general we can state that mostly students of lower years have confidence in e-learning. However, statistically significant difference was found only in the evaluation of the influence on the development of the skill of reading with comprehension, where there were responses 'yes' or 'rather yes' from 19 students of the first year of study (68.9%), 1 student of the second year of study (50.0%) a 3 students of the third year of study (30.0%).

The most statistically significant differences were between the responses of students who took part or did not take part in e-learning course:

From those who completed the course 17 (85%) thought that e-learning inclusion into the lessons of ESP for distance students was proper, 2 (10%) that it was improper and 1 (5%) did not know. From those who did not take part in e-learning course 15 (75%) thought that the inclusion of e-learning into the lessons was proper, nobody thought that it would not be proper, however, 5 students (25%) did not know.

Next statistically significant difference was found with responses to the questions if the development of the skill of reading with comprehension by means of e-learning can be of the same effectiveness as face-to-face teaching. Students who completed e-learning course responded in the following way: 5 students (25%) responded 'yes', 9 (45%) 'rather yes', 5 (25%)

'rather not' and 1 (5%) 'no'. From the students who did not take part in e-learning course 4 of them (20%) responded 'yes', 5 (25%) 'rather yes', 3 (15%) 'rather not', 6 (30%) 'no' and 2 (10%) did not know.

The last question, where there was found the statistically significant difference, was the question if the development of the skill of listening with comprehension by means of e-learning can be the same effective as the face-to-face teaching. From those students who completed e-learning course responded 9 of them (45%) 'yes', 8 (40%) 'rather yes', 3 (15%) 'rather not', responses 'no' and 'I do not know' did not occur. From the students who did not take part in e-learning course 4 (20%) responded 'yes', 5 (25%) 'rather yes', 9 (45%) 'rather not', nobody responded 'no', and 2 (10%) did not know.

Discussion

From the results of pretests and posttests it follows that students of the control group were a little better than students of experimental group, but not statistically significantly. E-learning method did not help to the important improvement of the skills but at the same time it did not worsen them. We can state that e-learning is a very good method for widening vocabulary.

At the beginning of the academic year, the experimental group was a little better than the control group but from the point of view of statistical significance there were not any statistically significant differences between groups except for vocabulary. At the end of the semester, the results were more or less the same, there were not any statistically significant differences at all.

Discussion could also arise in connection with the last question of the questionnaire that was open and that concerned any commentary as far as the course was concerned with the aim of improving and using for self-studies and distance studies. From 20 respondents who took part in the e-learning course only 10 (50%) expressed their views on the course. From those who did not have any commentary was 5 men (25%) and 5 (25%) women, 4 (20%) students were from the field of study TBT, 3 (15%) from the field of study BA and 3 (15%) from other non-specified fields of studies. As far as the year of study is concerned, 3 (15%) students were from the third year of studies, 5 (25%) students from the first year of studies and 2 (10%) from the second year. From those students who expressed their views on e-learning course were 7 (35%) men and 3 (15%) women. 7 (35%) students were from the field of study of EM, 2 (10%) from BA and 1 (5%) from TBT, all the students from EM and BA were from the first year of studies, 1 (5%) student from OPT was from the third year of studies.

There were found positive reactions with the expression of satisfaction from the lessons with 9 (45%) respondents with answers such as: the lessons were interesting, proper, in order, contributional etc., with 2 (10%) respondents there was absolute satisfaction with the course with answers: this style of the lessons is absolutely welcome, it was a perfect idea. Only 1 (5%) response was more negative when the student wrote that he had expected to improve knowledge of vocabulary but on the other hand he thought that it was proper for distance studies but suboptimal for full-time studies. However he did not comprehend that this course was developed particularly for distance studies. 1 (5%) student would welcome activities where students create sentences and for 2 (10%) respondents filling in gaps activities seemed to be difficult, especially with synonyms

where there are possible more answers and Moodle recognized only one. 3 (15%) respondents would welcome more listening and also speaking, however, it was excluded from our research. In general, students also expressed that they were satisfied with the possibility to do, finish or revise activities in Moodle at home, and the lessons in an electronic form seemed to be practical for them. At the end of this survey we can mention one interesting finding: students who responded 'I do not know' in all questions evaluating the effectiveness of e-learning were all men from the third year of study of the TBT field of study who did not take part in e-learning course.

The realised pre-research also served for verifying if the questions in the questionnaire were clear and if the students understood everything and could answer without problems.

Conclusion

In our pre-research we compared the results of two groups of students studying Business English through different methods. One group was taught face-to-face and the second one through e-learning in a computer laboratory. Students' knowledge of the language was on at least intermediate level. They were supposed to have mastered general grammatical principles and basic vocabulary in their previous studies.

Originality value of the paper consists in the fact that we have conducted the experiment in comparing the results of students learning through the method of e-learning with those being taught through face-to-face method as we have not found out any other research focused exclusively on ESP e-learning experiment in comparing the control and the experimental group.

On the basis of the results we have decided to adjust the course more to the needs of students, it means to add some required activities and also to change a bit the structure of the questionnaire for the final research. In questionnaires there was the demand for more listening activities. That is why we have recorded with the help of our American native speaker all specialist texts in all lessons of the course and also all key words and their definitions in all lessons were recorded and inserted into the Moodle system. On the contrary, we have omitted activities for searching synonyms as there could be more correct replies, and it was not possible to be checked through the computer system. Based on the pre-research there will be changes in the structure of tests so that tests could be checked through the computer and hence the evaluation will be more objective. For example reading comprehension that was realised by means of questions related to the specialist text and that was corrected and evaluated by the teacher, will be realised by means of multiple choice and corrected by the computer. Final research is also supposed to be realised on bigger number of population than in the pre-research. However, it will depend on the number of students that will enrol for this subject that is voluntary for the students in Bachelor studies.

From the results in pre-research it follows that e-learning method can be considered as an equally efficient method as the face-to-face method. In some cases, such as acquiring specialist vocabulary, even better. It could be offered for distance students and lifelong learning centers and of course this method can be used for other students, also foreign students coming within Erasmus programme of the EU and also for academic staff.

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