

CONTENT

INTERNATIONAL BUSINESS WEEKS – FROM CHALLENGE TO OPPORTUNITY Martina Chalupová, Martina Černá, Martin Prokop	31
ON THE WAY TO DEVELOP OPEN APPROACH TO MATHEMATICS IN FUTURE PRIMARY SCHOOL TEACHERS Libuše Samková, Marie Tichá	37
STUDENTS' EVALUATION OF EDUCATION QUALITY IN HUMAN RESOURCE MANAGEMENT AREA: CASE OF PRIVATE CZECH UNIVERSITY Lucie Vnoučková, Hana Urbancová, Helena Smolová, Julie Šmejkalová	45

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EDITORIAL

We are glad that we can present you the second issue of the year 2016 (Vol. 9, no. 2). In this second issue, which you hold in your hands, we are glad to introduce three articles from diverse group of authors covering following universities: University of Economics and Management, Czech Republic; Czech University of Life Sciences Prague; University of South Bohemia, Czech Republic; Institute of Mathematics of the Czech Academy of Sciences.

The first article from authors Chalupová, Černá and Prokop analyses an impact of project activities called International Business Weeks (IBW) on outgoing students' mobility at the College of Polytechnics Jihlava. The IBW network was established 17 years ago to encourage finance/business students to apply for international mobility. So far, 290 students at College of Polytechnics Jihlava from study courses Finance and Management, and Travel and Tourism have taken a part in the IBW project. On the other hand, 389 students have taken part in Erasmus mobility programme. However, data shows a stagnation of students' interest in IBW program. Therefore, the authors recommend a need for qualitative research about students' motivations and obstacles of international mobility. Furthermore, this research should also focus on the psychological profile of the students.

The second article from authors Samková and Tichá focuses on the possibility to develop open approach to mathematics for future primary school teachers. The study comprises 29 future primary school teachers studying second year of master studies at Faculty of Education, University of South Bohemia. These future teachers will not only teach mathematics. Instead, they will also teach many primary school subjects, such as languages, science, arts, etc. Results of the research were conducted in one-year long course of mathematics held in inquiry-based manner (guided inquiry). Results show that at the beginning of the course the future teachers tended to search only one solution of a task, i.e. they did not attempt to seek other solutions. However, after an active participation in the inquiry-based course, future teachers shifted to search more possible solutions, from unsystematic search for some solutions to systematic search for all solutions, and also shifted

towards accepting various forms of notations of a given solution.

The last article from collective of authors Vnoučková, Urbancová, Smolová and Šmejkalová investigates students' perception of education quality related to lectures, subjects and teachers in the area of human resource management. This investigation was carried out at private Czech university. In total, 218 students who had passed the human resource management classes were included in the research. The students' responses show that subjects, lessons and teachers in the area of human resource management mostly satisfied their expectations. Moreover, students also emphasized a positive atmosphere during the classes, followed by the opportunity actively participate during the classes. Most importantly, there is a dependency between teacher's effort, students' understanding and teacher's willingness to give students an opportunity to express an opinion. On the other hand, no dependency between gender or work experience and the effect of subjects, lectures, or teachers was identified.

By the end of this editorial, we would like to thank to all reviewers who contributed to this second issue. We would also like to thank all the authors who have submitted their manuscripts to the ERIES Journal. Further, we hope that all our readers will find this first issue of the year 2016 interesting. Last but not least, we also hope that the ERIES Journal will contribute to the field of efficiency and responsibility in education as it has contributed so far.

Sincerely,

prof. RNDr. Jaroslav Havlíček, CSc.

Editor-in-Chief

ERIES Journal

INTERNATIONAL BUSINESS WEEKS – FROM CHALLENGE TO OPPORTUNITY

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Highlights

- Internationalisation is an important item for students and for institution of higher education
- The most significant barrier of the student mobilities at CPJ appears to be higher cost sensitivity
- Cooperation of IBW network members on the researches from different fields might upgrade the project

Abstract

Article aims to analyse impact of project activities called International Business Weeks (IBW) on outgoing student mobilities at the College of Polytechnics Jihlava. The IBW network was established by University Paris 13 in France and Leuven University College in Belgium (now University College Leuven-Limbourg) 17 years ago to encourage finance/business students to apply for international mobility. The network of European business colleges/universities now contains 15 universities or colleges, College of Polytechnics in Jihlava (CPJ) joined it in 2008. The main goal of the paper is to evaluate the effect of IBW on Erasmus mobility at CPJ. Analysis of the data from CPJ information system shows that this impact has weakened gradually. The data also proved that the interest in IBW among CPJ students is stagnating. Partial goal of the article is to suggest solutions for the projects' revitalization. One of the conclusions is that there is a need for qualitative research among the students about their motivations and obstacles of international mobility, with focus on the psychological profile of the students.

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International Business Week, College of Polytechnics Jihlava, network of universities/colleges, mobility, internalization, correspondence analysis

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Introduction

Internationalisation represents a central focus of higher education institutions worldwide, it can be defined as "*the process of integrating an international, intercultural, or global dimension into the purpose, functions or delivery of postsecondary education*" (Knight, 2015). Teichler (2004) observed three main areas of learning and research related to internationalisation: knowledge transfer, international education and research and cross-border communication. International activities of universities and colleges expanded dramatically in volume, scope, and complexity over the past 20 years (Brooks, Walters, 2013; de Wit, 2011; Pesik, Gounko, 2011). Tertiary institutions established various strategies of internationalisation: academic programmes (exchange programmes, cross-cultural training, joint/double degree programs, visiting lectures and other), research and scholarly collaboration (research projects and agreements, exchange programmes), extra-curricular, such as students associations and external relations (domestic and crossborder) (Maringe, Foskett, 2013; Knight, 2008). In the Czech context internationalisation is mainly understood as student and staff mobility and an aspect of quality enhancement (Janebová, 2009; Mertová, 2013).

One of the latest researches among European universities with the focus on internationalisation carried out by European University Association in 2013 showed priorities in higher education institution internationalisation – majority of respondents (30%) wanted to attract students from abroad, 19% chose internationalisation of learning and teaching, 10% saw as a priority strategic research partnerships. No institution chose staff mobility and capacity-building of partners in developing regions as the top priority, and only small number regard

rankings (5%) and attraction of international researchers (4%) as the most important issue.

The main question with regard to international student mobility is the reason why students go abroad. Teichler (2015) mentions two basic ways of mobility: degree mobility, for an entire study programme and credit mobility, for a half-year or a year (e.g. Erasmus+ Programme). Degree mobility can be considered as vertical, from countries of a quantitatively or qualitatively lower level of provision into those with a higher level. Credit mobility is mainly horizontal (between countries with a similar quality in higher education). The main motivators for students' mobility include enhanced employability by obtaining the best quality education, mastering foreign language or even an intention to emigrate (Altbach, 2016) with emphasis on the role of specific psychological traits (Carlson, 2015). Van Mol's (2013) research on the topic revealed how significantly variable are students' motivations, experiences and outcomes within European countries. He presented the system of factors with the major influence on student mobility, in which students' personal motivations are framed with the global context and macro environment of the students' home country (see Figure 1).

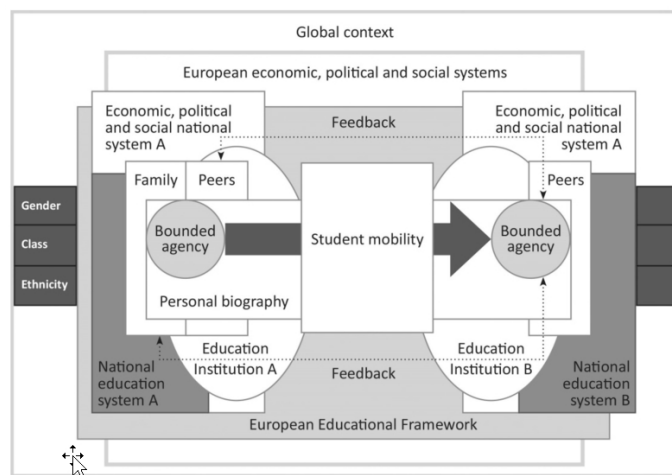


Figure 1: System approach for student mobility dynamics, (source: Van Mol, 2013, p. 153)

According to Teichler (2015) temporary student mobility appears to be effective in preparing students for an increasingly internationalizing environment. His research indicated that the majority of formerly mobile students (but also the majority of employers) believe that internationally experienced students turn out to be superior in number of competences: professional as well as general academic knowledge, communicative skills and personality features. Also, the findings showed that formerly mobile students reached slightly higher positions and a slightly higher income than formerly non-mobile students. The findings varied by field of study as well as by the formerly mobile students' home and host country. As regards field of study, these differences were smaller, as for the country, former Erasmus students from Central and Eastern European countries reported a high professional value for temporary study substantially more often than former Erasmus students from Western European countries.

The complex research among the Czech students (Fischer, Vltavská et al., 2013) showed quite low interest in international mobility. Almost 78 % of respondents (out of the 4664 students from both bachelor and masters study programmes) were not planning to study abroad. On the other hand, almost one third of the students (31 %) in the bachelor programmes planned to apply for international mobility. Research also revealed higher interest in international experience among students from public universities/colleges. Students in the Czech Republic see financial costs as the biggest obstacles in international mobility. Social selectivity of international student mobility is sufficiently documented also in other EU countries, Lörz et al. (2015) assumes that mechanism underlying this pattern of inequality is not sufficiently studied. The other major barrier of the Czech students is fear of losing job and separation from a partner, children or friends. On the contrary, the lowest barrier is the capacity of a mobility program or problems with the recognition of studies, which decreased significantly (Fischer, Vltavská et al., 2013). Research by Šmídová (2015) indicated that Czech students expect from mobility above all language skills enhancement, personal growth, familiarity of the foreign society and its culture.

The College of Polytechnics Jihlava (CPJ) decided to support its students' interest in international mobilities by joining the network of Universities/Colleges in their project International Business Week (IBW). The aim of this article is to evaluate the project by analysing the quantitative data about the students that attended IBW from February 2009 till May 2015 and of

those who applied for Erasmus+ programme at the same time. The goal is to prepare an evaluation of the IBW project in terms of its influence on students' willingness to apply for Erasmus mobility. Partial goals are to prepare an evaluation of the IBW project in terms of its influence on students' willingness to apply for Erasmus mobility and to suggest solutions for the projects' expansion and qualitative growth.

The article is an extension of the original article published in ERIE 2014 Conference Proceedings. It presents results of research with quantitative design, analysing data from the CPJ information system. The next chapter presents IBW procedures and the background of the project that has grown in 16 years of its history into vivid international cooperation of European universities and colleges. The following chapter describes the methodology of the analysis of the data. The chapter Results and Discussion summarizes results of the data analysis. In Conclusion the authors specify the need for more research on the topic and include possible evolution of the IBW project at CPJ.

The College of Polytechnics and International Business Week Network

The College of Polytechnics Jihlava (CPJ) is a public college of a non-university type, offering bachelor study programmes – Electrical Engineering and Informatics, Economics and Management, Midwifery, Health Care and Clinical Social Work.¹ At the beginning of the academic year 2015/2016 there were 2273 students studying at CPJ. They chose the course of Finance and Management or the course of Travel and Tourism from the study programme Economics and Management, in the study programme Electrotechnics and Informatics the course of Computer Systems or Applied Informatics, in the Health Care the course General Nurse, Midwifery and in the programme Clinical Social Work the course Clinical Social Worker. Students may choose study mobility from 40 partnering institutions in the Erasmus+ Programme (Štěrbová et al., 2015).²

International Business Weeks (IBW) network was formed 17 years ago by Belgian Leuven University College (University College Leuven-Limbourg since 2015) and The University of Paris 13 in France. The project reflected the situation in the late 90s: both partners tackled the problem of low interest of finance students in Erasmus mobility. Both universities partnered on the first IBW in Leuven in 1999. In the following years the number of universities/colleges in the network increased (CPJ joined the network in 2008). In the first years all partners came to Leuven, the theme was accountancy, The University of Paris 13 prepared a simulation game. In 2015 there were 15 partnering universities or colleges (National Mining University in Ukraine is not an active member in the present). Each IBW network member organizes a week of student activities, during which students work in international groups on an international business case, the central theme is international business. The main objective of IBW is to let students feel they can cooperate in English with fellow students on business or financial topics in an international context and in that way encourage them to apply

¹ From 2014/15 a new Master's degree programme was awarded accreditation as Community Care in Midwifery within the study programme Specialization in Health Care

² Students of Health Care and Clinical Social Work study programmes have other possibilities for studying abroad than students of Economics and Management. These programmes are quite new (f.e. programme Clinical Social Work started in 2013/14).

for study abroad (Chalupová, Prokop, 2014).

Three partners (the University of Paris 13, University College Leuven-Limbourg (UCLL) and the Rotterdam University of Applied Sciences) organise IBW twice a year. Universities in Rotterdam and Leuven also offer International Weeks that are specialised in marketing, personal management or accounting, IBA Kolding organises ICT and Marketing Week and UCLL offers also International Weeks for healthcare and social works students. The College of Polytechnics Jihlava cooperates with The Institute of Technology and Economics in České Budějovice and the institutions organise IBW only once in 2 years (the same situation is in Finland with 2 partnering universities – The Lahti University of Applied Sciences and Satakunta University. In the academic year 2014/15 the network offered 13 IBWs (see Table 1).

Country	University/College	IBW Topic	Semester
Portugal, Setúbal	The Polytechnic Institute of Setúbal	Entrepreneurship	Winter
France, Paris	The University of Paris 13	International Economical Simulation	Winter
Netherlands, Rotterdam	The Rotterdam University of Applied Sciences	Risk Management	Winter
Belgium, Leuven	University College Leuven-Limbourg	Business Simulation	Winter
Denmark, Kolding	International Business Academy	Financial and Management Case Study	Summer
Finland, Lahti	The Lahti University of Applied Sciences	Financial and Management Case Study	Summer
Czech Republic, Jihlava	The College of Polytechnics Jihlava	Financial and Management Case Study	Summer
France, Paris	The University of Paris 13	Communication Case Study	Summer
Belgium, Leuven	Leuven University College	Banking Simulation	Summer
Latvia, Riga	Banku Augustskola	Financial Case Study	Summer
Poland, Wrocław	Wrocław School of Banking	Project Management	Summer
Netherlands, Rotterdam	The Rotterdam University of Applied Sciences	Financial Case Study	Summer
Germany, Zweibrücken	The University of Applied Sciences Kaiserslautern	Business Simulation	Summer

Table 1: IBW Network Offer for Academic Year 2014/15, 2016 (source processed by the authors)

The exact dates of each International Business Week are discussed and announced before the start of the next academic year by official IBW representatives from each partnering university/college. Commonly they are lecturers who are also responsible for organizing IBW in their institutions. The general agreement is that during the IBW each incoming student is granted accommodation for 4 nights, local transport costs coverage and food (4 breakfasts, 4 lunches and 1 dinner), students must pay for the transportation to IBW from their home country. The home university transfers the participation fee for each of the

outgoing students to the organizing university (varies from 200 to 245 EUR per person). Each IBW lasts at least 5 working days (Monday till Friday), students work in international groups on a business/finance case. In order to get different nationalities together, partnering institutions can send no more than 5 students to every business week. If there are still places available (just before application deadline), higher student numbers can be discussed. IBW is meant for finance and/or business students. The sending university/college is responsible for the students' selection (by means of interviews, grades, motivation letters or CVs) (Chalupová, Prokop, 2014).

It is recommended that students are accompanied by a lecturer of their home university. Preferably, the lecturer is integrated in the program as a coach, his or her duties include:

- Ensuring the quality of students' presentations - with topics such as basic facts about the home country, city and own university.
- Participation, enthusiasm and cooperation during the business week.
- Punctuality of the students.
- Solution and presentation of the business case.
- Individual end report in English (reflection on the week).

Students that meet the IBW standards receive a common validation paper with recognition of all partner universities involved in the network. Participation is validated by the sending university, students receive 2 credits (Chalupová, Prokop, 2014).

Materials and Methods

The data about the students who have attended IBW and Erasmus mobility were extracted from CPJ's information system. It included information about the semester in which student attended IBW, student's study programme and whether he or she attended internal (in Jihlava) or international IBW (no information about specific university/college or country). The list was then compared with the list of Erasmus mobility participants, sorting data in 3 categories: students that attended only IBW, but did not apply for Erasmus mobility, students that went on Erasmus mobility after attending IBW, and students that attended IBW after their Erasmus mobility. First CPJ students attended IBW in the summer semester 2008/09, since then 290 of them from study courses Finance and Management and Travel and Tourism took part in the project.

Data have been processed with correspondence analysis (CA), a multivariate statistical technique. The method provides a means of displaying or summarizing a set of data in two-dimensional graphical form (Nenadić, Greenacre; 2007). All data should be nonnegative and on the same scale for CA to be applicable, it treats rows and columns equivalently. It is traditionally applied to contingency tables; the method decomposes the chi-squared statistic associated with this table into orthogonal factors. The idea in CA is to reduce the dimensionality of a data matrix and visualize it in a subspace of low-dimensionality, commonly two- or three dimensional. The CA solution was shown by Blasius and Greenacre (1994) to be neatly encapsulated in the singular-value decomposition (SVD) of a suitably transformed matrix. For the process, first divide the $I \times J$ data matrix, denoted by N , by its grand total n to obtain the so-called correspondence matrix $P = N/n$. Let the row and column marginal totals of P be the vectors r and c respectively, that is the vectors of row and column masses, and D_r and D_c be the diagonal matrices of these

matrices (Hebák et al., 2007). The computational algorithm to obtain coordinates of the row and column profiles with respect to principal axes, using the SVD, starting with matrix of standardized residuals (1) – (2) as follows:

1. Calculate the matrix of standardized residuals:

$$S = D_r^{-\frac{1}{2}} (P - rc^T) D_c^{-\frac{1}{2}} \quad (1)$$

2. Calculate the SVD:

$$S = U D_\alpha V^T \text{ where } U^T U = V^T V = I \quad (2)$$

3. Principal coordinates of rows:

$$F = D_r^{-\frac{1}{2}} U D_\alpha \quad (3)$$

4. Principal coordinates of columns:

$$G = D_c^{-\frac{1}{2}} V D_\alpha \quad (4)$$

5. Standard coordinates of rows:

$$X = D_r^{-\frac{1}{2}} U \quad (5)$$

6. Standard coordinates of columns:

$$Y = D_c^{-\frac{1}{2}} V \quad (6)$$

The total variance of the data matrix is measured by the inertia (see, e.g., Hebák et al.; 2007), which resembles a chi-square statistic but is calculated on relative observed and expected frequencies:

$$7. \text{ Inertia} = \varphi^2 = \sum_{i=1}^I \sum_{j=1}^J \frac{(p_{ij} - r_j c_j)^2}{r_i c_j} \quad (7)$$

The rows of the coordinate matrices in (3)-(6) above refer to the rows or columns, as the case may be, of the original table, while the columns of these matrices refer to the principal axes, or dimensions, of the solution. Notice that the row and column principal coordinates are scaled in such a way that $FD_r F^T = GD_c G^T = D_\alpha^2$, i.e. the weighted sum-of-squares of the coordinates on the the kth dimension (i.e., their inertia in the direction of this dimension) is equal to the principal inertia (or eigenvalue) α_k^2 , the square of the k-th singular value, whereas the standard coordinates have weighted sum-of-squares equal to 1: $XD_r X^T = YD_c Y^T = I$. The implementation of the algorithm follows Blasius and Greenacre (1994). The graphical representation of results from CA is commonly done with so-called symmetric maps. In that case, the row and column coordinates on each axis are scaled to have inertias equal to the principal inertia along that axis: these are the principal row and column coordinates.

There has also been a contingency table constructed; Pearson's Chi-square test of independence was counted in order to confirm or disapprove the relation between variables. If the p-value calculated by means of the χ^2 test (Pearson Chi-square test)

is lower than the selected level of significance $\alpha = 0.05$, null hypothesis is rejected. The analysis was carried out using SPSS programmes.

Results

The data obtained from the CPJ information system show that since academic year 2007/2008 up till 2014/15 the total number of 389 CPJ students had attended Erasmus Mobility Programme, 290 students had attended IBW. The network offers 13 IBWs in an academic year, which can be attended by 65 students from the partnering institution (as it was mentioned earlier, university/college can send no more than 5 students to every business week, higher student numbers must be discussed). In 2013/14 CPJ was sending the highest number of students for the IBW (66 in total).

Type of Mobility	Academic Year										Total
	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15			
Erasmus	23	30	32	41	37	35	39	33			270
Study Mobilities											
Erasmus	12	16	9	10	9	17	17	29			119
Traineeships											
Total Erasmus	35	46	41	51	46	52	56	62			389
IBW	0	25	20	29	29	59	66	62			290

Table 2: Outgoing student mobilities at CPJ, 2016 (Source: CPJ Information System, processed by the authors)

As it is apparent from Tab. 2, the number of students interested in IBW changed significantly in 2011 (from 29 to 59 the next year). By 2011 CPJ had supported each student with 2.500 CZK (100 EUR at that time) to help finance their participant fee. In 2012 each student that has represented CPJ on the IBW successfully also received upon their arrival additionally 3000 CZK in the form of scholarship. In 2013 this support rose up to 5.000 CZK and it covered 90% of the students' costs (they had to pay for their transportation). This academic year could have set the record, as the total number of students who signed up for IBW was even higher - in the summer semester of 2013/14 the National Mining University in Dnipropetrovsk had to postpone its international week due to the political situation and therefore 5 CPJ students did not leave for IBW in Ukraine. In 2014/15 most organisers raised their fees up by 10% and in this year the interest of the students for the IBW dropped slightly. This

indicates that financial costs play a major role in the decision making process of the CPJ students for international mobility. On the other hand, it is obvious that IBW mobilities costs³ for CPJ are rising and can be viewed as a high financial burden with low effect on the main goal (the support of Erasmus mobilities).

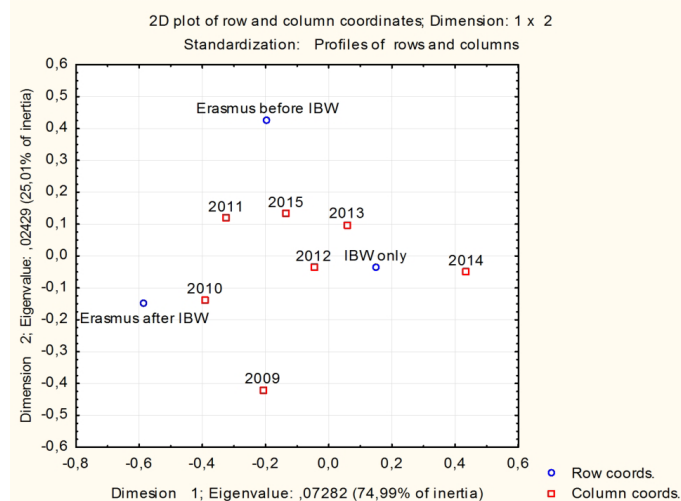
Results in Tab. 3 show, that IBW fulfilled its purpose (the support of Erasmus Programme) best in academic year 2009/10, when almost one third of those who attended IBW decided to apply for Erasmus mobility.

		Academic Year								Total
		2008/ 09	2009/ 10	2010/ 11	2011/ 12	2012/ 13	2013/ 14	2014/ 15		
IBW	Freq.	18	12	17	21	44	61	41	214	
Rel. Col. Freq.		72%	60%	58.62%	72.41%	74.58%	92.42%	66.13%	73.79%	
Erasmus After IBW	Freq.	7	6	7	5	7	1	11	44	
Rel. Col. Freq.		28%	30%	24.14%	17.24%	11.86%	1.52%	17.74%	15.17%	
Erasmus Before IBW	Freq.	0	2	5	3	8	4	10	32	
Rel. Col. Freq.		0%	10%	17.24%	10.34%	13.56%	6.06%	16.13%	11.03%	
Total	Freq.	25	20	29	29	59	66	62	290	
Total Col. Freq.		100 %	100 %	100%	100 %	100%	100%	100%	100%	
Chi-square test		p-value		Value					Df	
		0.005241133		31.17378485					14	

Table 3: Attendants of IBW and Erasmus, 2016 (source: CPJ Information System, own calculation)

Data in Tab. 3 also show that the number of students interested in IBW rose (from 25 in 2008/09 up to 66 in 2013/14), its impact on Erasmus mobility has weakened (the worst results were in 2013/14, when only 1 out of 66 students who attended IBW applied for Erasmus mobility). In the last academic year the trend was different – the number of IBW attendants slightly dropped (62 students), but the number of those who applied for Erasmus mobility rose (11 students). Relatively high number of students over the years who have attended IBW after their Erasmus stay can be viewed as a disadvantage, these students shouldn't be a target group for the project. However, it is an understandable and positive fact that the students who returned from their studies or traineeships abroad apply for IBW.

³ In academic year 2014/2015 the financial support for each student was 5 000 CZK.. With 62 students attended IBW in that year, it represents 310 000 CZK. The accompanying lecturers are supported by Erasmus+ programme.



Graph 1: Correspondence analysis – CPJ student outgoing mobilities, 2016 (source: own calculation)

Correspondence map (Graph 1) shows that points representing values of individual variables that are the nearest appear together the most frequently. Occurrence of outlier means that this value is connected the least frequently in connection with all values of the second variable. Graph 1 shows (as well as the results from the Tab. 3) that the students who attended IBW haven't decided to sign up for the Erasmus+ Programme frequently in the last 4 years. The proportion of students with no Erasmus experience (who attended IBW) exhibits greater variability and the plot is located aside, it illustrates that this situation does not have the long-term downward or upward trend.

Discussion

IBW was a challenge at the beginning – it was necessary to present it to the students as an opportunity that they should take. The rising number of the attendants up till the current level signals that the communication with the students was successful. The research on quality of information students receive about the international mobilities including IBW indicates that it is of a high level – almost 100% of Travel and Tourism and Finance and Management students knew about these possibilities to study or work abroad (Chalupová, 2014). As the current research shows, the most serious barrier in mobilities at CPJ might be the financial limitations of the students, which was also an outcome of the research of Fischer, Vltavská et al. (2014) or Lörz et al. (2015). Also, the trend of the IBW mobilities costs for CPJ is rising and the effect on Erasmus mobilities remains very low (the minor positive tendency was observed in 2014/15). To support the continuation of IBW activities it is necessary to demonstrate another benefits, for example networking and consequent cooperation with IBW partners on projects and in the field of research.

Conclusion

Based on the results we can summarize that IBW project in the present does not influence CPJ students significantly in their decision to apply for Erasmus mobility. In academic year of 2013/14 only 1 student out of 30, who attended IBW, applied for Erasmus mobility. The project therefore isn't currently fulfilling its purpose. We suggest that the criteria for evaluation of IBWs have to be set more broadly. They should reflect all possible benefits of cooperation with members of IBW network. It can be viewed positively that in 2015/16 students from the study programme Electrotechnics and Informatics and Clinical Social Work will have an opportunity to join project activities similar to IBW, but specialised in the case studies from their field of

study. This opportunity was offered from the members of the IBW network. Also, it would be interesting to analyse if the IBW project has effected the number of incoming students (if the number of students from the IBW network members that come to study at CPJ is significantly higher than from other partnering universities/colleges).

As the research indicated, financial costs of mobility may be considered as the major factor. Another important factor that should be tested is the personal profile of the applicants, because it may play a significant role, as it is shown in Van Mol's (2013) scheme. The next research should have a qualitative design, preferably in-depth interviews. The topic of this research should be oriented on the motivations and barriers that students from underprivileged families have to face when deciding for international mobilities. CPJ is a regional college attracting mainly the students from Vysočina Region. The incomes of the families in this region belong traditionally to the lowest in the Czech Republic (Majerová et al., 2011).

We can expect that the positive trends in mobilities of CPJ students that have been observed (interest in IBW and Erasmus+ training ships) may stop in the future. Students' willingness to spend time abroad may be affected by their safety concerns that arose after the terrorist attacks in Paris in 2015 and Brussel in 2016. As this topic is very recent, there is a research gap in this field. Such research could have international character, members of the IBW network could be involved. Cooperation of the IBW network members on the researches from different fields might upgrade the project.

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ON THE WAY TO DEVELOP OPEN APPROACH TO MATHEMATICS IN FUTURE PRIMARY SCHOOL TEACHERS

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Highlights

- Active participation in inquiry-based mathematics course can develop open approach to mathematics
- Concept Cartoons – a tool with supportive, educational, and diagnostic role in teachers' education

Abstract

In our contribution we focus on the possibility to develop open approach to mathematics in future primary school teachers during a university course on mathematics conducted in inquiry-based manner. In the first part of the research we analyse data obtained in the beginning and in the end of the mathematics course with respect to two main aspects related to open approach to mathematics: searching for all solutions of a task, and acceptance of different forms of notation of a given solution. Data analysis revealed in the participants three different shifts towards open approach to mathematics, and showed that after the active participation in the course each of the participants improved at least in one of the monitored aspects, and that none of the participants got worse in any of the aspects. In the second part of the research we analyse problems posed by participants several months after the end of the course, again with respect to the two aspects related to open approach to mathematics. As a special diagnostic instrument in our research we use an educational tool called Concept Cartoons.

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Introduction

The study reported here is a part of a three-year qualitative educational research conducted under Czech Science Foundation project. The goal of the project is to implement inquiry-based education into university courses on mathematics and didactics of mathematics for future primary school teachers, and observe how active participation in these courses can influence professional competences of project participants, i.e. their knowledge, beliefs, and practice.

In this particular study we focus on developing project participants' open approach to mathematics during the course on mathematics. Our research questions are "What shifts towards open approach to mathematics can be observed in future primary school teachers after their active participation in an inquiry-based university mathematics course?" and "Do the shifts towards open approach observed when participants solve problems appear also when they pose problems?" For the purpose of the research on the first research question we shall assign open problems to future primary school teachers in the beginning and in the end of the inquiry-based university course on mathematics, and in consideration of open approach we shall observe whether there occur any changes in the way how they solve and justify the problems. For the purpose of the research on the second research question we shall analyse problems posed by future primary school teachers in the time after the course, and observe whether the posed problems allow to engage open approach to mathematics when used in the classroom. Both the assigned and posed problems will be in the form of a special educational tool called Concept Cartoons.

From the perspective of ERIE conferences and ERIES journal,

the topic of our contribution is a broad-based one. Since it deals with developing problem-solving skills, it is in relation not only to educational issues such as students' ability to solve mathematical problems (Novotná et al, 2014; Novotná, Eisenmann and Příbyl, 2015) or future engineers' creativity (Zhou, 2012), but also to managerial issues such as decision making or managerial competencies (Hricová, 2015). Moreover, the study deals with problem posing which is in relation to teachers' ability to pose mathematical problems (Patáková, 2013).

The paper has been developed as an extension of the contribution (Samková and Tichá, 2016c).

Inquiry-based education

Inquiry as a pedagogical concept can be traced long way back to the work of Dewey (1938: 104-105) who introduced it as 'the controlled or directed transformation of an indeterminate situation into one that is so determinate in its constituent distinctions and relations as to convert the elements of the original situation into a unified one', and characterized the indeterminate situations as 'disturbed, troubled, ambiguous, confused, full of conflicting tendencies, obscure, etc.'.

On the other hand, nowadays inquiry-based pedagogy is used to be defined as a way of teaching in which students are invited to work in ways similar to how scientists work (Artigue and Blomhøj, 2013), i.e., to observe, pose questions, reason, think, search for relevant information, collaborate, collect data and interpret them, to solve and discuss problems that come out from real life or can be applied in everyday life contexts (Dorier and Maaß, 2014). From this point of view we can understand

inquiry-based mathematics education as a propaedeutic of both pure and applied mathematics.

Although the term *inquiry* is more common in the field of science education, and its appearance in the field of mathematics education is rather a matter of recent, the idea of *inquiry* is in accordance with educational frameworks that appeared in mathematics long before the term: problem solving, theory of didactical situations, realistic mathematics education, mathematical modelling, anthropological theory of didactics, dialogical and critical approaches (for details on these frameworks and their coherence with inquiry see Artigue and Blomhøj, 2013), problem posing (Tichá, 2009; Singer, Ellerton and Cai, 2015), substantial learning environments (Wittmann, 2001), and many others. Also by looking into the Czech past we can find research content close to the concept of inquiry: the concept of guided rediscovery (Vyšín, 1976), built on characteristics of genetic style of teaching of Brunner (1966), Wittmann (1974) and Freudenthal (1973), the concept of strengthening contact of mathematics education with everyday reality and with other school subjects (Koman and Tichá, 1988), or grasping of situations (Koman and Tichá, 1998).

In mathematics, the starting point for inquiry activities of pupils consists in creating an appropriate learning environment, usually in the form of a task or a problem that pupils have to solve. In accordance with Dewey, in order to stimulate enough inquiry activities of pupils, the task should contain something unknown for the solver what is perceived by the solver as though-provoking or interesting. But inquiry is possible only when this unknown part can be approached through something known, for only known facts and their relations might lead to conjectures and judgments that allow the solver to seek the solution.

For more details on inquiry-based mathematics education see also a survey study written by Samková et al (2015).

Open approach to mathematics

Open approach to mathematics is a method that is in accordance with the above mentioned educational frameworks. Within this approach the teachers assign the students problems that are called *open* – problems whose starting or goal situation is not exactly given. Open problems have multiple levels of grasping (i.e. the starting situation is open), multiple correct ways of solving (i.e. the process is open), multiple correct answers (i.e. end products are open) or multiple ways to transform the problem into a new one (i.e. ways to develop are open). Generally, solving an open problem may consist of various ways of formulating the problem mathematically, of investigating various approaches to the formulated problem, and of posing various advanced problems (Nohda, 1995, 2000; Pehkonen 1995).

When solving open problems, students' responses can be evaluated according to fluency (how many solutions the student produced?), flexibility (how many mathematical ideas the student discovered?), originality (to what degree is the student's idea original?), and elegance (to what degree is the student's explanation simple and clear?) (Nohda, 2000).

Open problems may arise from school mathematics as well as from real-life settings. In the latter case, a very important part of solving the problem consists of grasping the situation, i.e. by putting oneself into the position of the person involved in the situation, by reviving former experiences and accumulated

knowledge from everyday life which are close to the given situation, and by judging the results from the point of view of the person involved (Koman and Tichá, 1998).

A special class of open problems called *polyvalent math tasks* (*polyvalenten Aufgaben*) was introduced by Hellmig (2010). These tasks have multiple solutions, the solutions correspond to different levels of mathematical knowledge, and every student is probably able to find a solution.

Materials and Methods

Participants

Participants of the referred study were 29 future primary school teachers, completely all students of the second year of five-year master degree program at the Faculty of Education. They are not math specialists; after graduation they are expected to teach all primary school subjects (languages, mathematics, science, arts, physical education, etc.).

These students actively participated in one-year course on mathematics held in inquiry-based manner. The course focused on introduction to logic, set theory, and number systems; it had a range of three hours per week.

During the seminars of the course the students participated in so-called *guided inquiry*, i.e. inquiry when the teacher provides the students with problems or questions, and the students have to find the appropriate problem-solving strategies and methods (for characterization of various types of inquiry see Bruder and Prescott, 2013).

Diagnostic instrument

As a diagnostic instrument in our study we innovatively use a primary-school educational tool called *Concept Cartoons* (Keogh and Naylor, 1993). Each Concept Cartoon is a picture showing a situation well known to pupils from school or from everyday reality, and a group of children in a bubble-dialogue. The texts in the bubbles present alternative viewpoints on the situation or alternative solutions of a problem arising from the situation, regardless of their correctness; the correctness may also be unclear or conditional. For a sample see Fig. 1.

Concept Cartoons were developed more than 20 years ago. Its original goal was to support teaching and learning in science classroom at primary school level by generating discussion, stimulating investigation, and promoting learners' involvement and motivation. In later years the tool also expanded to other school subject, including mathematics. When working with Concept Cartoons, pupils have to choose all children that are right, and justify their choice.

Authors of Concept Cartoons performed several researches on the use of Concept Cartoons in primary school science classroom, one of them (Naylor, Keogh and Downing, 2007) showed that the lack of agreement amongst the pictured children encourages pupils to join the discourse with their own opinions, and that such discourse can take a form of sustainable and purposeful argumentation.

In our project we take advantage of this supportive argumentation feature, and innovatively use Concept Cartoons for diagnosing various types of future primary school teachers' mathematics knowledge. We work on establishing a typology of

Concept Cartoons that are applicable as a diagnostic tool, and on creating our own database of Concept Cartoons suitable for this purposes (Samková and Naylor, 2015; Samková, Tichá and Hošpesová, 2015). Our recent research on this issue shows that Concept Cartoons can be helpful in identifying various aspects of the process of grasping of a situation (Samková and Tichá, 2015), and that suitably chosen Concept Cartoons allow us to distinguish between subject matter knowledge and pedagogical content knowledge as well as between procedural knowledge and conceptual knowledge (for details see Samková and Hošpesová, 2015).

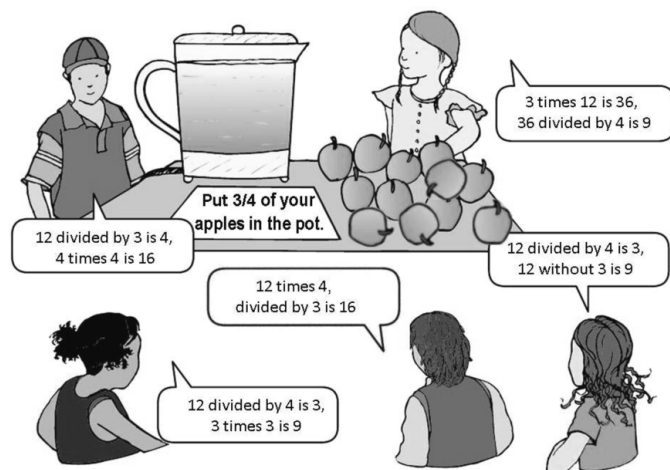


Figure 1: Concept Cartoon with three correct bubbles based on three different models of fractions, and with two incorrect bubbles, one of them being the most frequent pupils' misconception (source of the template of children with empty bubbles: Dabell, Keogh and Naylor, 2008: 3.10).

During the inquiry-based university mathematics course we continuously assigned students various Concept Cartoons in order to detect changes in various aspects of their mathematical knowledge. Altogether we proposed them 21 Concept Cartoons, 6 of them related to open approach to mathematics (e.g. the one in Fig. 1 which is based on three different correct ways of solving the pictured task; this task is also polyvalent in the sense of Hellmig, 2010).

First part of the research: open approach in problem solving

The first part of the research relates mainly to problem solving. It aspires to look for answers to the research question "What shifts towards open approach to mathematics can be observed in future primary school teachers after their active participation in an inquiry-based university mathematics course?"

In this part of the research data collection took place in two stages: in the beginning and in the end of the school year. In both cases we assigned the participants a worksheet with a Concept Cartoon, and asked them to choose in the picture all the children that are right, and to justify their choice. For the purpose of data collection the participants worked on the worksheets individually, during a lesson.

In the beginning of the school year we assigned the students the Concept Cartoon shown in Fig. 2. The task discussed in the picture has two solutions: the first one is directly described in a bubble B (here the missing digits are ordered like the child reads them from a sheet with a completed task) and also in a bubble A (here the missing digits are ordered from the smallest), the

second one is not described in any bubble, its possible existence is just indirectly mentioned in a bubble E.



Figure 2: Concept Cartoon from the first stage of data collection (source of the template of children with empty bubbles and an empty book: Dabell, Keogh and Naylor, 2008: 2.10).

In the end of the school year we assigned the students the Concept Cartoon shown in Fig. 3. The task discussed in this picture has three solutions. Similarly as in the initial worksheet, the first solution is directly described in bubbles B and A, and the possibility of existence of another solution is just indirectly mentioned in a bubble E.

Both worksheets were treated by 25 students (4 students absented at lessons where data were collected). One of the students made such mistakes in calculations that the data are not applicable for our purpose. Thus, 24 students remained relevant for the study.

During data analysis we registered combinations of bubbles that were chosen by individual students as right. We accepted only responses supported by appropriate justification.

We focused on two main aspects related to open approach to mathematics: searching for other (all) solutions – the case of choosing a bubble E, and acceptance of different forms of notation of a given solution – the case of choosing both bubbles A and B.



Figure 3: Concept Cartoon from the second stage of data collection; (source of the template of children with empty bubbles and an empty book: Dabell, Keogh and Naylor, 2008: 2.10).

Second part of the research: open approach in problem posing

The second part of the research relates to problem posing. It extends the first part of the research, and aspires to look for answers to the research question “Do the shifts towards open approach observed when participants solve problems appear also when they pose problems?”

In this part of the research data collection took place in one stage: several months after the end of the first part of the research, during a course on didactics of mathematics.

In this case we asked the participants to create their own Concept Cartoon that could be assigned to primary school pupils during a lesson on mathematics. Openness of the task was neither required, nor mentioned in the assignment; the participants did not know about the relation between the first and the second parts of the research.

They worked on the task individually, in the form of a written homework; the homework was treated by 26 participants.

During data analysis we focused again on aspects of open approach as in the first part of the research, but this time from the perspective of problem posing. We concentrated on whether the Concept Cartoons posed by participants would allow the pupils to experience open approach to mathematics, i.e. to experience searching for various solutions, searching for various ways of solving or deciding between different forms of notation of a given solution.

Results

Problem solving & searching for other (all) solutions

While observing responses related to this aspect, we realized that the most frequent strategy in the first worksheet consisted in checking the alternatives with given digits (i.e. alternatives in bubbles A to D), and by paying no attention to the possibility mentioned in a bubble E. Students who used this strategy found just one solution of the task, and did not search for any other. In the second worksheet, some of these students used again the same strategy, some of them responded to the bubble E and searched for one other solution, and some of them worked systematically and found all three solutions. For proportional details see Fig. 4.

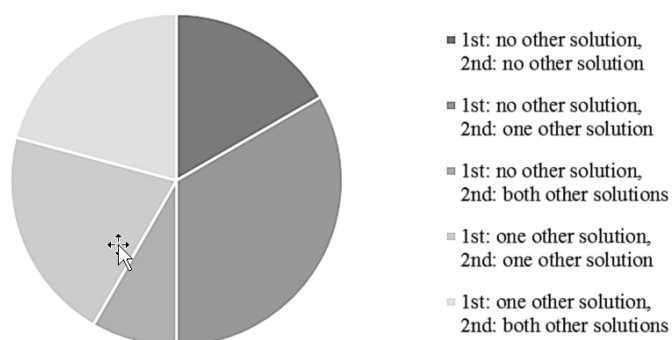


Figure 4: Searching for other solutions presented in 1st and 2nd worksheets, $n = 24$, 2014-2015 (source: own calculation).

The less frequent strategy in the first worksheet consisted in paying attention to the bubble E, and thus in searching for a solution not listed in bubbles. But only one of the students worked systematically and verified that there are no other solutions. In the second worksheet, some of these students again

paid attention to the bubble E and searched for one solution not listed in bubbles. But they did not find out that there are two such solutions. The rest of the students this time worked systematically and found all three solutions. For proportional details see Fig. 4.

Summarized: after the active participation in the course, none of the respondents got worse in the monitored aspect, and majority of the respondents improved in the monitored aspect.

Problem solving & acceptance of different forms of notation of a given solution

While observing responses related to this aspect, we realized that in the first worksheet majority of the students accepted the bubble B and did not accept the bubble A. In the second worksheet, some of these students used again the same strategy, some of them accepted both the bubbles B and A. For proportional details see Fig. 5.

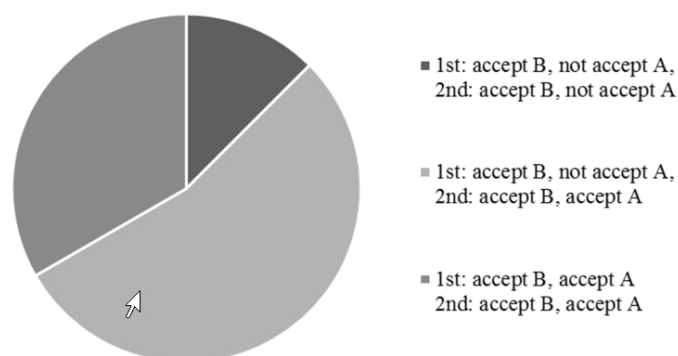


Figure 5: Acceptance of different forms of notation presented in 1st and 2nd worksheets, $n = 24$, 2014-2015 (source: own calculation).

All the students who accepted both B and A bubbles in the first worksheet used the same strategy in the second worksheet. For proportional details see Fig. 5.

Summarized: after the participation in the course, none of the respondents got worse in the monitored aspect, and majority of the respondents improved in the monitored aspect.

Problem posing & allowing pupils to experience open approach to mathematics

Among 26 Concept Cartoons posed by participants we found 7 that could allow pupils to experience searching for various solutions, and 2 that worked with different notations of a given solution. The remaining 17 participants posed Concept Cartoons on tasks with unique solution, unique way of solving, and unique notation, i.e. tasks that did not employ open approach. None of the participants posed Concept Cartoon that would allow to experience searching for various ways of solving.

From the perspective of individual respondents, the extent of openness proposed during problem posing was not related to the extent of openness presented during problem solving: authors of Concept Cartoons allowing to experience open approach belonged to various groups from diagrams in Fig. 4 and 5.

For illustration, we shall show four of the Concept Cartoons; three of them employing open approach, the fourth not. The first Concept Cartoon was posed by a participant who belonged to both last groups in the diagrams, i.e. a student who had already employed open approach before her participation in the inquiry-based course. She prepared a task with eight solutions, two of

them directly described in bubbles; one of the bubbles comprises of a question whether there may be more solutions (see Fig. 6).

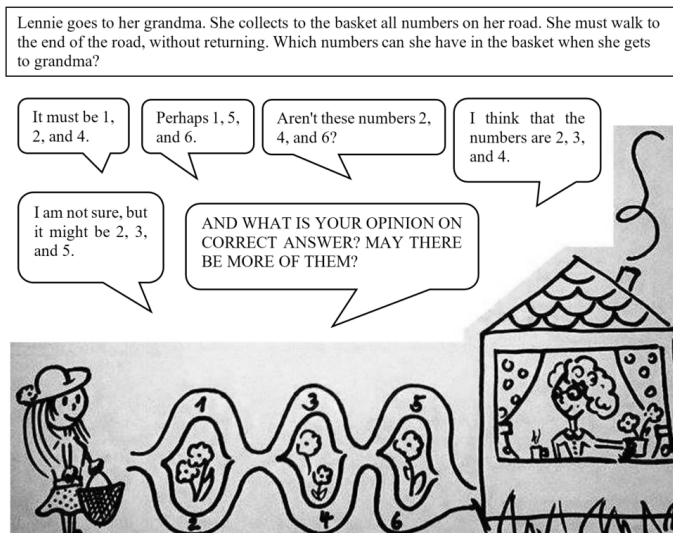


Figure 6: Concept Cartoon posed by the first student; translated from Czech.

The second Concept Cartoon was posed by a participant who improved during the inquiry-based course in searching for other solution, namely a participant who belonged to the third group in Fig. 4, and to the first group in Fig. 5. She prepared a task with two solutions; both of them directly displayed in bubbles (see Fig. 7).

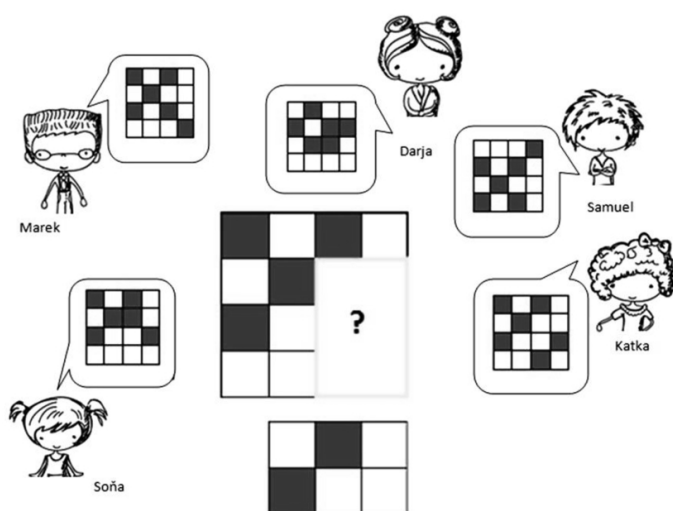


Figure 7: Concept Cartoon posed by the second student.

The third Concept Cartoon was posed by a participant who belonged to the first group in Fig. 4, and to the second group in Fig. 5, i.e. a participant who showed no shift in searching for other solutions, and improved only in acceptance of different forms of notation. Although he did not search for other solutions during his own problem solving, he posed Concept Cartoon with task open from several perspectives: the task allows various ways of grasping, and the correctness of the bubbles is conditional (see Fig. 8). The task grows from a certain real-life situation on a financial literacy issue, and provokes many related questions: Are newspapers distributed also on weekends? Is the paperboy able to sell always all newspapers appointed for the day? How often the salary is paid in particular jobs? Are the time conditions and other job requirements of particular jobs suitable for Tom?...

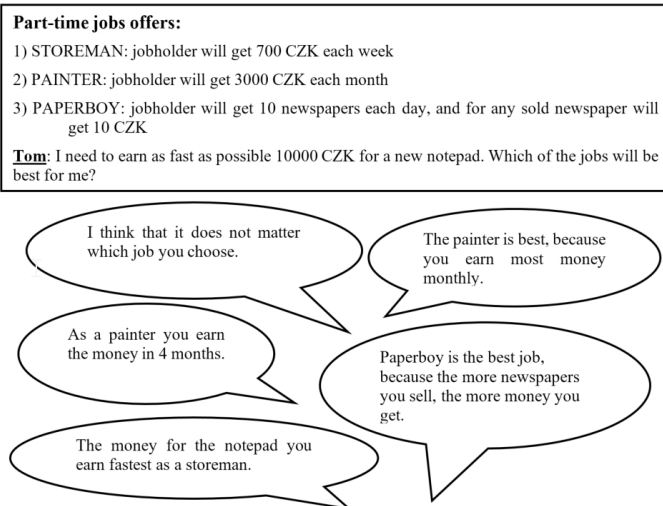


Figure 8: Concept Cartoon posed by the third student; translated from Czech.

The fourth Concept Cartoon was posed by a participant who belonged to the third group in both diagrams, i.e. a participant who had already accepted various notations before her participation in the inquiry-based the course, and who improved during the course in searching for other solutions (but only partially). She prepared a task with one correct solution, put this correct solution to one of the bubbles, and four incorrect alternatives to other bubbles. One of the incorrect alternatives mentions the possibility that the correct solution was not pronounced yet (see Fig. 9). At the first sight the Concept Cartoon looks like the ones in Fig. 2 and Fig. 3: numbers in different bubbles are ordered differently (some from the smallest, some not), and the bubble without numbers indirectly points on an absent solution. But a task with unique solution is not suitable for such an arrangement. Moreover, the participant did not take advantage of the potential of the task, e.g. a bubble with numbers from the correct solution but differently ordered would notably enrich the discussion. Such a Concept Cartoons does not allow the pupil to experience open approach to mathematics.

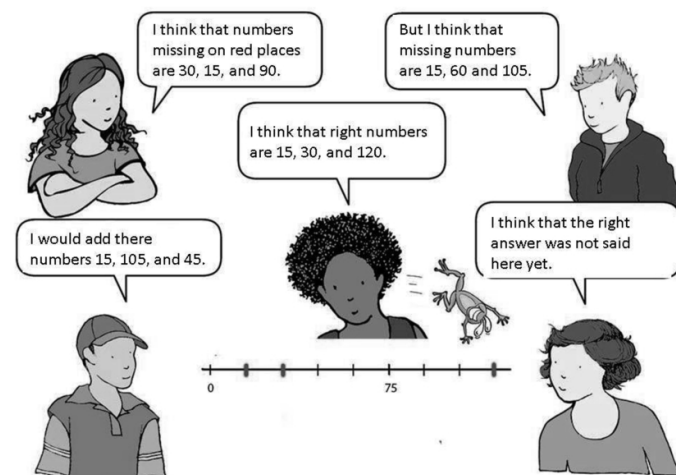


Figure 9: Concept Cartoon posed by the fourth student; translated from Czech (source of the template of children with empty bubbles: Dabell, Keogh and Naylor, 2008: 2.10).

Discussion

Our results are in accordance with findings of various research on impact of inquiry-based education on students' (or pupils') knowledge and attitudes. As summarizes the survey study by Bruder and Prescott (2013), most of the empirical studies dealing with inquiry-based education show positive gains

for the students, mostly on processes, rarely on content. The greatest gains in both content and process show studies oriented on guided inquiry, i.e. the type of inquiry we employed in our study. In this context we should not neglect an extensive research conducted by Jiang and McComas (2015), measuring the effects of inquiry-based education in the field of science through PISA data. They ascertained that among various types of inquiry, the guided inquiry have the greatest gains in students achievement.

Open approach to mathematics was longitudinally investigated e.g. by Boaler (1998) who showed that this method brings same or better content knowledge of pupils and students than in the traditional classrooms, and significantly better attitudes towards mathematics.

In the form of polyvalent tasks the open approach can also facilitate differentiation in the classroom – pupils can respond to the task at a variety of levels (Sullivan and Clarke, 1992). In our research we got use of this feature of polyvalent tasks while diagnosing knowledge through Concept Cartoons: when the Concept Cartoon is based on a polyvalent task, the analysis allow to determinate various levels of solver's knowledge.

The above findings also correspond with our other research involving the same group of participants: apart the shifts toward open approach to mathematics reported here we already detected changes in participants' approach to argumentation (a shift towards more efficient use of counter-examples, and a shift from using empirical arguments to attempts of using deductive arguments; see Samková and Tichá, 2016a), and changes in participants' beliefs about mathematics (e.g. the newly emerged beliefs that discovering a thing by oneself helps remembering the thing, that solving graded series of tasks help learning by allowing to understand simpler issues first, that linking theory to examples or everyday reality helps understanding; we also observed signs of an ongoing change of the belief that mathematics is about memorizing formulas and procedures – many participants uncovered deficiencies of this belief during the course, and started to explore its possible alternatives; for details see Samková and Tichá, 2016b).

In our study we got use of Concept Cartoons, an educational tool backgrounded by a rather rich research in the field of science education, especially with focus on its role in primary school classroom (Naylor and Keogh, 2013). We broadened the range of the tool, and investigate from various perspectives its possible usage in mathematics education of (future) primary school teachers. We analyse its supportive, educational and diagnostic role in teachers' education, and observe its benefits in the fields of problem solving and problem posing. Our findings are consistent with general research, e.g. the case of the student who posed the Concept Cartoon in Fig. 8 confirms the importance of linking problem solving and problem posing that was emphasized several times in recently issued monograph on problem posing (Singer, Ellerton and Cai, 2015): the student who was rather weak in problem solving from the perspective of open approach, posed Concept Cartoon that was the most open of all. Such cases illustrate how diverse information are provided by problem solving and problem posing, and how these information can complement each other. The revelation that there might be students who are more successful in problem posing and in grasping real-life situation than in their own solving problems of school mathematics corresponds also with

findings presented by Koman and Tichá (1998) in the context of grasping real-life situations.

Additionally, we also use Concept Cartoons while preparing future teachers for their own teaching; such a tool helps them become aware of possible pupils' mistakes that can occur in the classroom. Similar but not the same tool called *discussion prompt sheets* is mentioned by Ryan and Williams (2011) in their research about pupils' misconceptions in elementary mathematics.

From the applicability point of view, inquiry-based education, open approach, problem solving and problem posing are all of a high level of importance. Nowadays economics requires people who are highly adaptable to change, who are able to utilize their knowledge in different contexts (OECD, 2005), and the above approaches facilitate this adaptability in students: open approach can cultivate students' divergent thinking including fluency, flexibility, and originality (Kwon, Park and Park, 2006; Nohda, 2000), inquiry-based education rich in problem solving and problem posing can develop creativity (Silver, 1997). Also studies on engineering creativity indicate the importance of facilitating problem-solving skills in future engineers (Zhou, 2012). Last but not least we have to mention connections to managerial skills, since problem solving is one of the managerial competences, alongside with creativity, analytical thinking, teamwork, planning, organising, checking, flexibility, etc. (Hricova, 2015) – all of these take place and hopefully develop during inquiry-based education (Dorrier and Maaß, 2014) or during solving an open problem (Nohda, 2000).

Summarized, our research follows and deepens findings of wide range of relevant research, it returns and reacts to some remarkable issues from elder research (open problems, grasping situations), and reacts to recent issues (inquiry-based education).

Weak point of our research might consist in size of the sample, and in homogenous nature of the sample. In spite of these weaknesses, we believe that the results are applicable in teacher education also at other universities. From our experience at educational conferences and seminars (national and international) we may say that the issue is well accepted by the educational community.

Conclusion

During our study we implemented inquiry-based education into a university course on mathematics for future primary school teachers, and observed participants of the course from the perspective of three aspects related to open approach to mathematics: during problem solving we investigated whether they would search for all solutions of a multiple-solution task, and whether they were able to accept different forms of notation of a given solution, during problem posing we investigated whether they would pose problems allowing pupils to experience open approach.

Collected data showed that in the beginning of the course majority of the participants tended to search only one solution of a task, did not attempts to seek any other solutions, and did not try to verify whether there might be any other solutions. Further, majority of the participants tended to accept only one form of notation of a given solution. Based on our experience, such tendencies use to be very common among future teachers, and

hard to change. After the active participation in the inquiry-based course, we detected in the participants shifts from searching for just one solution to searching for more solutions, shifts from unsystematic search for some solutions to systematic search for all solutions, and also shifts towards accepting various forms of notations of a given solution.

We ascertained that each of the participants improved during the course at least in one of the monitored aspects, and that none of the participants got worse in any of the aspects.

As a positive signal we see the fact, that some of the participants were able to implement open approach while posing problems, even though the openness of the posed task was not required.

We consider open approach to mathematics as an important component of future teachers' education. It helps develop their pedagogical content knowledge, e.g. by making them ready to accept different ways of solving and different solutions proposed by pupils in the classroom.

Undoubtedly we can say that the active participation in the inquiry-based university mathematics course developed future primary school teachers' open approach to mathematics, and thus strengthened their professional competences.

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STUDENTS' EVALUATION OF EDUCATION QUALITY IN HUMAN RESOURCE MANAGEMENT AREA: CASE OF PRIVATE CZECH UNIVERSITY

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Highlights

- Effect of subjects, lectures or teachers on students does not depend on gender or work experience
- Results show there is a dependency between the effort of teacher and student understanding
- Students state that subjects, lessons and teachers mostly satisfied their expectations

Abstract

The quality of education, lessons, subjects and teachers perceived by students is currently often discussed topic regarding strategic management of universities. Assessment of higher education learning outcomes represents internalization of a higher education competition. The aim of the article is to evaluate perception of education quality of lectures, subjects and teachers by university students in the area of human resource management in private Czech university and to identify main approaches to academic staff. The data were collected by quantitative survey by questionnaire data collection ($n = 218$). Students state that subjects, lessons and teachers in the area of human resource management lessons mostly satisfied their expectations (average value between 1.09 and 1.97). The students emphasised that the staff creates positive atmosphere and gives the opportunity to express an opinion which is very important for students at the university. Research outcomes show there is a dependency between the effort of teacher, student understanding and teachers's willingness to give students an opportunity to express an opinion. The paper is extension of conference paper presented on ERIE conference 2016.

Keywords

Education, learning, student, quality, evaluation, university

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Introduction

The quality of tertiary education is currently often discussed theme at the state, private and public universities. The importance of quality of education grows accordingly to amount of people who want to study. Due to the continuous globalisation is Czech education system confronted with many high standard competitors. While scholars have analyzed global higher education competition, they have largely failed to address how global spaces of equivalence are tied both to coloniality and to competition (Shahjahan and Morgan, 2016).

The results of the study of Thatcher et al. (2016) show that analysis reveals evidence of multiple value adding factors; it emerged that the existence of knowledge, present or generated through blended learning techniques, was a key value adding element. The findings enabled the construction of a universal process model providing a project framework, detailing areas of collaborative efforts and associated recompenses; this included ease in project advancements and a noticeably advanced project outcome. The study highlights these values in terms of individual and organizational learning, originality and quality of outputs (Thatcher et al., 2016).

Shahjahan and Morgan (2016) argue that assessment of higher education learning outcomes represents the mediation and internalization of a higher education competition focused on teaching and learning, which reproduces coloniality by valuing characteristics of the enterprising, globally competitive institution. Ashraf, Osman and Ratan (2016) also state that is

crutial to determine the potential influence of education quality in private universities as well as in public universities.

This article aims to evaluate perceptions of education quality of lectures, subjects and teachers by university students in the area of human resource management in selected private Czech university and to identify main approaches to academic staff.

The paper is composed of five sections. The first is Introduction, the second one is Theoretical Background, this followed by a presentation of the methodological approach. Subsequently, an analysis and discussion section comes before the recommendations. Finally, authors conclude the paper and summarize the contributions and limitations of the article, last but not least focus on a future research in this area.

The paper is extension of conference paper presented on ERIE conference 2016 in Prague, Czech University of Life Sciences (Vnoučková et al., 2016). The paper was extended in the results and discussion in parts focused on evaluation of statements of respondents related to subjects, lessons and teachers and also hypotheses related to all three areas are presented. The contribution of the article lies in the emphasis on education quality process in current knowledge economy described by increasing number of public and private universities in the Czech Republic. Accordingly, discussion part was added and the conclusion was extended in compliance with presented results.

Theoretical Background

Recently, there has been described in a literature changes in higher education in the field of universities organization and function, due to expansion in the number of students, new systems and structures in universities management and organization and international regulations of higher education. The dominant conception, evident in many countries, has indicated the turn to an audit or corporate culture (see Forrester, 2011; Watts and Robertson 2011) concerned on quality. 'Universities have been reoriented by performance management techniques towards a competitive, performance culture' (Forrester, 2011). HEIS in the global markets have increasingly had to operate under forces of marketization which demand competitiveness, efficiency and consumer satisfaction (Kotler and Armstrong, 2011).

Since the university students are identified as key stakeholders (ACBSP, 2015, AACSB, 2016, IACBE, 2016) or consumers (Zairi, 1995) students' satisfaction should always be considered by the university due to its importance within the educational evaluation, intensive competition among universities, internationalization of higher education institutions and the classification of education as a marketable service (Kwek, Lau and Tan, 2010). Those reasons have prompted the management of the various public and private higher education institutions to pay more attention in assessing the overall students' perceived service quality.

Concept of Quality

At the European level, quality has always been in the center of attention, being regarded as one of the success factors of the Bologna Declaration (1999). University education, like any other system, is actually focused on concept of quality that is based on the principle of continuous assessment throughout the lifecycle of the system.

Quality is mainly defined by consumers and observers of consumption actions and utility. Quality has been defined in various ways by academics or experts in marketing management. Kotler and Armstrong (2011) states that product quality is one of product characteristics that lies on its ability to satisfy customers' needs. Lassar, Manolis and Winsor (2000) defined service as a set of characteristics that meet the clients' needs, strengthen the links between the organization and them, and enhance the clients' value as well. We can conceptualize quality in different ways and quality serves as a way of differentiating products and services from the point of view of consumers and competitors (Parasuraman, Zeithaml and Berry, 1988).

Service Quality

Service quality is defined as 'the difference between customers' expectations for service performance prior to the service encounter and their perceptions of the service perceived' (Asubonteng, McCleary and Swan, 1996: 64). While the perceived service quality is defined as 'a global judgment, or attitude, relating to the superiority of the service' (Parasuraman, Zeithaml and Berry, 1988: 16), the core concept of service quality is the disconfirmation of expectations theory (Rowley and Dawes, 1999).

Parasuraman, Zeithaml, and Berry (1988) propose five major dimensions to quality of services: reliability, responsiveness, assurance, tangibles, and empathy. However, the most fundamental idea underlying quality is that it bears on a service's

ability to satisfy. When all service quality features such as tangibility, responsiveness, empathy, assurance and reliability are effectively implemented; it may result in enhanced satisfaction of service clients (Grönroos, 1984, Parasuraman, Zeithaml and Berry, 1988; Ismail, Abdullah and Francis, 2009).

Quality Assurance

The quality assurance [QA] system in HEIS refers to the mechanism by means of which the university grants to students confidence that all the conditions are met to attain the assumed standards. It can be defined as asset of policies, systems and processes directed at the maintenance and enhancement of educational quality. 'With successive government support the university-business partnership ideology has been put into practice. Widening participation has increased in emphasis over recent years, providing key innovations and skills to support business growth. Yet business schools activities in business growth is marginal against other university schools' (Thatcher et al., 2016).

The objective of evaluation is to clarify the steps needed to assess the processes and outcomes of a program or organization. An effective evaluation is a dynamic tool that should be updated on an ongoing basis to reflect any changes and priorities over time. Internal evaluation can be used for program planning by highlighting goals, clarifying measurable objectives, and linking activities with intended outcomes (Megnounif, Kherbouche and Chermitti, 2013). The choice of a quality approach is imposed when the aim is to ensure the quality assurance of the product and at the same time to increase customer satisfaction.

Students as Consumers of Higher Education

Student satisfaction is a complex construct with various antecedents and these are not the same as in the actual customer satisfaction models. Customer satisfaction involves customer expectation of the service delivery, actual delivery of the customer experience, including under or over-fulfillment. If expectations are exceeded, positive results are given, while negative results are given when customer experience is poorer than expected (Kotler and Armstrong, 2011). Customer satisfaction also affects economic returns, i.e. profitability, market share, and return on investment (Anderson, Fornell and Lehmann, 1994).

Students' satisfaction could be presented as overall response not only to the learning experience of a student but also Student satisfaction is a changing construct in the Higher Education environment due to repeated interactions (Elliott and Shin, 2002). 'Focusing on student satisfaction not only enables universities to re-engineer their organizations to adapt to student needs, but also allows them to develop a system for continuous monitoring of how effectively they meet or exceed student needs' (Elliott and Shin, 2002: 197).

Education quality, according to Cheng (2003) is the character of an input, process and output of the education system that satisfy both internal and external stakeholders by meeting their explicit and implicit expectation.

The national QA evaluation methodology (which is closely following the Guidelines for Quality Assurance in the European HE Area), includes indicators regarding students' satisfaction: Though satisfied with the academic programs, students may be disappointed in other aspects, such as career counseling or

material conditions (Kotler and Fox, 1995). It is less expensive to maintain a present customer than to recruit a new one (Babin and Griffin, 1998).

Student's satisfaction survey could bring unique data and sources in identifying problem areas within the university, and in integrating information and data from students in a broader agenda mediated through institution. Student perception of studies also relate to an important goal of education, that is to develop student learning and engagement (Delaney, 1997). 'The ability to predict what university course a student may select has important quality assurance and economic imperatives. The capacity to determine future course load and student interests provides for increased accuracy in the allocation of resources including curriculum and learning support and career counselling services. The findings suggest that a students' grade point average relative to the grades of the courses they are considering for enrolment was the most important factor in determining future course selections' (Ognjanovic, Gasevic and Dawson, 2016).

Taking into account the different views, definitions and dimensions of quality are different in their measurement standards. Most researchers on service quality use customer satisfaction as the indicator for quality. The better the quality is, the more satisfied the customers should be. Students' satisfaction survey - identification of the students' satisfaction level concerning a broad range of aspects - it is a relatively new practice. Therefore it is analyzed in this paper.

Materials and Methods

This paper was prepared using a method of an analysis of secondary and primary resources, knowledge synthesis, induction, deduction and comparison. As part of secondary resources, scientific monographs and articles dealing with the theme were analysed. At the same time, websites of companies that are actively dealing with the issue were analysed. The primary data were obtained by conducting a quantitative research, through data collection using questionnaires.

The survey was carried out using students and academic staff. The student data set comprised in total 218 students. The evaluated subjects were Human Resource Management, Human Resource Development, Communication, Psychology in Human Resources, Leadership, Managerial Decision Making and Managerial Skills. Total 11 teachers were leading those subjects for evaluated students. Only students who passed the whole education and evaluation process of mentioned selected subjects in the area of human resources were part of the survey.

The respondents were structured as follows:

- Student category: 65 (30%) men, 153 (70%) women;
- Student professional experience: 128 (58.5%) works in area of study, 89 (41.5%) does not work;
- Student future intention to work in the area of study: 146 (67%) plan to works in area of studied subjects, 12 (0.5%) does not plan to work in area of studied subjects and the rest does not know.

The data collection instrument included questions to measure the activities of education in studied university. The questions were designed based on theories (see theoretical background) and similar researches.

The questionnaire addressed three main areas (other than identification questions). Those were lessons and their content, the course/subject and structure and usefulness and teachers quality.

Respondents' reactions to target statements and their attitudes to the given matter were restricted by offering a set of several statements. The extremes of the five-point scale represented bipolar concepts of the evaluation dimension. All the questions were measured in a Likert type scale with verbal anchors in 1 (strongly disagree) and 5 (strongly agree) or, provided it was not possible to favour either of the sides, selected a median, neutral value (the median value was characterized by number 3). The scale permitted not only the specification of respondents' attitudes, but also their intensity.

The data were evaluated using the tools of descriptive statistics (average, modus, median and standard deviation including absolute and relative frequency) and two dimensional statistics was used using Pearson's correlation coefficient to reveal relations between searched attributes. To evaluate the results IBM SPSS statistics were used.

Results

The objective of this chapter is to evaluate the results obtained from the primary survey. The results of the quantitative research have been statistically evaluated and recommendations have been formulated upon this basis. As the paper focuses on quality evaluation of three areas (subjects, courses and teachers) in human resource management education, the chapter presents results gained in these areas.

Firstly, students' evaluation of subject is presented. Bellow in the Table 1 the results show students perception of different attributes of subjects. Most of the attributes are evaluated positively (on the scale where 1 is the best and 5 is the worst). Modus and median values are almost always 1, except for difficulty of the studied subjects. Students evaluated the difficulty compare to other studied subjects. The most difficult for them is economics and related subjects. On the other hand, management and human resource management are usually evaluated as in the middle of difficulty. The average value of all attributes is 1.79. The perception of quality of lecture is on relatively high level. Additionally, standard deviation maximum value is 0.97.

Subject	AVG	MOD	MED	STD
filled expectations	1.52	1	1	0.80
is difficult	2.97	3	2.5	0.97
is beneficial and valuable	1.44	1	1	0.65
is connected with praxis	1.61	1	1	0.82
is adequately placed is study program	1.47	1	1	0.70
requirements for exam are adequate	1.70	1	1	0.83
AVG	1.79	-	-	-

Tab. 1: Statements of respondents related to subjects

As it is possible to see in Table 1, the subjects studied in the area of human resource management mostly filled the expectations (average value 1.52, modus and median 1), the subjects studied are valuable (average 1.44, modus and median also 1) and connected with praxis (average 1.66, modus and median 1). As the data were deeply analysed and the students questioned, they prefer subjects oriented on praxis. The connection of lessons with case studies and projects is evaluated as the best between the surveyed students. They also value experts from companies for workshops and seminars.

Evaluated attributes questioned students in the way of their readiness for passing the subject. Again, most of the respondents evaluated it positively, that they had good overall knowledge to be able to handle the learning goals and outcomes. Students also stated that requirements for exams are adequate (average 1.70, modus and median 1). Therefore it is possible to assume that the subjects are well placed in study plans and the content of the subjects is manageable for students who are able to prepare themselves for the exams.

The second area studied by the survey is lectures. The main results are placed in the Table 2. Similarly to the first evaluated area, lectures are evaluated well by the students (average value is 1.27, modus and median are 1). The results are even better than in the area of lessons.

Lecture	AVG	MOD	MED	STD
Lectures are adequate	1.24	1	1	0.50
Style of explanation is adequate	1.27	1	1	0.56
Explanation is understandable	1.19	1	1	0.44
Tempo suits me	1.27	1	1	0.53
The way of explanation suits me	1.39	1	1	0.65
AVG	1.27	-	-	-

Tab. 2: Statements of respondents related to lectures

Surveyed students perceive lectures as adequate (average 1.24, modus and median 1), style of explanation seems to be adequate (average 1.27, modus and median 1). Students perceive explanation as understandable, with suitable tempo of discussed topics and way of teaching.

The third area surveyed by questionnaires is lecturers. Students evaluated different attributes related to their teacher and his/her teaching techniques. The results are shown in Table 3. As it is possible to see in the table, students evaluated teachers the best of all studied areas (average value is 1.24, modus and median always 1).

Teacher	AVG	MOD	MED	STD
is an expert	1.21	1	1	0.53
uses modern teaching techniques	1.34	1	1	0.68
uses modern technologies	1.37	1	1	0.69
motivates to learn	1.35	1	1	0.67
is able to attract	1.20	1	1	0.54
creates positive atmosphere	1.09	1	1	0.37
adequately explains	1.17	1	1	0.45
connects theory and praxis	1.31	1	1	0.65
places attention on practicing	1.39	1	1	0.71
cares about students understanding	1.13	1	1	0.47
gives the opportunity to express opinion	1.09	1	1	0.41
AVG	1.24	-	-	-

Tab. 3: Statements of respondents related to teachers

The area of lecturers was studied from more standpoints. Attributes focus on the personality of the teacher, his/her abilities, skills and competencies related to positive and stimulus work with students and also their abilities to connect the theory with praxis.

Students perceive their teacher as an expert (average 1.21, modus and median 1). Best of all searched attributes students evaluate the opportunity to express their opinion and ability of teacher to create positive atmosphere (in both cases average value is 1.09). Mentioned attributes are strengths of teachers surveyed in the research. Also positive is the result that teacher cares

about students understanding (average 1.13) and can adequately explain theory and related areas (average 1.17).

It is possible to summarize that quality evaluation of teachers shows very good results. Students perceive quality teachers skills, abilities and knowledge. Surveyed students evaluate positively also connection with praxis during the lessons and high level of explanation and discussion.

To see, whether there are some relations between searched attributes, correlation analysis was used to evaluate the results. The statistically significant results are shown in the Tables 4, 5 and 6. Interesting finding is that effect of subjects, lectures or teachers on students does not depend on gender or work experience, neither on plans for future work area.

Hypothesis	Pearsons correlation	p-value
Subject is beneficial and valuable - is connected with praxis	0.348	0.00
Subject is beneficial and valuable - filled expectations	0.449	0.02
Adequately placed is study program - filled expectations	0.308	0.04

Tab. 4: Hypothesis related to subjects

The analysis of the area of subjects revealed three statistically significant correlations. Students perceive subjects as beneficial and valuable when they are connect with praxis and when they filled their expectations. That means students come to university with usually clear picture about subjects they will and want to study and they want them to be connected with praxis to fill their expectations. It is necessary to mention that half of the surveyed students were part time students. Part time study is specific form of study; students already work full-time for some time and they have clear expectations about their studies and how they should fit into their current or future job position. The correlation analysis confirmed this. But also regular full time students perceive it in the same way. They also want their subjects to be connected with praxis to fill their expectations.

Students' expectations seem to be quite important in perception of quality education by students. The correlation analysis finds another significant relation connect with expectations. It is adequate structure of study program. The surveyed students perceive subjects as filling their expectations when they are adequately placed in study program. That means the continuity of study program and subject is very important and evaluated by students. Only when subjects properly follow logical structure it is perceived as filling students expectations.

The Table 5 bellow presents the results of correlation analysis focused on the lectures and their quality evaluation.

Hypothesis	Pearsons correlation	p-value
Suitable way of explanation - style of explanation is adequate	0.528	0.02
Suitable way of explanation - tempo is suitable	0.413	0.04
Suitable way of explanation - explanation is understandable	0.367	0.01
Explanation is understandable - tempo is suitable	0.572	0.05
Explanation is understandable - style of explanation is adequate	0.572	0.02
Lectures are adequate - style of explanation is adequate	0.536	0.02

Tab. 5: Hypothesis related to lectures

In the area of lectures students perceive way of explanation as suitable when it is adequate, tempo is suitable and explanation is understandable. Those areas are straight connected and there are close relations between them. Similarly, students see explanation as understandable when tempo is suitable for them and style of explanations is adequate. Also, the analysis found relation between adequate style of explanation and perception of lectures as adequate.

It is possible to conclude that the whole area of lectures is inter-correlated. Almost all attributes are connected. Surveyed students perceive lecture as adequate when the explanation, style and tempo is suitable and understandable. That means it is necessary to use all these techniques and focus on tempo, style and comprehensibility to maintain students attention and satisfaction with lectures.

Finally, bellow in table 6 the correlation analysis of quality perception of teachers by surveyed students is presented.

Hypothesis	Pearsons correlation	p-value
Cares about students understanding - opportunity to express opinion	0.508	0.00
Cares about students understanding - adequately explains	0.507	0.02
Place attention on practicing - connects theory and praxis	0.406	0.05
Attention on practicing - able to attract	0.443	0.02
Attention on practicing - motivates to learn	0.522	0.02
Attention on practicing - uses modern teaching techniques	0.438	0.04
Motivates to learn - is an expert	0.433	0.01
Uses modern technologies - uses modern teaching techniques	0.716	0.00

Tab. 6: Hypothesis related to teachers

Correlation analysis revealed relations between the effort of teacher about student understanding and his/her willingness to give students an opportunity to express their opinion. Similarly, a care of a teacher about students positively correlates with his/her explanation in the course theory. That means students positively perceive when a teacher shows respect to the students. They seems better understand the theory and they are not afraid to ask questions.

Another correlation was found between connection of theory and practice while teacher is oriented also on practice. This relation is no surprise, but students can better understand theory, when it is shown on examples.

Attention on practicing also correlates with students' attraction, motivation for learning and use of modern teaching techniques. This result therefore confirms that practicing in seminars and workshops or even as a part of theoretical lecture leads to higher motivation of students and their attraction.

Students perceive their teacher as an expert when he/she is able to motivate them to learn. And vice versa, an expert in the field motivates students to learn. Consequently it is necessary to employ specialists in order to gain students attraction and motivation to learn.

The last strong correlation was found between use of modern technologies and modern teaching techniques by a teacher. Students perceive a teacher to be expert in modern education techniques, as he/she is able to use also new technologies (it is sometimes interconnected). As students are these days straight connected to technique (tablets, PC, mobile technologies etc.), they expect also a teacher to use them and use the opportunities which they offer also to education.

Discussion

To summarize, students evaluate the best quality teachers who can connect theory and praxis and cares about students' needs. The best evaluated are also teachers with ability to work with new teaching techniques and technologies. Sarabdeen (2013) according to her results states that understanding of learning styles helps the educators and the trainers to deliver relevant materials in a learning/training process. This creates an enthusiasm and motivation among the learners to learn and practice what they have learned. For a successful learning process is very important selection of teaching techniques and technologies. As Keengwe and Georgina (2011) states, the educator should have the understanding of different learners and should be flexible to adapt the trainees' needs. The survey of Borges and Stiubiener (2015) shows, that the information and communication technologies nowadays used in educational process have become increasingly present in education, either as support for classroom learning or in distance learning. Together they support the online systems in education. They also state that the online systems are used for better student-teacher communication and especially for providing instructional materials, activities, assessments and other resources to provide collaborative activities. According to both Sarabdeen (2013) and Cheng (2003) it is very important to correctly combine the selection of the teaching techniques (for example role playing, simulation in the lecture/seminars) and technologies. Well placed combinations of methods will have influence to the results of educational process quality and satisfaction of students and academic staff.

Conclusion

Presented paper analysed and assessed the education quality of subjects oriented to human resources at the private university. The paper focused on perception of education quality by students and teachers. The results show that students in general find economics more difficult compared to management and human resource management and the perception of quality of lecture is at relatively high level at the university. The students state that subjects studied in the area of human resource management lessons mostly satisfied their expectations, the subjects studied are valuable and connected with practice, the requirements for exams are adequate (average value between 1.44 and 1.97). The results from assessment of the lectures are even better than in the area of lessons. The average value in every evaluating

criterion was from 1.19 to 1.39. Students assessed the academic staff relatively positive, they emphasised that the staff creates positive atmosphere and gives the opportunity to express an opinion which is very important for students at the university.

Research outcomes identified that the effect of subjects, lectures or teachers on students does not depend on gender or work experience, neither on plans for future work area. On the other hand there is a dependency between the effort of teacher, student understanding and teachers's willingness to give students an opportunity to express an opinion.

The theoretical contribution of the article lies in the emphasis on education quality process in current knowledge economy described by increasing of the number of public and private universities in the Czech Republic. The practical contribution of this article lies in presenting the actual results from evaluating process at the private university. The results are important base for assessment process of academic staff and preparation of the new study program.

Besides this study there are several promising directions for further research. It would be useful to include the influence of the students' attendance on the seminars and lectures on successfulness in exams.

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