PROCEEDINGS OF THE
OF THE 2nd INTERNATIONAL SCIENTIFIC CONFERENCE

»TEACHING METHODS FOR ECONOMICS AND BUSINESS SCIENCES«

EDITORS
NATAŠA GAJŠT
ALENKA PLOS

University of Maribor Press

Faculty of Economics and Business

Proceedings of the 2nd International Scientific Conference »Teaching Methods for Economics and Business Sciences«

7 May 2018, Maribor, Slovenia

Editors
Nataša Gajšt
Alenka Plos

June 2019

Title Proceedings of the 2nd International Scientific Conference »Teaching Methods for Economics and Business Sciences«

Subtitle 7 May 2018, Maribor, Slovenia

Editors lect. Nataša Gajšt, MSc
(University of Maribor, Faculty of Economics and Business)

lect. Alenka Plos, MSc
(University of Maribor, Faculty of Economics and Business)

Review Prof. Dr. Darja Boršič (University of Maribor, Faculty of Economics and Business, Slovenia), Assoc. Prof. Dr. Petya Dankova (University of Economics – Varna, Bulgaria), Assist. Dr. Magdalena Grazyk-Kuharska (Poznań University of Technology, Poland), Assist. Prof. Dr. Marina Letonja (DOBA Business School Maribor, GEA College – Faculty of Entrepreneurship Ljubljana, Slovenia) Assist. Prof. Dr. Igor Perko (University of Maribor, Faculty of Economics and Business, Slovenia), Prof. Dr. Vojko Potočan (University of Maribor, Faculty of Economics and Business, Slovenia), Assist. Prof. Dr. Anita Radman Peša (University of Zadar, Department of Economics, Croatia), Assist. Prof. Dr. Tjaša Štrukelj (University of Maribor, Faculty of Economics and Business, Slovenia), Assist. Prof. Dr. Igor Todorović (University of Banja Luka, Faculty of Economics, Bosnia and Herzegovina) and Assist. Prof. Ewa Wiecek-Janka, Ph.D. (Poznań University of Technology, Poland).

Language editor lect. Nataša Gajšt, MSc
(University of Maribor, Faculty of Economics and Business)

Technical editor Jan Perša, MEng
(University of Maribor Press)

Cover designer Jan Perša, MEng
(University of Maribor Press)

Conference name 2nd International Scientific Conference »Teaching Methods for Economics and Business Sciences«

Conference date 7 May 2018

Conference location Maribor, Slovenia

Programme committee Prof. Dr. Darja Boršič (University of Maribor, Faculty of Economics and Business, Slovenia), Assoc. Prof. Dr. Petya Dankova (University of Economics – Varna, Bulagria), Lecturer Nataša Gajšt, MSc (University of Maribor, Faculty of Economics and Business, Slovenia), Assist. Dr. Magdalena Graczyk-Kucharska, (Poznań University of Technology, Poland), Assist. Prof. Dr. Romana Korez Vide (University of Maribor, Faculty of Economics and Business, Slovenia), Assist. Prof. Dr. Franjo Mlinarič (University of Maribor, Faculty of Economics and Business, Slovenia), Assist. Prof. Dr. Igor Perko (University of Maribor, Faculty of Economics and Business, Slovenia), Assist. Prof. Dr. Anita Radman Peša (University of Zadar, Department of Economics, Croatia), Lecturer Alenka Plos, MSc (University of Maribor, Faculty of Economics and Business, Slovenia), Assist. Prof. Dr. Tjaša Štrukelj (University of Maribor, Faculty of Economics and Business, Slovenia), Assist. Prof. Dr. Igor Todorović (University of Banja Luka, Faculty of Economics, Bosnia and Herzegovina), Prof.

Publihed by
University of Maribor Press
Slomškov trg 15, 2000 Maribor, Slovenia
http://press.um.si, zalozba@um.si

Co-published by
University of Maribor,
Faculty of Economics and Business
Razlagova ulica 14, 2000 Maribor, Slovenia
http://epf.um.si, epf@um.si

Edition 1st **Published** Maribor, Slovenia, June 2019

Publication type E-book **Available at** http://press.um.si/index.php/ump/catalog/book/422

CIP - Kataložni zapis o publikaciji
Univerzitetna knjižnica Maribor

37.091.3:33(082)

PROCEEDINGS of the 2nd International Scientific Conference "Teaching Methods for Economics and Business Sciences", 7 May 2018, Maribor, Slovenia [Elektronski vir] / editors Nataša Gajšt, Alenka Plos]. - 1st ed. - El. zbornik. - Maribor : Univerzitetna založba Univerze, 2019

Način dostopa (URL): http://press.um.si/index.php/ump/catalog/book/422
ISBN 978-961-286-285-5
doi: 10.18690/978-961-286-285-5
1. Gajšt, Nataša
COBISS.SI-ID 96915201

ISBN 978-961-286-285-5 (PDF)

DOI https://doi.org/10.18690/978-961-286-285-5

Price Free copy

For publisher full prof. Zdravko Kačič, PhD, University of Maribor Rector

PROCEEDINGS OF THE 2ND INTERNATIONAL SCIENTIFIC CONFERENCE
»TEACHING METHODS FOR ECONOMICS AND BUSINESS SCIENCES«
7 MAY 2018, MARIBOR, SLOVENIA
N. Gajšt & A. Plos (eds.)

University of Maribor Press

Proceedings of the 2ND International Scientific Conference »Teaching Methods for Economics and Business Sciences«

NATAŠA GAJŠT & ALENKA PLOS

Abstract Besides delivering scientific and professional content, teaching entails fostering students' learning by adopting effective instructional strategies in an engaging and motivating environment, which needs to be aligned with our intended outcomes and with our varied and specific teaching and learning contexts. These proceedings bring a selection of papers presented at the 2nd International Scientific Conference »Teaching Methods for Economics and Business Sciences« held on 7 May 2018 at the University of Maribor, Faculty of Economics and Business. The authors who submitted their work for this publication share a common interest both in a continuous improvement of their teaching and in the enhancement of their students' engagement and learning in order to contribute to global prosperity.

Keywords: • teaching methods • economics and business • didactics • higher education • students •

CORRESPONDENCE ADDRESS: Nataša Gajšt, MSc, Lecturer in English, University of Maribor, Faculty of Economics and Business, Maribor, Slovenia, e-mail: natasa.gajst@um.si. Alenka Plos, MSc Lecturer in German, University of Maribor, Faculty of Economics and Business, Maribor, Slovenia, e-mail: alenka.plos@um.si.

DOI https://doi.org/10.18690/978-961-286-285-5 ISBN 978-961-286-285-5
Dostopno na: http://press.um.si

PROCEEDINGS OF THE 2ND INTERNATIONAL SCIENTIFIC CONFERENCE
»TEACHING METHODS FOR ECONOMICS AND BUSINESS SCIENCES«
7 MAY 2018, MARIBOR, SLOVENIA
N. Gajšt & A. Plos (eds.)

University of Maribor Press

Table of Contents

PROCEEDINGS OF THE 2ND INTERNATIONAL SCIENTIFIC CONFERENCE
»TEACHING METHODS FOR ECONOMICS AND BUSINESS SCIENCES«
7 MAY 2018, MARIBOR, SLOVENIA
N. Gajšt & A. Plos (eds.)

University of Maribor Press

Developing a Self-Assessment Methodology as a Strategy in Teaching Advance Finance

BEGOÑA ÁLVAREZ-GARCÍA, JOAQUÍN ENRÍQUEZ-DÍAZ,
ÁNGELES LONGARELA-ARES & FÉLIX PUIME-GUILLÉN

Abstract An adequate understanding of financial transactions is essential to business professionals who will develop their careers in fields such as investments, funding or mergers and acquisition areas. Moreover, the independence, flexibility and decisional capacity of these future professionals will be also key skills that can be acquired or improved during their educational stage. Taking into account this demands, a learning methodology was developed to ensure that students feel involved and motivated to study financial topics while, at the same time, they strengthen important cognitive and social skills. The aim is to use e-learning tools and self-regulated learning to help students to become the main managers of their own learning rather than mere receivers of knowledge and to play a stronger role in the learning process. An important part of the methodology is to receive feedback from students and to continuously supervise them to prevent that they have the feeling of abandonment or focus on topics far from the subject being studied. After implementing this methodology, students were asked to evaluate it. They give a positive assessment about the usefulness of the process and the use of e-learning tools.

Keywords: • financial maths • self-regulated-learning • self-assessment • e-learning • higher education •

CORRESPONDENCE ADDRESS: Begoña Álvarez-García, PhD Economics, Lecturer, University of a Coruna, Faculty of Economics and Business, A Coruña, Spain, e-mail: balvarez@udc.es. Joaquín Enríquez-Díaz, BSc Economics and MSc in Banking and Finance, Teaching Assistant, University of a Corun, Faculty of Economics and Business (a), A Coruña, Spain, e-mail: joaquin.enriquez@udc.es. Angeles Longarela-Ares, BSc Economics and MSc in Banking and Finance, Teaching Assistant, University of a Coruna, Faculty of Economics and Business, A Coruña, Spain, e-mail: angeles.maria.longarela.ares@udc.es. Félix Puime-Guillén, PhD Economics, Lecturer, University of a Coruna, Faculty of Economics and Business, A Coruña, Spain, e-mail: felix.puime@udc.es.

DOI https://doi.org/10.18690/978-961-286-285-5.1 ISBN 978-961-286-285-5
Dostopno na: http://press.um.si

1 Introduction

The development of the European Higher Education Area (EHEA) together with the growing influence of the information and communication technologies (ICTs) in teaching and the new demands on education and training of the society in the 21st century have led to a new learning model in which students adopt a leading role and lecturers may not only be restricted to transmit knowledge to the students but also to teach them how to develop skills and competencies (Fernández-Sáinz, García-Merino, & Urionabarrenetxea, 2016; Lagoa-Varela, Alvarez-García, & Boedo Vilabella, 2016).

In this changing environment, lecturers promote a more interactive teaching process that places the student as the main manager of his own learning process (Álvarez-Rojo et al., 2011; Fernández Díaz, Carballo Santaolalla, & Galán González, 2010; Gerhardt, 2016; Isidro de Pedro & Esteso Díaz, 2005, Mateo, Escofet, Martínez, & Ventura, 2009; Mateo & Vlachopoulos, 2013). To do so in practice, lecturers count on the help of different teaching methodologies and incorporate as much as possible online learning tools and self-learning tools (Arias Aranda, Haro Domínguez, & Romerosa Martínez, 2010; García Valcárcel, 2008; Níkleva & Rodríguez Muñoz, 2015; Valentín et al., 2013; Varela-Candamio, Enriquez-Díaz, & Rouco-Couzo, 2018). The choice of these teaching methodologies depends on the kind of discipline being taught (Chu et al., 2017; Mathieson, 2012).

Advanced programs in financial subjects, in which mathematics have an important weight, are often perceived by students as difficult and too abstract; moreover, mathematics can even generate anxiety and/or lack of motivation in some students (Mardanov, Khasanova, & Kalganova, 2016). Consequently, the teaching of these subjects can be improved by combining academic rigor with practical examples that make it possible to connect students with professional practice (this can be done by using real data and information very close to reality) and by incorporating ICT in teaching to ensure that students are able to successfully assume the challenges they will have to deal with in their future work (Abreu, Carrillo, & Herrera, 2014; Shen et al., 2015; Siewiorek, Saarinen, Lainema, & Lehtinen, 2012; Sosa Mora, 2017).

This study shows a pilot teaching experience carried out during the current academic year in the subject Analysis of Financial Operations (Financial Mathematics). This subject is taught in the Business Administration Degree of the University of A Coruña during the first quarter of the second year. The experience involved developing a teaching methodology that aims to promote the students' self-regulated learning (SRL) as web as to stimulate their self-assessment (SA) capacity and their involvement in the design of the tools used to achieve these goals.

This paper has been structured as follows: Section 2 shows the state of the art regarding new teaching methodologies of SRL and SA, Section 3 presents the learning and SA tools designed and applied in the subject Analysis of Financial Operations (Financial Mathematics), Section 4 concerns the feedback from students about perceived learning and motivation and, finally, in Section 5 the main conclusions are presented.

2 State of the Art

SA and SRL are processes by which students proactively seek information and take the appropriate steps to treat this information (Zimmerman, 1990). Both the participation in SA and SRL processes are learning methodologies with increasing application in recent years (Villardón, 2006). This fact involves the publication of numerous studies about new techniques and methodologies (McDonald & Boud, 2003; Taras, 2001, 2002, 2003) that allow students to receive feedback from teacher before the self-assessment phase, so they will be able to (i) identify and understand their mistakes, (ii) reconsider their work to improve it, and (iii) obtain a qualification only after the training phase (Schank, 1997; Taras, 2001; Villardón, 2006).

In this regard, Zamora et al. (2018) have determined a close relationship between the detection of errors in SRL and students' own performance and Del Puerto, Minnaard, and Seminara (2006) come to similar conclusions in mathematics instruction, in which the presence of algebraic errors often hinder learning success. Other key aspect is the generation of spaces in which students receive opportunities to acquire the necessary skills to be independent and autonomous. Another point to be taken into consideration is the support provided by new technologies for e-learning, which promote the participation of students and

increase their motivation. In fact, as noted by authors such as Kramarski and Gutman (2006), Kramarski and Mevarech (2003) or Zimmerman (1998), the combination of SRL and the e-learning environments is essential to students to achieve more autonomy on the learning process which in turn contributes to develop their metacognitive knowledge and has a positive influence in their academic performance. However, Eom (2012), Eom, Ashill, and Wen, (2006), Freeze, Alshare, Lane, and Wen (2010) and Rai, Lang, & Welker (2002), who studied the effects of self-efficacy, SRL, and electronic learning systems over student satisfaction and the effectiveness of this kind of systems, conclude that the use of e-learning resources does not influence the student's satisfaction on its own, but rather it is the quality of the system and the information that has a positive impact on the satisfaction and effectiveness of the system.

Regarding SRL processes in financial subjects, there are not numerous previous experiences; however, we want to highlight the work developed by Kramarski and Gutman (2006). These authors analyze the practical and theoretical implications of SRL support in mathematical e-learning environments based on questionnaires, mathematical explanations, and feedback to achieve the highest level of effectiveness in the process. They conclude that teaching in an e-learning environment is more effective if it is applied in combination with SRL strategies. When designing an SRL strategy, it is important that (i) teachers offer expectations that meet the needs of students and challenge their potential, (ii) learning environments encourage the intensive adoption of approaches to delve into learning, and (iii) classes not only focus on the transmission of concepts (Pintrich & De Groot, 1990).

3 Methodology

3.1 Context of application

This work deals with a pilot teaching experience conducted during the current academic year in the course Analysis of Financial Operations (Financial Mathematics). This course is taught in the first quarter of the second year of the Business Administration Degree of the University of A Coruña. It is structured in three main blocks in which the fundamental concepts to understand the financial transactions are presented. Table 1 shows both the learning outcomes

and the possible evidences of learning of each block, together with the teaching planning.

Table 1: Teaching planning of the course

Block	Learning outcomes	Evidences of learning	Block length (in months)
Block 1	Understanding the time value of money and knowing the basics of the different types of interest rates and how they are applied to specific financial transactions.	Correct use of financial laws. Students should be able to operate with financial capitals and the formulas for simple interest, compound interest, and discount rate.	1.5
Block 2	Knowing and identifying the concept of financial operation, as well as its components. Being able to use these concepts in financial transactions and, in particular, the concepts of Annual Percentage Rate of Charge (APRC) and Amortized Cost.	Students should be able to identify a financial operation, as well as its components. Students should understand the concept of APRC and apply it to real cases. Students should be able to calculate the amortized cost according to the Spanish National Chart of Accounts.	1.5
Block 3	Applying the concepts learned in calculating present and terminal value for various streams of cash flows as a basis for use in lending operations.	Students should be able to identify capital flows and to calculate their present and terminal value. In the case of lending operations, students should be able to elaborate charts of accounts with different methods (French and Italian) and to calculate the APRC.	1

Since time class is not enough to develop the whole subject in-depth and to stop to do a lot of practical exercises and examples in detail with complementary cases that clarify all the doubts, an essential part of the student learning relies on his personal work. In this light, SA methodologies are very valuable learning strategies (Villardón, 2006) because they enable every student to move up at his own pace and to identify the parts of the subject that are more difficult to

assimilate (Calatayud Salom, 2007). Additionally, SA methodologies encourage students' involvement in both the development of their skills and the construction of their knowledge (Nicol & Macfarlane-Dick, 2006). Therefore, an experimental methodology based on on-line SA was developed as outlined in the following section.

3.2 Design of the methodology

On the grounds of what has been exposed, a teaching methodology based on the students' SA was developed in three phases as depicted in Figure 1.

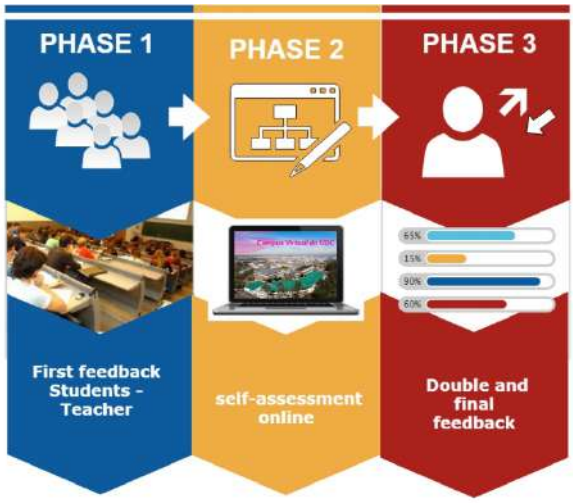


Figure 1: Phases of the SA methodology implementation
Source: own

Phase 1. The first phase was developed at the end of each block of the subject by making a review session in which students solved practical cases related to the learning outcomes aforementioned. With these exercises and the wide-ranging questions of the students, the teacher ascertained the most problematic concepts and aspects. Thus, a first feedback was received and it was very useful for the preparation of the following SA phase.

Phase 2. In this phase students had the possibility to self-assess the contents of the topic over a limited period of time (1 week) if they wished (optional). To that end, the distance training platform called Moodle was used. Several tests related to the whole block and, in particular, with the practical cases identified by the teacher in the previous phase as the most difficult were uploaded to the Moodle platform. Each assessment test was available over a limited period of time and each student could only get three attempts before being locked out of the platform.

Phase 3. This phase, which started when the SA period was closed, was useful to obtain a double feedback. On the one hand, the teacher could see the number of students that performed the tests, the number of times that each one of them tried to do every test and the students' responses (Figure 2). On the other hand, the students received an overall score of their SA and, in turn, they could know the questions they have been answered in a wrong way.

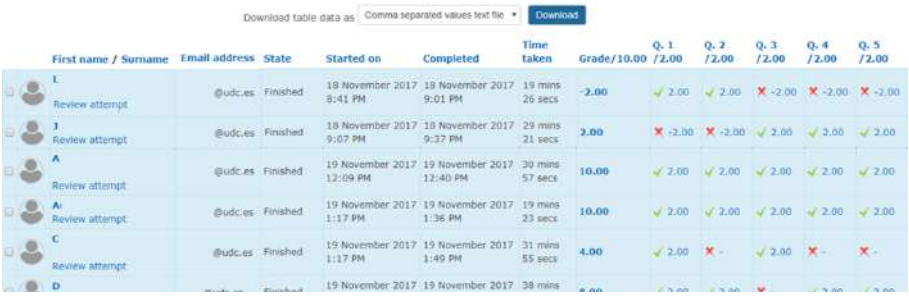


Figure 2: Students' SA report
Source: own

Four processes of SA were developed with the objective of adapting the methodology described above to the learning contents and to the length of the blocks covered in the course. The first SA was undertaken at the end of block 1, two others at the end of block 2, and the last one at the end of the block 3. Every SA test was available online to the students for one week, with the exception of the last one that due to time constraints was only accessible by students few days before the final examination and with the possibility of undergoing just one attempt.

4 Results

4.1 Participation in the experience

A total of 190 students were enrolled in the course Analysis of Financial Operations (Financial Mathematics). However, not all students were involved in this new teaching experience due to the optional character of, it. Table 2 synthesizes the results of the participation obtained for every SA.

Table 2. Results from the students' involvement

BLOCK	BLOCK 1	BLOCK 2		BLOCK 3
	Self-assessment 1	Self-assessment 2	Self-assessment 3	Self-assessment 4
Participation (Nº of students)	23	53	41	31
Nº of students that tried SA more than once	3	29	19	*(just one attempt was allowed)*

As can be seen from Table 2, there is an increasing trend concerning students' participation. The number of participants rose from 23 students in the first SA to as many as 40 to 50 students in the second block. In the third block, the figure dropped to 31 students, presumably due to the short time they had been given to perform the last SA. Even then, the figure remained higher than the first one.

The number of attempts was also trending positively. A larger number of learners repeated, at least once, the SA in the second block of the course.

In short, taking into account that SA was performed voluntarily, students seemed to value positively this new teaching methodology as reflected by the growing trend discernible in both the learners' participation in tests and the number of attempts.

4.2 Students' opinions

After the application of this new methodology, learners responded to a short on-line two question survey (Table 3). This short survey was designed to know the students' opinion about the experience with the new methodology implemented. Had the experience not been positive, the teacher could make the necessary changes for future courses.

Table 3. Student survey

Question	Values
Are the SA useful?	**Likert scale: 0 - 5**
Is the SA methodology good to achieve your learning goals?	**Likert scale: 0 - 5**

A total of 27 students answered the survey. The results obtained after examining the opinions are shown in Figure 3.

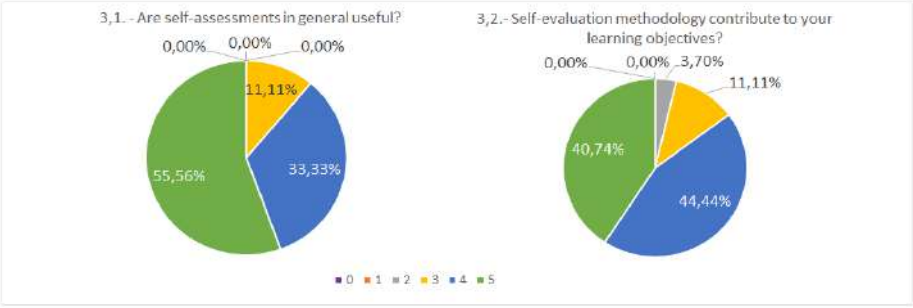


Figure 3. Students' opinion about the new methodology

As seen in Figure 3.1, when students were asked to evaluate the usefulness of the new methodology giving scores from 0 (useless) to 5 (very useful), more than 55% of the students thought that this methodology is useful, giving a score of 4 points.

When students were asked to evaluate if SA were good to achieve the learning goals, the latter understood as the acquisition of the minimal skills to pass the course, again the results were very positive. About 44 % of students expressed that the methodology was very good to achieve the learning goals (by giving the

maximum score on a scale up to 5 points) and about 41 % gave a score of 4 point (pretty good).

In the end, this pilot experience appears (according to the survey results) to be helpful for the students involved when they study the course materials.

5 Conclusions

This paper presents a pilot teaching experience implemented in the academic year 2017/2018 in the course Analysis of Financial Operations (Financial Mathematics) that is taught in the second year of the Business Administration Degree of the University of A Coruña. This pilot experience involved the development of a learning methodology based on SRL and SA activities. Applying this methodology had several interesting implications:

- *From the students' point of view*. This methodology enhances the students' motivation and participation and gives to them a feedback on the learning achieved. In this case, as shown in section 4.1, there has been a positive evolution in the participation in the experience and a high percentage of students think that it was very useful to help them to achieve the learning objectives to pass the course.

- *From the teacher's point of view*. This methodology gives an important role to the teacher as the designer and the manager of the SA activities. This bivalent role is reinforced by the fact that teacher receives feedback on the student evolution and he can focus more on the aspects in which students tend to have greater difficulties or he can even take this information into account for the preparation of materials for future courses.

References

Abreu, L., Carrillo, J., & Herrera, L. (2014). Procedimiento didáctico para favorecer la formación matemática de los estudiantes en las carreras de comercio y finanzas con la integración de las TIC y la resolución de problemas profesionales. In M. Ramos, & V. Aguilera (Eds.), *Educación. Handbook T-IV: Congreso Interdisciplinario de Cuerpos Académicos* (pp. 185-195). Spain: ECORFAN

Álvarez-Rojo, V., Romero, S., Gil-Flores, J., Rodríguez-Santero, J., Clares, J., Asensio, I., Del-Frago, R., García-Lupión, B., García-García, M., González, D., Guardia, S., Ibarra, M., López-Fuentes, R., Rodríguez-Gómez, G., & Salmeron-Vilchez, P. (2011). Necesidades de formación del profesorado universitario para la adaptación de su docencia al Espacio Europeo de Educación Superior (EEES), *Revista Electrónica de Investigación y Evaluación Educativa*, *17*(1), 1–22.

Arias Aranda, D., Haro Domínguez, C., & Romerosa Martínez, M. M. (2010). Un enfoque innovador del proceso enseñanza-aprendizaje en la dirección de empresas: el uso de simuladores en el ámbito universitario. *Revista de Educación*, *353*, 707–721.

Calatayud Salom, A. (2007). La evaluación como instrumento de aprendizaje y mejora. Una luz al fondo. In: A. Calatayud (Coord). La evaluación como instrumento de aprendizaje. Estrategias y técnicas. Madrid: MEC.

Chu, S .K. W., Zhang, Y., Chen, K., Chan, C. K., Lee, C. W. Y., Zou, E. & Lau, W. (2017). The effectiveness of wikis for project-based learning in different disciplines in higher education. *The Internet and Higher Education*, *33*, 49–60.

Del Puerto, S. M., Minnaard, C. L. & Seminara, S. A. (2006). Análisis de los errores: una valiosa fuente de información acerca del aprendizaje de las Matemáticas. *Revista Iberoamericana de Educación*, *38*, 1–13.

Eom, S. B. (2012). Effects of LMS, self-efficacy, and self-regulated learning on LMS effectiveness in business education. *Journal of International Education in Business*, *5*(2), 129–144. doi: 10.1108/18363261211281744

Eom, S.B., Ashill, N., & Wen, H. J. (2006). The determinants of students' perceived learning outcome and satisfaction in university online education: an empirical investigation. *Decision Sciences Journal of Innovative Education*, *4*(2), 215–236.

Fernández Díaz, M. J., Carballo Santaolalla, R., & Galán González, A. (2010). Faculty attitudes and training needs to respond the new European higher education challenges. *Higher Education 60*(1), 101–118. doi:10.1007/s10734- 009-9282-1

Fernández-Sáinz, A., García-Merino, J. D., & Urionabarrenetxea, S. (2016). Has the Bologna process been worthwhile? An analysis of the learning society-adapted Outcome Index through quantile regression. *Studies in Higher Education 41*(9): 1579–1594. doi:10.1080/03075079.2014.988703A

Freeze, R. D., Alshare, K. A., Lane, P., & Wen, H. J. (2010). IS success model in e-learning context based on student perception, *Journal of Information Systems Education*, *21*(2), 173–184.

Gerhardt, M. G. (2016). The importance of being…social? Instructor credibility and the Millennials. *Studies in Higher Education*, *41*(9), 1533–1547. doi:10.1080/03075079.2014.981516

Isidro de Pedro, A. I., & Esteso Díaz, M. A. (2005). El siempre complejo quehacer de la docencia... y más ante vientos de cambio: redefinición de roles docente-discente. *Revista Electrónica Interuniversitaria de Formación del Profesorado*, *8*(1), 1–5.

Kramarski B., & Mevarech Z. R. (2003). Enhancing mathematical reasoning in the classroom: effects of cooperative learning and metacognitive training. *American Educational Research Journal*, *40*, 281–310. doi: 10.3102/00028312040001281

Kramarski, B., & Gutman, M. (2006). How can self-regulated learning be supported in mathematical E-learning environments?. *Journal of Computer Assisted Learning*, *22*, 24–33. doi: 10.1111/j.1365-2729.2006.00157.x

Lagoa-Varela, D., Alvarez-García, B., & Boedo Vilabella, L. (2016). Recent changes in the role of Spanish lecturers in economics and business: an empirical analysis

based on their own perspectives. *Studies in Higher Education*, *43*(8), 1321–1333. doi: 10.1080/03075079.2016.1250738

Mardanov, R. S., Khasanova, A. Y., & Kalganova, G. F. (2016). Psychological problems with learning mathematical disciplines at the economics faculties. In H. Çalişkan, I. Önder, E. Masal, & Ş. Beşoluk (Eds.) *ERPA International Congresses on Education 2015*. SHS Web of Conferences: *Vol. 26*, 01130. doi: 10.1051/ shsconf/20162601130

Mateo, J., & Vlachopoulos, D. (2013). Evaluación en la universidad en el contexto de un nuevo paradigma para la educación superior. *Educación XX1*, *16*(2), 183–208.

Mateo, J., Escofet, A., Martínez, A., & Ventura, J. (2009). Naturaleza del cambio en la concepción pedagógica del proceso de enseñanza-aprendizaje en el marco del EEES. Una experiencia para el análisis. *Revista Fuentes*, *9*, 53–77.

Mathieson, S. (2012). Disciplinary cultures of teaching and learning as socially situated practice: rethinking the space between social constructivism and epistemological essentialism from the South African experience. *Higher Education, 63*(5), 549–564.

McDonald, B., & Boud, D. (2003). impact of self-assessment on achievement: The effects of self-assessment training on performance in external examinations. *Assessment in Education: Principles, Policy & Practice*, *10*(2), 209–220. doi: 10.1080/0969594032000121289

Nicol, D. J., & Macfarlane-Dick, D. (2006). Formative assessment and self-regulated learning: a model and seven principles of good feedback practice. *Studies in Higher Education*, *31*(2), 199–218. doi: 10.1080/03075070600572090

Níkleva, D. G., & Rodríguez Muñoz, F. (2015). Renovación metodológica en el espacio europeo de Educación Superior. *Espiral. Cuadernos del Profesorado,* 8(17), 3–15.

Pintrich, P. R., & De Groot, E. (1990). Motivational and self-regulated learning components of classroom academia performance. *Journal of Educational Psychology*, *82*, 33–40. doi: 10.1037/0022-0663.82.1.33

Rai, A., Lang, S. S., & Welker, R. B. (2002). Assessing the validity of IS success models: An empirical test and theoretical analysis. *Information Systems Research*, *13*(1), 50–69. doi: 10.1287/isre.13.1.50.96

Schank, R. (1997). *Virtual learning: a revolutionary approach to building a highly skilled workforce*. New York, NY: McGraw-Hill.

Siewiorek, A., Saarinen, E., Lainema, T., & Lehtinen, E. (2012). Learning leadership skills in a simulated business environment. *Computers & Education*, *58*(1); 121–135.

Sosa Mora, E. (2017). Aprendizaje colaborativo mediante estudio de caso y juego de roles en el curso Análisis de las Finanzas de la Escuela de Administración de Negocios en la Universidad de Costa Rica, *Tec Empresarial*, *11*(2), 41–53.

Taras, M. (2001). The use of tutor feedback and student self-assessment in summative assessment tasks: towards transparency for students and for tutors. *Assessment & Evaluation in Higher Education*, *26*(6), 605–614. doi: 10.1080/02602930120093922

Valentín, A., Mateos, P. M., González-Tablas, M. M., Pérez, L., López, E., & García, I. (2013). Motivation and learning strategies in the use of ICTs among university students. *Computers & Education*, 61, 52–58.

Varela-Candamio, L., Enriquez-Díaz J., & Rouco-Couzo M. (2018). Gamification in service learning: an innovative experience. In L. Daniela and M. Lytras. *Learning strategies and constructionism in modern education settings*. Hershey PA: Igi Global. doi: 10.4018/978-1-5225-5430-1

Villardón Gallego, M. L. (2006) Evaluación del aprendizaje para promover el desarrollo de competencias. *Educatio Siglo XXI*, *24*, 57–76.

Zimmerman B. J. (1998). Academic studying and the development of personal skill: a self-regulatory perspective. *Educational Psychologist*, *33*, 73–86. doi: 10.1207/s15326985ep3302&3_3

Zimmerman, B. J. (1990). Self-regulated learning and academic achievement: An overview. *Educational Psychologist*, *25*(1), 3–17. doi: 10.1207/s15326985ep2501_2

PROCEEDINGS OF THE 2ND INTERNATIONAL SCIENTIFIC CONFERENCE
»TEACHING METHODS FOR ECONOMICS AND BUSINESS SCIENCES«
7 MAY 2018, MARIBOR, SLOVENIA
N. Gajšt & A. Plos (eds.)

University of Maribor Press

Practical Knowledge Transfer in Quality Management Lectures: The "Peanut Chocolate Candy" Case Study

STEFAN BONGARD

Abstract Students enrolled in the Bachelor's degree program in logistics at the University of Applied Sciences Ludwigshafen am Rhein attend a Quality Management lecture in their fourth semester. In this lecture, logistics quality is defined as "the degree of performance between the customer's expectations and the supplier's performance." This generic definition leaves much space for interpretation. Following the methodology of action-based learning, the "Peanut Chocolate Candy" case study was developed in order to illustrate this concept with a hands-on, practical example for students. The following steps were taken: 1. Defining various quality criteria, including "Whole Nut-Rate" or "No Nut-Rate." 2. Designing and conducting an online survey to research customer expectations, for which 276 valid answers were received. 3. Examining 869 pieces of peanut chocolate candy from three different brands with pincers to determine supplier performance. 4. Analysing data and interpreting results. The paper describes all the necessary processes, findings, and interesting results of this empirical case study, with the aim of encouraging others to create comparable cases that might add to the growing body of knowledge in the field of quality management.

Keywords: • action based learning • empirical case study • logistics • online survey • quality management • research-based teaching •

CORRESPONDENCE ADDRESS: Stefan Bongard, PhD, Professor, University of Applied Sciences, Ludwigshafen on the Rhine, Germany, e-mail: stefan.bongard@hs-lu.de.

DOI https://doi.org/10.18690/978-961-286-285-5.2 ISBN 978-961-286-285-5
Dostopno na: http://press.um.si

1 Introduction

Keeping students' attention and stimulating their motivation during lectures is no easy job for university instructors in this increasingly digital age. One useful method to engage students and prevent them from becoming merely passive recipients and consumers of information is called action-based learning (Naidu & Bedgood, 2012). In the context of the following case study, we refer to a broad definition of this pedagogical approach: action-based learning includes "… all learning that is orchestrated by some activity on the part of learners" (Naidu & Bedgood, 2012). The activities performed in this case study consisted of group discussion, hands-on activities, and data collection. Following the group-based educational setting called for in action-based learning, students were divided into groups of two.

The basic theoretical assumption behind action-based learning is the belief that learning is more effective and efficient than traditional didactic methods when it is orchestrated around meaningful activities. The advantages of action-based learning are described as "... a deeper level of engagement with the learning process, enhanced motivation to learn, greater enjoyment of the learning experience, a deeper understanding of the subject matter and increased retention" (Naidu & Bedgood, 2012). Related models of action-based types of learning include problem-based learning (Barrows & Tamblyn, 1980; Gräsel 1997; Zumbach, 2003); inquiry-based or goal-based learning (Haack & Mischke, 2005; Schank, 1997); scenario-based learning (Naidu, 2010; Pfeffermann & Breuer, 2013); and adventure learning (Doering, 2006; Veletsianos & Kleanthous, 2009).

The activities included in this case study can also be connected to the concept of research-based teaching and learning, a concept that gained significant attention in the 1970s and is currently experiencing a resurgence in interest (Karber & Wustmann, 2015; Sabla, 2017; van der Rijst, 2017).

It should also be mentioned here that the term action-based learning is further related to a more physical approach that is mainly associated with the work of Jean Blaydes Madigan. In this context, physical exercises such as jumping jacks, jumps, squats, dips, or push-ups are used to enhance both teaching and learning processes in the classroom (Lengel & Kuczala, 2010).

2 Methodology: The "Peanut Chocolate Candy" case

Following the definition of action-based learning from Naidu & Bedgood (2012), learners should be confronted with an authentic problem – one that closely represents a situation they might encounter in the real world. This problem situation offers a critical incident that then serves as the precipitating event for the following steps.

In this case, the author's irresistible urge for sweets (more precisely, peanut chocolate candy) served as the problem situation. While eating these candies, the author made several rather intriguing observations concerning the quality of the product. In some candies, for instance, the peanut was totally missing, while some candies contained only half a nut. Other candies were very small or looked misshapen. These observations lead to two critical incidents. On the one hand, this lack of quality in product consistency contradicts the marketing promise as well as customer expectations for a perfect peanut chocolate candy as depicted on the product packaging. On the other hand, however, this degree of product quality inconsistency might also be an efficient strategy to reduce production costs for the producer, especially regarding the use of peanuts, one of the main and most expensive ingredients in the product. According to a production process description of M&M® chocolate candies (Madehow, 2018), approximately one hundred million individual M&Ms® can be manufactured per day. This immense production output underscores the cost savings potential if a small percentage of the product excludes peanuts – the constituent ingredient – in full or part.

Against the backdrop of the core subject content in the Quality Management lecture, the product quality incident was highlighted. Logistics quality in this lecture was defined as "the degree of performance between the customers' expectations and the supplier's performance." This generic definition, however, leaves much space for interpretation. The "Peanut Chocolate Candy" case was developed in order to illustrate this theoretical definition with a hands-on, practical example.

2.1 Definition of various quality criteria

After introducing the topic of research to the class, the first step was to determine several criteria that would define the quality of the peanut chocolate candies. One central point in these discussions was the consideration of subjective factors such as taste. In order to reduce complexity and subjectivity, the class decided to focus on the following seven quality criteria, which were then divided in two categories. The first category related to the content of the peanut chocolate candy, while the other category comprised visual appearance.

Table 1: Definition of quality criteria

No.	Quality criteria	Category	Score on data-entry table if …	"Perfect" value of candy score	Criteria weighting
1	Whole Nut-Rate	Content-related	the candy contains a whole peanut.	1	30%
2	Half Nut-Rate	Content-related	the candy contains half a peanut.	0	10%
3	No Nut-Rate	Content-related	the candy contains no peanut.	0	50%
4	Peanut Shell Rate	Content-related	the candy contains peanut shells.	0	3%
5	Normal Size Rate	visual appearance-related	the candy is normal sized.	1	3%
6	Small Size Rate	visual appearance-related	the candy is smaller than normal	0	2%
7	Mutant Rate	visual appearance-related	the candy looks misshapen.	0	2%

2.2 Designing and conducting an online survey

The intense classroom discussion of customer expectations led to an agreement that, on the one hand, everyone has a certain personal opinion regarding the specifics of quality criteria, but on the other hand, many opinions are needed to form a valid average due to statistical reasons. After this discussion, the project to design and later conduct an online survey was started. A set of questions was developed based on classroom discussions and group work. The goal of the

survey design was not only to collect answers for the relevant quality criteria, but also to gather demographic data (e.g. gender or age). Questions were also to be included for split analysis, e.g. the frequency with which peanut chocolate candies are eaten, such as daily or once a week.

The pre-test of the survey within the class showed that questions concerning the quality of peanut chocolate candy must be related to a specific price segment. This finding was drawn from the fact that the answer to the question "Is the price of peanut chocolate candy a factor that influences your quality expectations?" was clearly answered with a "yes."

After making final adjustments to the questionnaire, the online survey was made accessible to targeted respondents via an online link. The link was sent by email to various mailing lists (e.g. members of the University of Applied Sciences Ludwigshafen am Rhein community) and posted on social media outlets. During the period from 23 October – 22 December 2017, a total of 323 datasets were gathered. In order to filter out the datasets that did not contain enough valid answers, a validation filter was applied, which reduced the number of usable datasets to 276. The validation filter was designed to include all surveys for analysis in which at least 14 of the 20 questions were answered (a minimum question response rate of 70%).

The findings of the survey clearly show that the average consumer does not expect a 'perfect' peanut chocolate candy and is ready to accept some deviations from the ideal candy in terms of both shape and content. The survey results also demonstrate that the price level influences customer expectations. In case of the Whole Nut-Rate, customer quality expectations for brand-name products were 83%, while the value for discount products was significantly lower at 68%. Surprisingly, the consumer is willing to accept No Nut-Rates from 5% for brand-name products and up to 10% for discount products. In the category of visual appearance related criteria, customers even expect, astonishingly enough, a high rate of unshaped (mutant) candies. At 40%, the acceptance rate of mutant candies in discount products is nearly ten percentage points higher than for brand-name products (with 31%).

Table 2: Survey results of customer expectations[1]

		Content-related criteria				Visual appearance-related		
Abbr.	**Products/Rates**	**Whole Nut-Rate**	**Half Nut-Rate**	**No Nut-Rate**	**Peanut Shell-Rate**	**Normal Size-Rate**	**Small Size-Rate**	**Mutant-Rate**
CE-Brand	Customer expectations brand-name product - premium price	**83%**	25%	**5%**	13%	73%	26%	**31%**
	Customer expectations brand-name product - premium price; n=	**276**	260	**273**	253	241	251	**253**
CE-Discounter	Customer expectations discount product - discount price	**68%**	35%	**10%**	17%	61%	36%	**40%**
	Customer expectations discount product - discount price; n=	**276**	244	**267**	248	232	239	**250**

Due to inclusion of demographic and other questions, it was possible to make a split analysis. A short example of such an analysis is the question of whether one tends to prefer to eat sweet or salty foods when snacking. For the 'sweet' fraction (n=103), the Whole Nut-Rate was 81% for brand products. The 'salty' fraction (n=51) has a slightly higher demand for this rate with 86%.

2.3 Examination of peanut chocolate candies

During the discussion of quality criteria, students were already growing more and more interested in the case because they realized that they personally had similar experiences with other goods. They were also intrigued as to whether customer expectations correspond with actual facts. To prepare the practical component of the action-based approach, the author (teacher) bought some packages of peanut chocolate candy from three different manufacturers: M&M® as the brand-name sample, as well as Choklets from Aldi and Big Hit from Lidl as two samples from discount grocers. It is important to emphasize here that the main focus was not to conduct a complete market survey, but to concentrate on the 'rate of quality' as measured in the difference between supplier performance and customer expectations. In addition to purchasing the samples of candy, the teacher also brought some empty shoeboxes. Students were asked to bring pincers with them to class. In order to facilitate data collection, a pre-printed form with a data-entry table was handed out to the students.

Each group of two students was given packages of peanut chocolate candy from one supplier, an empty shoebox and some data collection forms. Together with the pincers, this was the set-up to begin examining the peanut chocolate candies. The first step of the examination was the visual inspection of the candy to evaluate the quality criteria nos. 5 – 7. After visual inspection, the candy was crushed with the pincers in order to determine the quality criteria nos. 1 – 4. The

[1] CE is the abbreviation of 'customer expectations'.

shoebox was therefore very helpful to prevent crumbs from littering the students' work areas and the classroom floor. The results were entered in the form and this process was repeated with all candies from each group. After almost an hour, 869 pieces of candy had been evaluated.

Figure 1: Photos of classroom examination of peanut chocolate candies.

With the results from this practical exercise, it is possible to analyse supplier performance. In the case of the Whole Nut-Rate, the leader was not the brand-name product but rather the discounter product Choklets with 82%, followed by the brand-name product M&Ms® with 77%. The other discounter candy sample, "Big Hits", however, had very poor whole nut performance, at only 30%. This means that only about one in three candies actually contained a whole peanut. However, the probability of finding half a peanut was two times higher, at 67%. The findings for the No Nut-Rates show that for this criterion, the brand-name product M&M® and the discount product Choklets are on the same quality level, with only 1%. This means that for every 100 candies produced by either of these manufacturers, only one piece will be missing a peanut. The No Nut-Rate for the second discount product Big Hit, however, was significantly higher, at 3%. In the case of the Mutant-Rate, the results for both brand-name and discount products were almost the same, ranging from 10% to 14%.

Table 3: Results of candy examination[2]

			Content-related criteria				Visual appearance-related		
Abbr.	**Price in €/100 gram**	**Products/Rates**	**Whole Nut-Rate**	**Half Nut-Rate**	**No Nut-Rate**	**Peanut Shell-Rate**	**Normal Size-Rate**	**Small Size-Rate**	**Mutant-Rate**
PR-M&M®	1,16	M&M®; n=293	**77%**	23%	**1%**	45%	74%	15%	11%
PR-Aldi	0,40	ALDI Choklets n=359	**82%**	18%	**1%**	33%	64%	26%	10%
PR-Lidl	0,40	LIDL Big Hit n=217	**30%**	67%	**3%**	7%	64%	23%	14%

One of the remarkable results of this research was the key finding that none of the products tested completely fulfilled neither the content-related nor the visual appearance-related criteria. If one defines the "perfect" peanut chocolate candy referring to table 1, we have following results: the brand-name product M&M® and the discount product Choklets (from Aldi) have the same "Perfect Rate" of 31%. Noticeably lower is the value for the second discount product Big Hit (from Lidl) with only 20%.

To conclusively evaluate the quality of the peanut chocolate candies, it is necessary to compare the performance results with customer expectations. For the author (teacher), the Whole Nut-Rates were very disappointing because when he pulls a piece of peanut chocolate candy out of the box, he expects a complete whole peanut – not an empty chocolate bean or half a peanut. But if the average consumer is willing to accept these rates of product non-conformity, the perceived quality of the peanut chocolate candy quality might be sufficient to keep up with the planned sales volume. In the next step, quality was evaluated by comparing the results of customer expectations (see chapter 2.2) and supplier performance (see chapter 2.3).

2.4 Data analysis and interpretation of results

The comparison of the results – performance rate (PR) vs. customer expectations (CE) – shows some significant deviations. In case of the Whole Nut-Rate, the brand-name product M&M® underperformed, with a deviation of -8%. In the discounter sector, Aldi's product outperformed the comparable product at Lidl by far. Customer expectations of the discounter were exceeded by the performance of the Aldi product Choklets by an astonishing 20%. Very disappointing was the score of the Lidl product Big Hit, with a deviation of -56%. In case of the No Nut-Rate, each product far exceeded customer

[2] PR is the abbreviation of 'performance rate'.

expectations. Although the sign of the deviation is negative, this means there is a positive result. Another good result was achieved regarding the Mutant-Rate. For both brand-name and discount products, supplier performance was much better than customer expectations, with -66% (M&M® and Big Hit) and -76% (Choklets).

Table 4. Data analysis

	Content-related criteria				Visual appearance-related		
Variance analysis in percent	**Whole Nut-Rate**	**Half Nut-Rate**	**No Nut-Rate**	**Peanut Shell-Rate**	**Normal Size-Rate**	**Small Size-Rate**	**Mutant-Rate**
PR-M&M® vs. CE-Brand; n=293	**-8%**	-9%	**-87%**	245%	2%	-43%	**-66%**
PR-Aldi vs. CE-Discounter; n=359	**20%**	-50%	**-95%**	89%	5%	-27%	**-76%**
PR-Lidl vs. CE-Discounter; n=217	**-56%**	92%	**-73%**	-60%	4%	-37%	**-66%**

The collected data was then distributed to all students. The students were then given the task of creating adequate graphic formats for the presentation of results. In case of the Whole Nut-Rate and No Nut-Rate, the following charts were created:

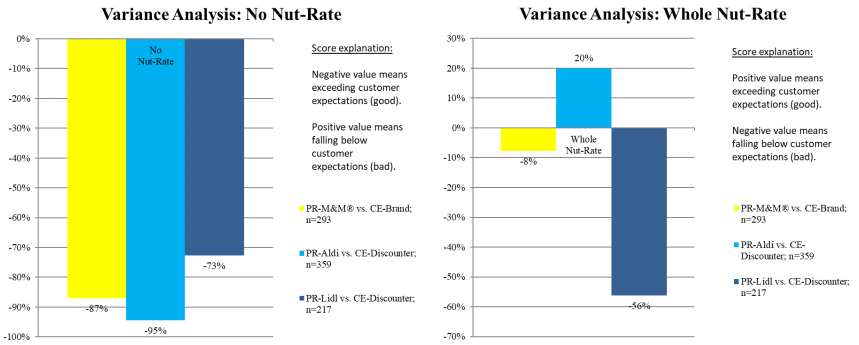


Figure 2: Variance analysis charts.

During a following class discussion, it was decided that particular criteria results needed to be consolidated in a single quality figure. The quality criteria were therefore weighed by the students (see Table 1), and after a few calculations were made, the peanut chocolate candy index (abbreviated PCCI) was created. In first place, we have the discounter product Choklets from Aldi with 58%, which means that on average, customer expectations were exceeded by 58%. Second

place goes to the brand-name product M&M®, with a PCCI of 37%. In third place, we have the discounter product Big Hits from Lidl with 14%. The positive values of all three PCCI means that all products exceeded customer expectations – this may help explain why all of these products are successful and are still sold in retail outlets. If the PCCI were found to have been negative, this could have been taken as a strong sign that sales may begin to decline given that the product is apparently not meeting customer expectations.

Based on these results, a recommendation for buying peanut chocolate candy can be made for the PCCI-leader Aldi Choklets. If one considers the PCCI in relation to the purchase price (abbreviated pPCCI), the Choklets product also offers the lowest price for the over-fulfilment of customer expectations. Economically speaking, the pPCCI-based purchase would be the most rational decision. But as we know from many other studies concerning consumer economic decision-making, people often make economically irrational choices in purchasing decisions, perhaps for reasons such as taste, marketing, brand trust/loyalty, or visual attractiveness.

Table 5. PCCI and pPCCI ranking

Product	PCCI	PCCI Ranking	Price per 100 gram	price per PCCI (pPCCI)	pPCCI Ranking
M&M®	37%	2	1,16	0,031	3
ALDI Choklets	**58%**	**1**	**0,40**	**0,007**	**1**
LIDL Big Hit	14%	3	0,40	0,028	2

3 Implications for teaching pedagogy

Overall, the project was a complete success: in addition to the results gathered, the students were highly motivated and engaged, and the many discussion rounds with them revealed deeper understanding about quality management – the pedagogical goal of the activity. One of the key learning outcomes was to learn to deal with the complexity of quality criteria and their objective evaluation. Furthermore, the students were able to transfer their knowledge to logistics-related topics such as distribution or production systems. In the field of distribution, e.g. online distribution systems, customer expectations are typically much higher than for other products. If someone orders a book, for example, the expectation is clear: the customer fully expects that all pages of the book are

included (not only 80 %) and the book binding should be in perfect, unmarked condition. When it comes to logistically demanding products like food, however, it is not always easy to define distinguishing quality criteria, such as freshness for salad or fruits/vegetables. Against the backdrop of anticipated market growth in the field of online grocery shopping (Gassmann 2015; Lichtner 2015) and the involved players like Amazon (Zdrzalek 2016), the practical research and discussion of quality management subjects in the classroom could be a highly motivating and relevant venture.

This practical case study has also helped to shed light on why many logistics services are not provided at a service level of 100%. The reasons for this include the high costs incurred as well as the fact that in many cases, customer expectations are simple not at 100% but somewhat lower – similar to the expected Full Nut-Rate or No Nut-Rate in our case study. In addition to this, expectations differ across various price levels from brand-name to discount products. Students learned that companies ultimately have two strategic moves they can deploy in their search to find satisfied customers: adjust their prices, or raise or lower product quality.

In preparing to undertake an action-based approach in the classroom, the instructor must take into account the fact that such activities are time consuming. The pedagogical benefits of the practical exercise should thus be weighed against the time needed to teach remaining course content. Another consideration is how to motivate students for time-consuming tasks that need to be performed outside of the classroom, such as analysing data or creating graphical presentations. To complete these tasks, students may have to use special spreadsheet, survey or statistical software that they may not be familiar with. For these reasons, the instructor should make an effort do a greater share of these tasks himself. It should also be mentioned that due to the discussion-based and hands-on nature of this approach, it is more suitable for smaller classes of approximately 20-30 students.

Acknowledgements

I would like to thank the undergraduate students majoring in logistics who participated in the Quality Management course during winter semester 2017/2018 at the University of Applied Sciences Ludwigshafen am Rhein for their many interesting ideas, stimulating discussions and active support, as well as Ms. Carly Ottenbreit for proofreading this paper.

Disclosure statement

The author hereby declares that he has no relevant or material financial interests that relate to the research described in this paper.

References

Barrows, H. S., & Tamblyn, R. (1980). *Problem-based learning: An approach to medical education*. New York: Springer.

Doering, A. (2006). Adventure learning: Transformative hybrid online education. *Distance Education*, 27(2), 197–215.

Gassmann, M. (2015, July 23). Warum wir Lebensmittel bald doch im Internet kaufen. Welt. Retrieved from https://www.welt.de/wirtschaft/article144340416/Warum-wir-Lebensmittel-bald-doch-im-Internet-kaufen.html

Gräsel, C. (1997*). Problemorientiertes Lernen*. Göttingen, Germany: Hofgrefe.

Haack, J., & Mischke, D. (2005). *Applying transfer in goal-based interdisciplinary learning environments*. Retrieved from http://www.isprs.org/proceedings/XXXVI/6-W30/Paper/eLearnWS_Potsdam2005_Haack.pdf

Karber, A., & Wustmann C. (2015). Forschendes Lehren und Lernen: Perspektiven der Akteurinnen und Akteure in den Blick nehmen und erforschen. In: R. Egger, C. Wustmann, & A. Karber (Eds.), *Forschungsgeleitete Lehre in einem Massenstudium: Bedingungen und Möglichkeiten in den Erziehungs- und Bildungswissenschaften*. Heidelberg, Germany: Springer.

Lengel, T., & Kuczala, M. (2010). *The kinesthetic classroom: teaching and learning through movement*. Thousand Oaks, CA: Corwin.

Lichtner, C. (2015). *eCommerce: Anteil bei Lebensmitteln und Drogerieartikeln wird sich verdoppeln*. [press release GfK]. Retrieved from http://www.gfk.com/fileadmin/user_upload/dyna_content/DE/documents/Press_Releases/ 2015/20150723_PM_GfK-Studie_eCommerce_dfin.pdf

Madehow (2018). *M&M® Candy*. Retrieved from www.madehow.com/Volume-3/M-M-Candy.html

Naidu S., & Bedgood D. R. (2012). Action-Based Learning. In: N. M. Seel (Ed.) *Encyclopedia of the Sciences of Learning*. Boston, MA: Springer.

Naidu, S. (2010). Using scenario-based learning to promote situated learning and develop professional knowledge. In: E. P. Errington (Ed.), *Preparing graduates for the profession using scenario-based learning* (pp. 39–49). Brisbane, Australia: Post Pressed.

Pfeffermann, N., & Breuer, H. (2013). Scenario-based learning for innovation communication and management. In A. Brem & E. Viardot (Eds.), *Evolution of innovation management: trends in an international context* (pp. 95–114) Basingstoke [et al]: Palgrave Macmillan.

van der Rijst, R. (2017). The transformative nature of research-based education: A thematic overview of the literature. In: E. Bastiaens, J. van Tilburg, & J. van Merriënboer (Eds.), *Research-Based Learning: Case Studies from Maastricht University*. Professional Learning and Development in Schools and Higher Education, 15. Cham, Germany: Springer.

Sabla, K. P. (2017). *Forschendes Lernen in der Praxis der Sozialen Arbeit*. München, Basel: Ernst Reinhardt.

Schank, R. (1997). *Virtual learning: A revolutionary approach to building a highly skilled workforce*. New York: McGraw-Hill.

Veletsianos, G., & Kleanthous, I. (2009). A review of adventure learning. *The International Review of Research in Open and Distributed Learning, 10*(6), 84–105.

Zdrzalek, L. (2016). *Der Angstgegner*. Retrieved from http://www.zeit.de/wirtschaft/2016-06/amazon-fresh-lebensmittel-handel-aldi-rewe-edeka-lidl

Zumbach, J. (2003). *Problembasiertes Lernen*. Münster, Germany: Waxmann.

PROCEEDINGS OF THE 2ND INTERNATIONAL SCIENTIFIC CONFERENCE
»TEACHING METHODS FOR ECONOMICS AND BUSINESS SCIENCES«
7 MAY 2018, MARIBOR, SLOVENIA
N. Gajšt & A. Plos (eds.)

University of Maribor Press

Didactical Use of Information Communication Technology (ICT) and Modern Teaching Practices (MTPs) in Higher Education

KATJA BREZNIK, NATALIJA ŠPUR, ALASTAIR CREELMAN & SEBASTIJAN FRUMEN

Abstract Along with the development of information communication technology (ICT) came modern teaching practices (MTPs) which provide opportunities for effective transfer of knowledge from university teachers (UTs) to students. However, the use of ICT can only be effective when used didactically appropriate. The newly established Centre for Teaching Support at the University of Maribor (UM) provides didactical and technical support to UTs for the appropriate didactical use of ICT through MTPs. This paper presents results of the analysis of the didactical use of ICT and MTPs, conducted with an online survey, answered by 217 university teachers. The results indicate that problem and project based learning are most present. The majority of teachers plan the didactical use of ICT in written communication and written materials, presentations, and learning management systems. Results revealed gaps where ICT and MTPs should be encouraged, and fields in which UTs need support to improve their pedagogical process.

Keywords: • didactics • higher education • ICT • modern teaching • support •

CORRESPONDENCE ADDRESS: Katja Breznik, Assistant, University of Maribor, Centre for Teaching Support, Maribor, Slovenia, e-mail: katja.breznik@um.si. Natalija Špur, Assistant, University of Maribor, Centre for Teaching Support, Maribor, Slovenia, e-mail: natalija.spur@um.si. Alastair Creelman, MA, E-learning Specialist and Distance Learning Coordinator, Linnaeus University, University Library, Växjö, Sweeden, e-mail: alastair.creelman@lnu.se. Sebastijan Frumen, University of Maribor, Department of Education and Students' Affairs, Maribor, Slovenia, e-mail: sebastijan.frumen@um.si.

DOI https://doi.org/10.18690/978-961-286-285-5.3 ISBN 978-961-286-285-5
Dostopno na: http://press.um.si

1 Introduction

With the emergence of information-communication technology (ICT) and its pervasion into all areas of social activity, there are new stories to be written in education as well. It is hard to say that there still exists a part of the education sphere not marked by technology to some extent. Modern technologies have altered and transformed existing pedagogical approaches and contributed to the development of new pedagogical paradigms which are becoming more and more frequent in the field of higher education. As Klimov (2012) stated, new technologies enabled to redefine some of the strategies and concepts of teaching and learning. Evseeva and Solozhenko (2015) give us a powerful statement that we are observing a transition from "education for life" to "lifelong learning", the latter denoting a continuous and self-motivated search of knowledge. Furthermore, Talebian, Mohammadi, & Rezvanfar (2014) stated that the use of ICT is a symbol of a new era in education where ICT enriches existing educational models and provides new approaches.

Using modern teaching practices together with ICT enables the development of much needed competencies in modern society, especially with jobs of the present and, more importantly, jobs of the future in mind. This means that successful methods of using ICT in teaching and learning are not just a means but also an objective that is especially necessary in the tertiary education period, being the last stop before entering the labour market. Multiple research has shown that modern teaching approaches have a positive effect on student's academic performance. Ersoy and Başer (2014) found that problem based learning in higher education has improved creative thinking skills. Heterick and Twigg (2003) identified other positive outcomes achieved by blending, including increased course completion rates, improved retention, better student attitudes toward the subject matter, and increased student satisfaction with the mode of instruction compared to traditional formats. Pietilä and Virkkula (2011) investigated project-based learning and found that by tackling complicated procedures, authentic research, and self-directed learning, project-based learning improves the quality of learning in terms of better cognitive development. Many other studies have shown that students in project-based learning classrooms get better scores in comparison with traditional courses (Marx et al., 2004; Williams & Linn, 2002). There was also much research into how university teachers and students experience new teaching approaches. Lasauskiene and Rauduvaite

(2015) investigated how lecturers saw project-based teaching and obtained positive results.

Hung (2015), quoted by Soliman (2016), conducted a study using flipped learning, and results showed learning outcomes were improved, and very importantly, student's satisfaction and participation in the learning process were increased. Gilboy, Heinerichs, and Pazzaglia (2015) also conducted the flipped classroom pedagogy research and found that the majority of more than 140 students were pleased with the flipped method. These studies are not isolated cases. Talley and Scherer (2013) also investigated the effects of flipped classroom on psychology students and results indicated an increase in the student's final grades. Mason, Shuman, & Cook, (2013) obtained the same results in engineering course. De Grazia, Falconer, Nicodemus, and Medlin, (2012) found that students learning by flipped classroom method were more prepared for class activities. Moreover, Strayer (2012) conducted a study using the flipped learning pedagogical approach in an introductory statistics course. Results showed one important challenge teachers face. Flipped learning enhanced student's cooperation, innovation, and task orientation, but they were not satisfied with the structure of the course task presentation. This justifies why it is necessary to didactically plan teaching and learning with the use of ICT, and why it needs to be of high quality.

It is evident from the analysis of the existing literature on the (didactic) use of ICT in the higher education pedagogical process in Slovenia that the scope of ICT has been investigated but, by our estimation, not as much as it could have been based on the strong information-communication tendencies. There are many exemplary contributions to the field of utilising ICT in higher education (Aškerc, Cvetek, Florjančič, Klemenčič, & Požarnik, 2016; Baggia, Borštnar, & Pucihar, 2015; Florjančič & Lesjak, 2007; Istenič Starčič, & Turk, 2010; Sapač et al., 2016; Vouk, 2014).

1.2 Higher education teaching staff facing the challenges with the help of appropriate pedagogical and technical support

There are many obstacles that higher education pedagogical staff faces when trying to innovate and reconsider their educational practice, especially when these include or depend on the use of ICT. To be able to organize and carry out teaching methods altered by ICT, we need to satisfy different conditions (to obtain ICT tools, to have a positive attitude to new technologies, digital/ICT literacy, etc.).

Garrison and Kanuka (2004) declare, "leaders of higher education are challenged" in order to help their teaching staff and students to meet growing expectations and demands for higher quality learning experiences and outcomes. However, the worrying but commonly known fact is that higher education staff devotes most of their attention to research. Teaching is usually not understood as their primary concern. Oye, Iahad, and Rabin (2011) state the reasons why higher education staff does not use ICT in their teaching practice. The results of their pilot research indicated that the use of ICT is present in a relatively low degree due to the following factors: lack of time, lack of training, low motivation, insufficient financial resources, lack of ICT support in the workplace, low level of knowledge about the appropriate use of ICT and lack of time for experimental practice of modern methods. Şoitu, Ungureanu, and Rusu, (2014) stated that teacher's professional development is an absolutely necessary aspect in human resource management. Authors conclude that new programmes for teacher professional development are being implemented in universities all over the world.

The University of Maribor is facing the challenges with the help of a newly established Centre for teaching support. The Centre began offering support in July 2017 by providing didactical and technical support to university teachers for the appropriate didactical use of ICT together with modern teaching practices. They also provide opportunities to exchange good practices. The Centre for Teaching Support is pursuing the mission of the project called Didakt.UM (duration 2017–2020), which is co-financed by the Republic of Slovenia and the European Union under the European Social Fund. The main goal of the project is to raise the quality of the higher education process.

1.3 Purpose of the study

The use of ICT can only be effective when used didactically appropriate, meaning that ICT does not bring success by itself nor do MTPs enhanced by ICT. We have to use them thoughtfully and prudently. When answering these questions, we can help ourselves with didactic guidelines for ICT usage (active work, clearness, teamwork, adaptability, structurality and systemity, individualization, differentiation, openness, and economy). These didactic guidelines for the use of ICT can be understood as starting points arising from the generalization of learning experiences using ICT and from the didactic principles (e.g. Ivanuš Grmek and Javornik Krečič, 2011) dictated by the general didactics.

This paper presents results of the analysis of the didactical use of ICT and modern teaching practises at the University of Maribor. The main goals of this detailed analysis of the didactic use of ICT in the higher education pedagogical process are:

- to obtain a rough picture of the current state of the didactic use of ICT and MTPs among higher education teachers at the University of Maribor; and
- to use the obtained valuable information as a starting point for the training of pedagogical staff and providing support.

The aim of the analysis is thus to determine the situation in the field of didactic design of the use of ICT among education staff at the University of Maribor. All this information will help to create a comprehensive picture of the current state of the didactic use of ICT, which will help to identify the gaps, in order to adequately plan support work for higher education teachers at the University of Maribor. A detailed analysis of the situation is made by study fields.

2 Methodology

To achieve our goals, we gathered information on the extent to which university teachers are acquainted with modern teaching practices and the use of ICT, how they assess their skills, what modern teaching practices and ICT they use, and what are the possible reasons for non-use.

This paper presents results of the analysis of the didactical use of ICT and MTPs at the Slovenian second largest university, the University of Maribor. The analysis was conducted with an online survey among university teachers.

Results are presented according to the KLASIUS-P classification[1] (based on ISCED 1997 fields of education), valid at the time of conducting the research. The KLASIUS-P is a classification that classifies activities or outputs of education and training in classification groups or categories in terms of education and training. At the first classification level, the KLASIUS-P consists of ten fields. At the University of Maribor, eight of them were present. Respondents were able to choose more than one option.

Table 1: The KLASIUS-P classification of study fields

KLASIUS-P	Name of category
1	Educational sciences and teacher education
2	Arts and humanities
3	Social, business, administrative and legal sciences
4	Natural sciences, mathematics and computing
5	Technique, production technology and construction
6	Agriculture, forestry, fisheries, veterinary medicine
7	Health and social affairs
8	Services

2.1 Data collection

Data were collected via an online survey system[2] between September 7, 2017 and September 30, 2017. The link to the survey was sent via an email to all (approximately 900) university teachers of the University of Maribor. Anonymity of respondents was guaranteed.

[1] For more information on KLASIUS, see Statistical Office of the Republic of Slovenia (http://www.stat.si/Klasius/Default.aspx?id=1).
[2] The survey was administrated using the OneClickSurvey tool (1KA) (http://english.1ka.si/).

2.2 Structure of the Questionnaire

The questionnaire had three basic scales: *(1) Knowledge and the use of modern teaching practices, (2) Self-evaluation of the competence for the use of ICT elements and (3) Frequency of general and didactical use of ICT elements.*

(1) Knowledge and the use of modern teaching practices: Respondents were asked about their knowledge and the use of four modern teaching practices. The list included:

(1) flipped learning,
(2) blended learning,
(3) project learning, and
(4) problem based learning.

The 4-point scale was used to measure knowledge of respondents and the use of modern teaching practices:

(F1) "I am not familiar with this practice.",
(F2) "I am not familiar with this practice/I do not use it, but I would like to hear about/use it.",
(F3) "I am familiar with this practice, but I've never used it.", and
(F4) "I used/use it.".

(2) Self-evaluation of the competence for the use of ICT elements: The scale consisted of 10 categories of ICT elements:

(1) written communication,
(2) learning management systems (e.g. Moodle),
(3) videoconference systems,
(4) interactive whiteboards with didactically prepared materials,
(5) collections of educational resources (e.g. OpenLearn, Web of Science, and local DKUM[3]),
(6) voting applications and feedback,

[3] DKUM: The University of Maribor Digital Library (DKUM) is the institutionalised repository. DKUM supports the open access to scientific, research and professional works, and research data, which are results of research and education at the UM.

(7) production of graphically rich learning materials (e.g. animations, images, schemes, infographics, storytelling, conceptual maps, and mind maps),
(8) production of electronic slides and written materials (e.g. Prezi, Microsoft Power Point, Microsoft Word, and LaTeX),
(9) screen recording, oral explanation, and video editing (e.g. Microsoft Power Point), and
(10) recording pedagogical activities.

The 4-point scale was used to measure respondents' self-evaluation of the competence for the use of ICT elements:

(1) not a user,
(2) basic user,
(3) independent user, and
(4) advanced user.

The 4-point scale for each ICT element is presented in Table 2.

Table 2: The 4-point scale for measuring self-evaluation of the competence for the use of different categories of ICT elements

Category of ICT elements	Not a user	Basic user	Independent user	Advanced user
Written communication	I do not use these ICT elements.	I send and receive emails. I can attach a file to my e-mail.	I use several different communication tools. I use collaborative web tools where I upload and share files.	I use a range of online communication tools (e.g. e-mail, blog, discussion forum, private and group messaging, and intranet). I use programs that allow multiple people to share simultaneously (e.g. calendar, and collaborating online editors).
Learning management systems	I do not use these ICT elements.	I upload literature to my learning unit.	I can use some of the learning activities/resources that are available in the Moodle of the UM (e. g. I prepare an option for students to submit their homework until due date).	I use advanced Moodle UM functionalities (groups and groupings, grading, and gradebook). I keep up to date and include novelties.
Videoconference systems	I do not use these ICT elements.	I can attend a videoconference, but I cannot prepare it.	I can prepare a videoconference.	I can upload files and include advanced functionalities when I conduct a videoconference.
Interactive whiteboard with didactically prepared materials	I do not use these ICT elements.	I use interactive whiteboard and its basic functionalities (e.g. writing).	I use interactive whiteboard for writing on slides.	I use interactive whiteboard for integrating associated software and I am able to prepare interactive materials on my own.
Collections of educational resources	I do not use these ICT elements.	I use it mostly for my work and the preparation of learning content.	I use it and share resources with students.	I am acquainted with and use a lot of repositories and collections. I also encourage students to use them.
Voting applications and feedback	I do not use these	I occasionally use functionalities that	I use several different tools that	I use advanced applications and

	ICT elements.	are available for this purpose in the Moodle of the UM (e.g. learning activity Choice).	enable feedback.	tools for providing instant feedback and voting during lectures, lab work, etc.
Production of graphically rich learning materials	I do not use these ICT elements.	I use simple tools for picture and scheme design (e.g. adding text, and cropping images). I can make simple changes to the content prepared by others.	I use more functionalities that are advanced and various programs for designing graphically rich materials. I can make content in different formats.	I create my own graphically rich materials. I can prepare dynamic learning materials (animation, and models). I use advanced online applications for making infographics.
Production of e-slides and written materials	I do not use these ICT elements.	I use basic functionalities of one programme for creating e-slides and written material.	I use various tools and some advanced functionalities (adding animations, pictures, video, and sound).	I can create complex materials in different formats with multimedia elements. I know how to copyright the content. During production, I follow the recommendations for designing e-slides and written materials (e.g. colours, and text structure).
Recording computer screen, oral explanation and video editing	I do not use these ICT elements.	I can record and save in an appropriate format.	I can record and edit basic elements (adding titles, audio, and pictures). I can cut a certain part of the video or insert a new one.	I can record and perform advanced video editing (blur, adding subtitles, captions, cutting, adding dynamic elements, sound editing, and noise removal).
Recording pedagogical activities	I do not use these ICT elements.	I perform the pedagogical activity but I need all the technical support from another person.	I can record and edit basic video elements (e.g. adding title).	I independently record and perform advanced corrections in the video (e.g. cutting out certain video segments, and inserting transitions).

(3) *Frequency of general and didactical use of ICT elements:* The scale consisted of 10 categories of ICT elements as mentioned in Table 2. The 4-point scale was used to measure the general and didactical use of ICT elements:

(F1) never,
(F2) rare (several times a year),
(F3) often (several times a month), and
(F4) always (almost every lecture).

Reasons for the non-use of teaching practices: When respondents answered that they do not use teaching practices, we asked them about the reasons for not using them. The question was open-ended.

2.3 Statistical procedure

The collected data were analysed with the IBM SPSS Statistics 21 software and descriptive statistics test was performed.

3 Results

We analysed 217 fulfilled and partially fulfilled questionnaires from university teachers. Table 3 shows the results by their field of expertise. The majority of teachers involved in the analysis come from the fields of Technology, manufacturing technology and constructions (28.57%), and Educational sciences and teacher education (20.28%).

Table 3: The number of respondents based on study fields

Study field	**F (%)**
1 Educational sciences and teacher education	44 (20.28)
2 Arts and humanities	22 (10.14)
3 Social, business, administrative and legal sciences	30 (13.82)
4 Natural sciences, mathematics and computer science	24 (11.06)
5 Technology, manufacturing technology and construction	62 (28.57)
6 Agriculture, forestry, fisheries, veterinary medicine	3 (1.38)
7 Health and social work	10 (4.61)
8 Services	28 (12.90)
/ not defined	41 (18.9)

3.1 The use of modern teaching practices

It is clear from our results that the majority of teachers already used project based (59.0%) and problem based learning (58.5%).

Table 4: Knowledge and use of modern teaching practices

Modern teaching practices	**F1 (%)**	**F2 (%)**	**F3 (%)**	**F4 (%)**
Flipped learning	35 (16.1)	42 (19.4)	68 (31.3)	67 (30.9)
Blended learning	29 (13.4)	33 (15.2)	40 (18.4)	108 (49.8)
Problem based learning	11 (5.1)	15 (6.9)	56 (25.8)	127 (58.5)
Project based learning	17 (7.8)	13 (6.0)	50 (23.0)	128 (59.0)

Legend F1 = I am not familiar with this practice.; F2 = I am not familiar with this practice/I do not use it, but I would like to hear about/use it.; F3 = I am familiar with this practice, but I have never used it.; F4 = I used/use it.

Reasons for non-use of modern teaching practices

Some of the reasons expressed for the non-use of selected teaching practices were:

- Lack of knowledge of specific tools.
- Lack of knowledge of specific modern teaching practices.
- Not enough ICT support and computer knowledge.
- Bad experiences, the majority of students do not do the assignments in advance (e.g. by flipped learning).
- The lack of time to prepare a lecture.
- Too large group of students.
- Too difficult to prepare.

3.2 The use of ICT elements

According to our results (Table 5), the majority of university teachers self-evaluated as advanced users of ICT elements for written communication (53.5%), non-users of interactive whiteboard (52.5%), non-users of ICT elements for recording pedagogical activities (39.6%), non-users of voting applications and feedback (38.7%), advanced users of elements for production of e-slides and written materials (37.8%), advanced users of learning managements systems (36.9%), and basic users of ICT elements for production of graphically rich learning materials (32.7%).

Table 5: Self-evaluation of the competence for the use of ICT elements

ICT elements	F1 (%)	F2 (%)	F3 (%)	F4 (%)
Written communication	10 (4.6)	19 (8.8)	52 (24.0)	116 (53.5)
Learning management systems	17 (7.8)	39 (18.0)	59 (27.2)	80 (36.9)
Videoconference systems	49 (22.6)	67 (30.9)	34 (15.7)	45 (20.7)
Interactive whiteboard with didactical prepared materials	114 (52.5)	43 (19.8)	20 (9.2)	18 (8.3)
Collections of educational resources	25 (11.5)	49 (22.6)	63 (29.0)	59 (27.2)
Voting applications and feedback	84 (38.7)	53 (24.4)	29 (13.4)	27 (12.4)
Production of graphically rich learning materials	23 (10.6)	71 (32.7)	54 (24.9)	47 (21.7)
Production of e-slides and written materials	9 (4.1)	31 (14.3)	75 (34.6)	82 (37.8)
Recording computer screen, oral explanation and, video editing	69 (31.8)	63 (29.0)	33 (15.2)	31 (14.3)
Recording pedagogical activities	86 (39.6)	54 (24.9)	27 (12.4)	30 (13.8)

Legend: F1 = not at all; F2 = basic user; F3 = independent user; F4 = advanced user.

The majority of university teachers generally (59.9%) and didactically (60.0%) never used ICT elements for recording pedagogical activities, generally (58.1%) and didactically (58.5%) never used interactive whiteboards, and generally (50.7%) and didactically (53.0%) never used voting applications and feedback.

Table 6 reveals a difference in frequency between the general and didactical use of collections of educational resources, elements of graphically rich learning materials, elements for written communication, and learning management systems. The majority of university teachers generally always used ICT elements for written communication (47.5%), learning management systems (39.2%), and ICT elements for production of e-slides and written materials (42.4%). However, they used them didactically less. They also generally often used collections of educational resources (33.2%) and ICT elements for production of graphically rich learning materials (28.6%), however didactically they used them less.

Table 6: Frequency of the general (FGen) and didactical (FDid) use of ICT elements

Category of ICT elements	F1 (%)		F2 (%)		F3 (%)		F4 (%)	
	FGen	FDid	FGen	FDid	FGen	FDid	FGen	FDid
Written communication	13 (6.0)	23 (10.6)	16 (7.4)	23 (10.6)	58 (26.7)	54 (24.9)	103 (47.5)	78 (35.9)
Learning management systems	20 (9.2)	28 (12.9)	35 (16.1)	34 (15.7)	48 (22.1)	50 (23.0)	85 (39.2)	64 (29.5)
Videoconference systems	106 (48.8)	125 (57.6)	65 (30.0)	37 (17.1)	12 (5.5)	10 (4.6)	5 (2.3)	3 (1.4)
Interactive whiteboard with didactically prepared materials	126 (58.1)	127 (58.5)	48 (22.1)	36 (16.6)	8 (3.7)	9 (4.1)	4 (1.8)	3 (1.4)
Collections of educational resources	33 (15.2)	50 (23.0)	64 (29.5)	67 (30.9)	72 (33.2)	49 (22.6)	17 (7.8)	10 (4.6)
Voting applications and feedback	110 (50.7)	115 (53.0)	57 (26.3)	48 (22.1)	18 (8.3)	7 (3.2)	2 (0.9)	6 (2.8)
Production of graphically rich learning materials	25 (11.5)	38 (17.5)	65 (30.0)	52 (24.0)	62 (28.6)	49 (22.6)	36 (16.6)	37 (17.1)
Production of e-slides and written materials	8 (3.7)	17 (7.8)	26 (12.0)	28 (12.9)	58 (26.7)	48 (22.1)	92 (42.4)	81 (37.3)
Recording computer screen, oral explanation and video editing	95 (43.8)	105 (48.4)	64 (29.5)	49 (22.6)	23 (10.6)	15 (6.9)	6 (2.8)	6 (2.8)
Recording pedagogical activities	130 (59.9)	132 (60.8)	44 (20.3)	32 (14.7)	7 (3.2)	7 (3.2)	5 (2.3)	3 (1.4)

Legend: F1 = never, F2 = rare (several times a year), F3 = often (several times a month), F4 = always (almost every lecture)

4 Discussion and conclusions

Based on the results, the lack of use of specific ICT categories, especially voting applications and feedback, was determined. Although students in higher education are expected to be more independent, giving frequent feedback on current state of students' skills and knowledge is vital. Digital tools and platforms can significantly enhance the quality of feedback and formative assessment in all subjects. The great potential of frequent feedback using voting applications and feedback lies in opportunities to provide valuable information on students' current skills and knowledge promptly and directly at lectures, before they are exposed to serious evaluation. This information helps teachers and students recognize knowledge gaps in time, and action needed for improvements. Video or audio feedback from the teacher can often be less time-consuming for the teacher than written feedback, and significantly raises the teacher's social presence, especially in online courses (Borup et al., 2014). The feeling that the teacher is talking directly to the student creates a personal bond that can contribute to a greater sense of community and belonging, which can be a strong motivator. Similarly, the use of collaborative writing tools enables teachers to monitor and guide the students during the writing process. If the teacher has access to the students' assignments, it is possible to comment on the work in progress at pre-agreed review points. This type of formative feedback enables the teacher to provide asynchronous coaching. However, it is important to identify the reasons why teachers do not use a specific ICT tool in their pedagogical process more frequently. From the list of more frequent reasons for the non-use of ICT, two major reasons can be summarized: the lack of knowledge of specific tools, and not enough ICT support and computer knowledge. These reasons were also found by Oye, Iahad, and Rabin (2011). Teachers are often unaware of these ICT tools, and this can be an opportunity for the ICT support team to offer workshops and introduce the advantages of a more multimodal approach to feedback and assessment. At this point, we present our newly established Centre for Teaching Support at the University of Maribor, which will promote specific ICT tools and offer appropriate technical and didactical support. The results also reveal that the majority of teachers want to learn more about flipped learning. The Centre for Teaching Support of the University of Maribor has already organized a webinar entitled 'Didactical use of ICT in flipped learning' and will try to fulfil expressed needs in the future.

We must take into account some limitations of this study. The study was conducted using data received from university teachers of the University of Maribor. Their experiences, attitudes, and opinions may vary based on differences in their knowledge of ICT and modern teaching practices. We did not succeed in accessing as large a sample of university teachers as we had wished (approximately 25%). In addition, the questionnaire was optional, so we must take into account of there being a high probability that most of the teachers who responded were exceptionally interested in this field. For representative data, we should have obtained more respondents from different study fields for equal representation. Moreover, we did not collect any other special demographic data. The questionnaire includes questions of self-evaluation, so there is a possibility of less objective results.

For the successful integration of didactical use of ICT in the institution's strategic development, there are several critical success factors. Digitalisation is no longer simply a technical issue to be delegated to the IT department or other unit. It has to be addressed in a comprehensive manner. It affects all levels of university's operations and the top management must therefore be fully aware of the issues, challenges, and opportunities involved in a successful digitalisation process. For that reason, future research should be performed based on digital literacy of university teachers. The institution's strategic documents make the pedagogical use of ICT a critical factor in all teaching and research, and show a clear strategy for raising the digital literacies of both staff and students in line with, for example, the EU Commission's Framework for the Digital Competence of Educators: DigCompEdu (Redecker, 2017). One method for reinforcing this would be to make digital literacy and the use of ICT in teaching compulsory points for discussion at annual appraisal interviews, focusing on the review of acquired skills and setting new objectives for improvement in the coming year.

ICT should be fully integrated into the university's support for pedagogic scholarship and research, as is the case at many leading universities in the world. Professional development courses should showcase the pedagogical use of digital platforms and tools, and the institution's learning and teaching strategy should stress the development of digital literacies among both staff and students. A good example of successful integration of these elements is the University of the Highlands and Islands in Scotland (Learning and teaching academy). Another good example of this kind of integrated approach is the University of Brighton

in England (Centre for Learning and Teaching). In particular, they have developed digital literacies frameworks for both staff and students. Further incentives for development can include annual awards for pedagogical innovation and the availability of internal funding for innovative development projects.

There is a tendency that units providing ICT support are successful in reaching out to teachers who already use ICT in their teaching, but much less successful in connecting with those who are sceptical about technology in education. There are many experienced teachers who use a traditional approach that has proved successful with students with good results and evaluations. Given the heavy workload of most teachers, it is only natural for them to be sceptical of new approaches that demand considerable training and experience in order to be implemented successfully (Young, 2018). Their own models of successful teaching simply do not include ICT, and they are therefore content to continue as before, on the grounds that if something is not broken, then it does not need to be fixed.

Making the pedagogical use of ICT an integrated and strategic element of the institution's approach to teaching is one way to approach this issue. The effective use of ICT becomes a prerequisite for the institution's operations and not an optional extra. Another option would be to investigate which problems the teachers encounter in their teaching and offer digital solutions. Helping teachers, and other staff, to solve their most pressing problems can be a way of demonstrating the advantages of digital solutions. Introducing mentoring programmes where experienced teachers advise and coach less experienced colleagues can also be a strategy to reach those who are reluctant to attend more formal training sessions, especially if the mentoring scheme is focused on pedagogical development rather than explicitly on developing ICT skills.

Acknowledgments

This paper was prepared within the Didakt.UM project. The project is co-financed by the Republic of Slovenia and the European Union under the European Social Fund. We would also like to thank Petra Usar who proofread this paper.

References

Aškerc, K., Cvetek, S., Florjančič, V., Klemenčič, M., & Požarnik, B. M. (2016). *Izboljševanje kakovosti poučevanja in učenja v visokošolskem izobraževanju: od teorije k praksi, od prakse k teoriji.* Monograph. Retrieved from https://www.cmepius.si/wp-content/uploads/2014/02/Monografija_projekt-EHEA_splet.pdf

Baggia, A., Borštnar, M. K., & Pucihar, A. (2015). Uporaba IKT pri študiju in njen vpliv na informacijsko pismenost študentov organizacijskih ved. In M. Bernik, U. Rajkovič (Eds.), *Vzgoja in izobraževanje v informacijski družbi – VIVID 2015: Zbornik referatov* (pp. 15–25). Retrieved from https://www.researchgate.net/publication/282319916

Borup, J., West, R., Thomas, R., & Graham, C. (2014). Examining the impact of video feedback on instructor social presence in blended courses. *The International Review of Research in Open and Distributed Learning, 15*(3), 232–256. http://dx.doi.org/10.19173/irrodl.v15i3.1821

de Grazia, J. L., & Falconer, J. L., & Nicodemus, G., & Medlin, W. (2012, June), *Incorporating ScreenCasts into Chemical Engineering Courses*. Paper presented at 2012 ASEE Annual Conference & Exposition, San Antonio, Texas. Retrieved from https://peer.asee.org/21519

Ersoy, E., & Başer, N. (2014). The effects of problem-based learning method in higher education on creative thinking. *Procedia-Social and Behavioral Sciences*, *116*, 3494–3498. http://dx.doi.org/10.1016/j.sbspro.2014.01.790

Evseeva, A., & Solozhenko, A. (2015). Use of flipped classroom technology in language learning. *Procedia-Social and Behavioral Sciences*, *206*, 205–209. http://dx.doi.org/10.1016/j.sbspro.2015.10.006

Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education*, *7*(2), 95–105. http://dx.doi.org/10.1016/j.iheduc.2004.02.001

Gilboy, M. B., Heinerichs, S., & Pazzaglia, G. (2015). Enhancing student engagement using the flipped classroom. *Journal of Nutrition Education and Behavior*, *47*(1), 109–114. http://dx.doi.org/10.1016/j.jneb.2014.08.008

Ivanuš Grmek, M. & Javornik Krečič, M. (2011). *Osnove didaktike.* Maribor: Pedagoška fakulteta.

Heterick, B., & Twigg, C. (2003). *The learning MarketSpace.* Retrieved from http://www.thencat.org/Newsletters/Feb03.html

Istenič Starčič, A., & Turk, Ž. (2010). Slovenski študenti geodezije in informacijsko-komunikacijska tehnologija. *Geodetski vestnik*, *54*(1), 70–87. Retrieved from https://core.ac.uk/download/pdf/12089215.pdf

Klimov, B. F. (2012). ICT versus traditional approaches to teaching. *Procedia-Social and Behavioral Sciences*, *47*, 196–200. http://dx.doi.org/10.1016/j.sbspro.2012.06.638

Lasauskiene, J., & Rauduvaite, A. (2015). Project-based learning at university: teaching experiences of lecturers. *Procedia-Social and Behavioral Sciences, 197,* 788–792. http://dx.doi.org/10.1016/j.sbspro.2015.07.182

Marx, R. W., Blumenfeld, P. C., Krajcik, J. S., Fishman, B., Soloway, E., Geier, R., & Tal, R. T. (2004). Inquiry-based science in the middle grades: Assessment of learning in urban systemic reform. *Journal of Research in Science Teaching*, *41*(10), 1063–1080. http://dx.doi.org/10.1002/tea.20039

Mason, G. S., Shuman, T. R., & Cook, K. E. (2013). Comparing the effectiveness of an inverted classroom to a traditional classroom in an upper-division engineering course. *IEEE Transactions on Education*, *56*(4), 430–435. http://dx.doi.org/10.1109/TE.2013.2249066

Oye, N. D., Iahad, N. A., & Rabin, Z. A. (2011). A model of ICT acceptance and use for teachers in higher education institutions. *International Journal of Computer Science & Communication Networks*, *1*(1), 22–40. Retrieved from http://www.ijcscn.com/Documents/Volumes/vol1issue1/ijcscn2011010105.pdf

Pietilä, M. & Virkkula, E. (2011). Integrating therapy and practice according to PBL-based project designs in secondary vocational education of engineering and music. In J. Davies, E. de Graaff, & A. Kolmos (Eds.), *PBL across the disciplines: research into best practice* (pp. 53–66). Aalborg: Aalborg Universitetsforlag. Retrieved from http://vbn.aau.dk/files/57931848/PBL_across_the_disciplines_research_into_the_best_practice.pdf

Redecker, C. (2017). *European Framework for the Digital Competence of Educators: DigCompEdu*. Luxembourg: Publications Office of the European Union. http://dx.doi.org/10.2760/159770.

Sapač, K., Šraj, M., Brilly, M., Lobnik, F., Lobnik, M., Šubic, Ž., & Gotvajn, A. Ž. (2016). Razvoj in uporaba inovativne metode mešanega učenja na doktorskem študiju. In J. Kljun (Ed.) *KEMIJSKE znanosti 2016* (pp. 23–24). Retrieved from http://www.cutting-edge.si/wp-content/uploads/2016/03/zbornik_spletna.pdf

Şoitu, L., Ungureanu, R., & Rusu, C. (2014). European partnership for teacher training in universities. *Procedia-Social and Behavioral Sciences*, *142,* 200–206. http://dx.doi.org/10.1016/j.sbspro.2014.07.685

Soliman, N. A. (2016). Teaching English for academic purposes via the flipped learning approach. *Procedia-Social and Behavioral Sciences*, *232*, 122–129. http://dx.doi.org/10.1016/j.sbspro.2016.10.036

Strayer, J. (2012). How learning in an inverted classroom influences cooperation, innovation and task orientation. *Learning Environments Research, 15,* 171–193. http://dx.doi.org/10.1007/s10984-012-9108-4

Florjančič, V., & Lesjak, D. (2007). Uporaba e-učilnice v terciarnem izobraževanju: študija primera. *Management, 2*(1), 51–63. Retrieved from https://repozitorij.upr.si/IzpisGradiva.php?lang=slv&id=4031

Talebian, S., Mohammadi, H. M., & Rezvanfar, A. (2014). Information and communication technology (ICT) in higher education: advantages, disadvantages, conveniences and limitations of applying e-learning to agricultural students in Iran. *Procedia-Social and Behavioral Sciences, 152,* 300–305. http://dx.doi.org/10.1016/j.sbspro.2014.09.199

Talley, C. P., & Scherer, S. (2013). The enhanced flipped classroom: Increasing academic performance with student-recorded lectures and practice testing in a "flipped" STEM course. *The Journal of Negro Education, 82*(3), 339–347. http://dx.doi.org/10.7709/jnegroeducation.82.3.0339

Vouk, M. (2014). *Usposobljenost visokošolskih učiteljev Univerze v Mariboru za uporabo informacijsko-komunikacijskih tehnologij* (graduation thesis). University of Maribor, Faculty of Education, Maribor. Retrieved from https://dk.um.si/Dokument.php?id=63074

Williams, M., & Linn, M. C. (2002). WISE inquiry in fifth grade biology. *Research in Science Education*, *32*(4), 415–436. http://dx.doi.org/10.1023/A:1022452719316

Young, J. R. (2018). *Why Professors Doubt Education Research*. Retrieved from https://www.edsurge.com/news/2018-03-07-why-professors-doubt-education-research

PROCEEDINGS OF THE 2ND INTERNATIONAL SCIENTIFIC CONFERENCE
»TEACHING METHODS FOR ECONOMICS AND BUSINESS SCIENCES«
7 MAY 2018, MARIBOR, SLOVENIA
N. Gajšt & A. Plos (eds.)

University of Maribor Press

Teaching Instruments: Wolfram Mathematica and EViews

ARUNAS BURINSKAS

Abstract It is well known that there are the three main types of learners – visual, audio and kinesthetic. The ideal learning environment is when students see, hear and feel the material themselves. In quantitative analysis, Wolfram Mathematica could be used as an instrument useful to present the main principles. Wolfram Mathematica interactive manipulation tool helps students that learn various subjects of economics get to the ideal learning environment: having heard the material, they can see how it works and even try it themselves. It is useful in providing simplified versions of various econometric models implemented in programs designed for econometric analysis such as, for example, EViews. Students immediately feel benefits of the content they are thought. The author investigates ways how both instruments are compatible for teaching purposes. Numerous examples that are presented illustrate the advantages it brings to the table of a teacher. The article is based on comparative and scientific literature analysis.

Keywords: • teaching • instruments • Wolfram Mathematica • EViews • compatibility •

CORRESPONDENCE ADDRESS: Arunas Burinskas, PhD in Soc. Sc., Researcher, Vilnius University, Vilnius, Lithuania, e-mail: burinskas.arunas@gmail.com.

DOI https://doi.org/10.18690/978-961-286-285-5.4 ISBN 978-961-286-285-5
Dostopno na: http://press.um.si

The question of how best to promote intellectual development has long been the focus of philosophical debate and, more recently, empirical investigation. Over the past half century, this discussion has been contributed by an abundance of research examining how instructors can make classes more interesting and engaging. These advancements have had a significant effect on how instructors teach, and this is especially true in higher education, where lecturing still remains the most common form of instruction and accounts for the largest percentage of class time used.

Progress at the highest conceptual level of contemporary approach to learning has involved the reformulation of some learning principles. The most discussed of them are active learning, student-centered learning, collaborative learning, experiential learning, and problem-based learning.

The paper focuses on one of the modern teaching methods – creating experiential lessons that transcend the boundaries of the classroom. It enables students to reshape their understanding of a concept through experience, develop self-confidence and self-efficacy by applying their capabilities to achieve success, challenge prevailing thoughts and attitudes through problem-solving and debate, and enhance attitudes and beliefs about learning by experiencing ideas as relevant and meaningful.

In teaching Economics, the models created on the background of Wolfram Mathematica and EViews packages prove as very useful in creating experiential lessons.

The paper comprises several following sections: the first one covers the empirical findings of the methods applied in teaching Economics; the second section covers some contemporary teaching methods specifically focusing on experiential learning; the third section reveals how the models made in Wolfram Mathematica and EViews programs designed for experiential learning are covered in literature; the fourth section covers some examples of the Wolfram Mathematica and EViews models designed for experiential learning; and finally the paper ends with some conclusions.

1.1 The empirical findings of the methods applied in teaching economics

For many years, there has been a long going discussion of efficiency of lecture as the dominant method for learning Economics. Many surveys (most notably Becker & Watts, 1996; Becker &Watts, 2001a, 2001b; Watts & Becker, 2008; Watts & Schaur, 2011) show predominance of lecture as the main choice of instructors from the whole variety of teaching methods that are at hand for them.

For example, in their survey of lecturers, Goffe and Kauper (2014) found out that the median respondent reports spending 70% of class time lecturing, 20% leading class discussion, and 10% percent using other learning activities such as experiments, group activities, peer instruction, clickers, etc. The most common explanation of lecture's efficacy, by the third who favoured it, is the ability to control the delivery and coverage of content. This group even seemed to have difficulty conceptualizing anything other than lecturing. The second third considered lectures as a cost-efficient method. Only the remaining third considered efficacy of non-lecture methods' and the students' active involvement as ones that lead to increased learning.

However, while lecture prevails in instructor use, it does not prevail in student outcomes. According to Goffe and Kauper (2014), a significant amount of research shows that alternatives to lecture yield more learning and other improved student outcomes. For example, in the outstanding experiment of teaching an Introductory Physics course, Deslauriers, Schelew, and Wieman (2011) discovered that the students of novice instructors scored almost twice as high as the students of experienced, highly evaluated instructors. The research-based instructional strategies (RBIS) that were used by the novice instructors are based on findings from cognitive psychology.

Many other studies such as, for example, those performed by Crouch, Watkins, Fagen, and Mazur (2007) on the usage of peer instruction as well as engaging their physics students in the classroom at Harvard University and Swarthmore College, or Beichner et al. (2007) found equivalent results.

Goffe and Kauper (2014) notice that while there is not as much research on the learning gains from using RBIS in economics as there is for physics and some other disciplines, the gains in economics are consistent with potential widespread gains. Economics instructors consistently report small to large gains of RBIS over lecture.

Lage, Glenn, Platt, and Treglia (2000) moved lectures outside of class using videos and webcasts, whereas learning activities were moved into the classroom. The report reveals that 189 students, on average, increased learning in the 'Inverted Classroom'. In an experiment developed by Simkins and Maier (2004), the control group had three to four Just-in-Time Teaching (JiTT) assignments, whereby the assignments are completed and graded just before the class meeting so that they can be discussed in class. The control group scored higher on average on all the exams, and in most cases six to twelve, statistically significant percentage points higher.

Yamarik (2007) taught one Intermediate Macroeconomics class with standard lecture while two were taught with cooperative learning; specifically, students worked together in small groups for approximately half of the class meetings. The report shows significant improvements in students' results of those last two classes as well.

2 Experiential lessons as one of core methods of contemporary teaching

Contemporary advancements in teaching methods have taken many different forms. The progress at the highest conceptual level has involved the reformulation of some learning principles. The most discussed of them are active learning, student-centered learning, collaborative learning, experiential learning, and problem-based learning.

Despite many differences, Slavich and Zimbardo (2012) find them more similar than different because of similar theoretical roots. At the heart of all these forms is the constructivist notion that students generate knowledge and meaning best when they have experiences that lead them to realize how new information conflicts with their prevailing understanding of a concept or idea. To produce the type of cognitive dissonance that promotes new understanding, though,

students must do more than just listen to an instructor describe concepts. Therefore, students must engage in activities or exercises that require them to reflect on their understanding and examine or explain their thinking (Jensen & Lawson, 2011; Lord, 1997; Stockdale & Williams 2004).

Slavich and Zimbardo (2012) divide modern teaching methods in groups according three overarching transformational teaching principles as follows: (1) facilitating students' acquisition and mastery of key course concepts; (2) enhancing students' strategies and skills for learning and discovery; and (3) promoting positive learning-related attitudes, values, and beliefs in students. All those theoretical perspectives and principles translate into strategies that can be employed in the classroom and may be organized in the following six core methods: (1) establishing a shared vision for a course; (2) providing modelling and mastery experiences; (3) intellectually challenging and encouraging students; (4) personalizing attention and feedback; (5) creating experiential lessons that transcend the boundaries of the classroom; and (6) promoting ample opportunities for reflection and reflection.

The teaching experience that the author of this paper has gathered points out to the fifth core method as the most relevant in teaching economic concepts of Economics that reveal itself as complicated one for students to learn. The importance of engaging students in learning exercises and activities is highlighted in all of the aforementioned theoretical perspectives.

In many studies, for example, Bandura (2012), Bass (1985), Boyatzis (2006), Mezirow (2000), instructors identify the main reason behind the decisions of choosing this core method, i.e. the fact that experiential lessons enable students to reshape their understanding of a concept through experience, develop self-confidence and self-efficacy by applying their capabilities to achieve success, challenge prevailing thoughts and attitudes through problem-solving and debate, and enhance attitudes and beliefs about learning by experiencing ideas as relevant and meaningful. Slavich and Zimbardo (2012) reveal that hundreds of activities have been developed for the purpose of creating experiential lessons.

The experiential lessons may benefit students in many ways. First, they provide students with an opportunity to experience concepts first-hand and, as such, give students a richer, more meaningful understanding of course concepts and of how they operate in the real world. Second, they enhance the affective quality of the

course content. This occurs both when students are engaged in solving problems that are part of the activities, and when they are analysing, sharing, discussing, and reflecting on their personal reactions to the activities (Gross Davis, 2009). The affective quality that lessons take on plays an important role because both it makes the lessons more interesting and it can significantly improve student's memory for concepts insofar as the information gets stored in autobiographical memory (Bower & Gilligan, 1979; Holland & Kensinger, 2010; Thompson, Skowronski, Larsen, & Betz 1998; VanderStoep, Fagerlin, & Feenstra, 2000; Westmacott, Black, Freedman, & Moscovitch, 2003). Third, experiential lessons have the ability to shape students' beliefs about learning and about self. Perhaps the unique notion behind this method is that, if the experimental lessons employed involve examining personally held thoughts or beliefs, then they can also lead to significant personal insights, including a greater awareness of one's personally held perspectives with possibility to enhance these attributes through critical reflection. Therefore, attitudinal and behavioural change resulting from experiential lessons is worthy by product.

3 The literature covering EViews and Wolfram Mathematica as teaching methods

The author of this paper favours teaching Economics and modelling in Wolfram Mathematica and EViews packages designed for experiential learning for several reasons. First, the pedagogical assumption followed in the development of the Wolfram Mathematica package is that a student learns better and in a more stimulating way using the strategy of learning by doing. Manipulating data and observing the results of their manipulation a learner can reach a deeper knowledge of the subject (D'Apice, Manzo, & Tibullo, 2003). Second, as results from the interviews performed by Roddick (2001) show, the students that work with Wolfram Mathematica are more likely to approach problems from a conceptual viewpoint of calculus knowledge, whereas the traditional students are more likely to approach problems procedurally. The students working with Wolfram Mathematica also demonstrate a more general understanding of the topic than the traditional groups of students.

Teaching Advanced Macroeconomics and Statistics inevitably involves calculations with a statistical package. One of the most used is EViews, or Econometric Views – the statistical package used for time series oriented econometric analysis. However, this program requires some advancement in knowledge of statistics and this kind modelling from students. This is where the Wolfram Mathematica package might be helpful. Unfortunately, the literature analysis reveals that this possibility is almost not utilised.

In general, despite advantages that provide these mathematical and statistical packages, in general, there is not a big number of publications on the topic. The review of literature on EViews and Wolfram Mathematica shows that EViews appears on the literature more often than Mathematica. Specifically, 87 percent of papers are dedicated to EViews. Most of these publications are given to the application of models and methods on various topics of Economics. But the main part of these papers do not cover learning issues (see Table 1), while modelling subject is the most popular among the publications.

Table 1. Number of publications classified by periods

Period	EViews	Wolfram Mathematica	Total number of publications
1990-1995	1	12	13
1996-2000	2	3	5
2001-2005	4	2	6
2006-2010	30	1	31
2011-2015	58	2	60
2016-2018	39		39
Total	134	20	154

In literature, the concept of eViews is analysed by the authors as follows: Bodkhe (2015), Djelassi (2012), Ferstl (2016), Kang (2011), Kaziro (1999), Maiti (2017), Peymany (2009), Ruize & Ning (2010), Tong, Chen & Yang (2012), Xu, Peng & Ding (2013), etc.

On Wolfram Mathematica topic, most of publications was delivered by Varian with co-authors: Varian (2013), Kendall (1993), Judd and Guu, (1993), Steele and Stine (1993), Stine (1993). Also other authors have Crossref publications: Hopkins (1996), Spady et al. (1990), Belsley (1997).

Deeper analysis of publications in learning shows that Wolfram is used for learning analysis more often. Below are placed three of 30 publications dedicated to learning of different subjects, mainly Mathematica.

Table 2. Wolfram Mathematica in learning.

Author	Year	Paper	Citation	Journal
Evans, Karam, West & McClellan	1993	Learning signals and systems with Mathematica	15	IEEE Transactions on Education
O'Rorke	1987	LT Revisited: Experimental Results of Applying Explanation-Based Learning to the Logic of Principia Mathematica	4	Proceedings of the Fourth International Workshop on Machine Learning
Roddick	2001	Differences in learning outcomes: Calculus & Mathematica vs. traditional Calculus	3	PRIMUS
Kaziro	1999	Mathematica-Assisted Learning in Physical Chemistry	2	Journal of Chemical Information and Computer Sciences
Rübenkönig & Korvink	2007	Interactive Learning	1	The Mathematica Journal
Tong, Chen & Yang	2012	Fast learning rates for regularized regression algorithms	1	Scientia Sinica Mathematica

The literature review shows that although Wolfram Mathematica has not received much attention from scholars, it, in some extent, is still applied in teaching Economics successfully.

4 The models of EViews and Wolfram Mathematica appropriate for experiential lessons

Wolfram Mathematica package provides powerful modelling, graphical, statistical, and programming facilities that allow the user, within a single environment, to do almost everything. And even if more special-purpose routines are eventually called for, they allow for rapid prototyping and testing of concepts and processes that makes subsequent implementation in other environments very much easier and surer.

Wolfram Mathematica is a fully integrated symbolic algebraic computational environment. 'Fully integrated' means that, within a single environment, one can do calculations, algebra, calculus, and matrix manipulations; one can solve equations, build models, program, enact rule-based transformations, and one can graph the numeric results. 'Symbolic'means that most of these operations can take place either numerically or symbolically, a feature that is particularly useful in economics (Besley, 1997).

But the most striking feature of Wolfram Mathematica package is it's a unique capability for interactive learning. The possibility to combine program code and explanations in an interactive environment is well suited for teaching. In addition, Wolfram Mathematica package is useful in educational process because it is able to show the results of internal computations in symbolic form. This enables us to explore topics in depth, and to vary parameters to see the effect of these changes. The solutions can be visualized in a number of ways, thereby elucidating the concept under study. Especially the dynamic features in the latest versions have revolutionized visualization of evolving processes (Johannesen, 2015).

Its manipulation feature is especially helpful there; it enables students to analyse many different aspects of phenomena. Together with minimum programming abilities, it helps in depth analysis in a way of reverse engineering process that reveals all aspects of studied phenomena for students.

For example, Figure 1 depicts the optimal choice of a consumer whose preferences are represented by a Cobb–Douglas utility function. By changing prices and wealth the consumer adjusts her decisions to the new environment. By leaving initial prices and wealth unchanged and modifying the parameter α, two consumers with different preferences change from their optimal choices.

These changes in α translate into changes in the consumer's willingness to pay for goods 1 and 2.

In a lecture, such interactive model involves all three main types of learners – visual, audio and kinesthetic. Therefore, it makes learning process much quicker.

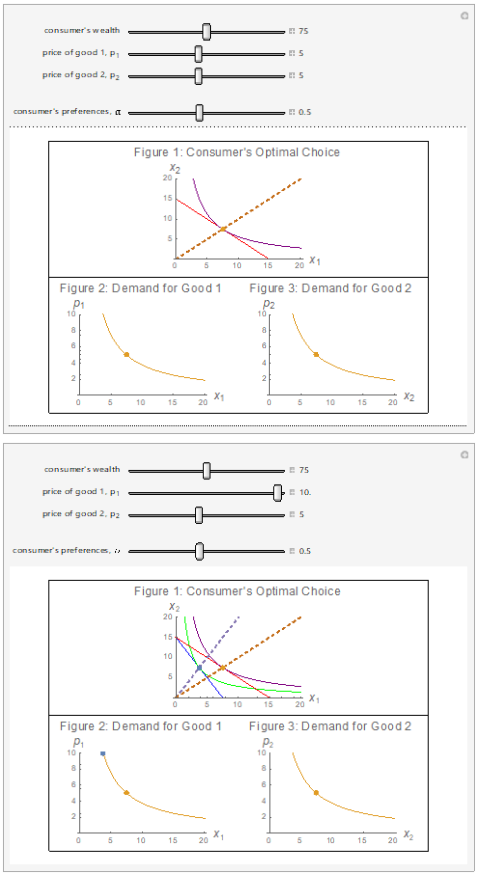


Figure 1: Manipulated model of Cobb-Douglas Utility Function
Source: Wolfram demonstrations projects

The same might be said of teaching many concepts of Micro- and Macro Economics. For example, the classic model of Monopoly Profit-Maximization with Quadratic Marginal Cost may appear easy to understand with help of the employed manipulation function (Figure 2).

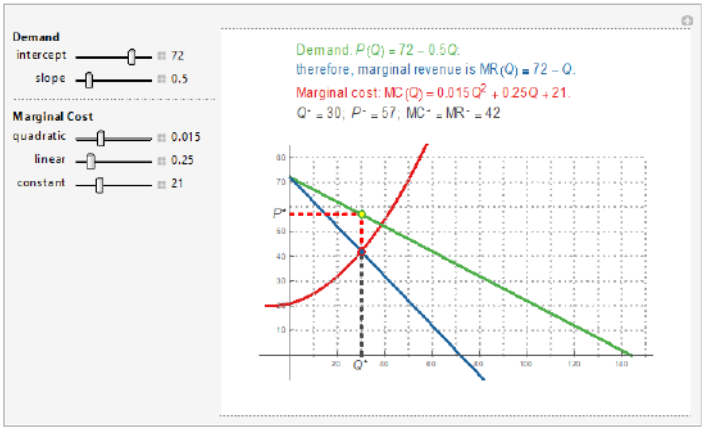


Figure 2: Manipulated model of Monopoly Profit-Maximization with Quadratic Marginal Cost

Source: Wolfram demonstrations projects

In the same way, one can deal with even more complicated model, such as, for example, from behavioural economics. Figure 3 shows equilibrium prices when firms compete on the basis of price (Bertrand), but with a U-shaped average cost function. The graph on the left shows total market demand, one firm's demand function (the total demand at price p, denoted Q(p), divided by n), one firm's cost function, and the average and marginal cost function. The graph on the left also shows, for each price p, the profit level when the firm covers all or only a fraction, 1/n, of the market demand. When profit covering all the demand is lower than profit covering only the nth part of the demand, p is an equilibrium price (i.e., there are no incentives to slightly lower the price). On the right, there is shown how equilibrium prices (the shadowed area) change as a function of the number of firms in the industry.

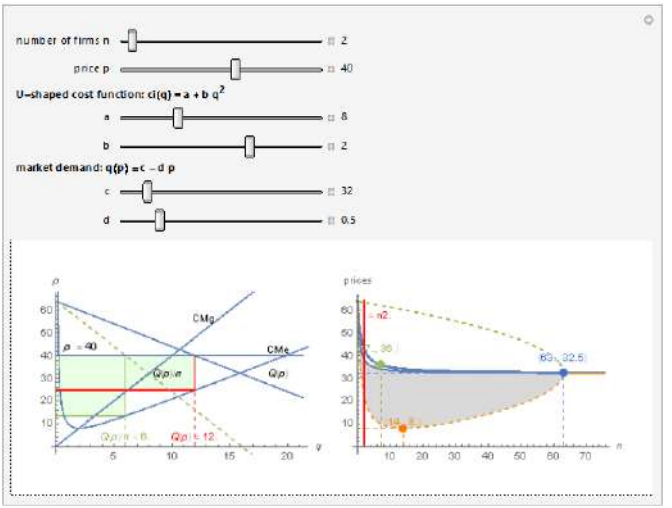


Figure 3: Manipulated model of Price Competition
Source: Wolfram demonstrations projects

In Figure 4, the IS-LM model is a graphical representation of a Keynesian model of the macroeconomics. The model solves for equilibrium in both the goods market and the money market, taking certain parameters as given. The IS line represents the goods market, and the LM line represents the money market (Wolfram demonstrations).

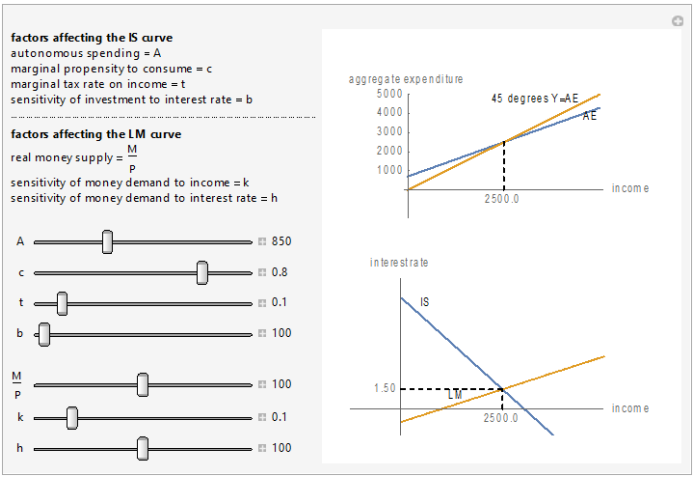


Figure 4: The Keynesian IS-LM Model (manipulated)
Source: Wolfram demonstrations projects

In Figure 5, we present computable general equilibrium (CGE) models of markets for situations where demand and supply are interdependent in order to analyse growth through trade and the benefits of trade agreements developed by neoclassical economists. Paul Samuelson showed that optimization could be used to solve such models, in particular John Von Neumann's economic equations developed in 1938. Recently, multiregional input-output models have become popular as networked production functions for use in solving the dynamics of growth through trade (Wolfram demonstrations).

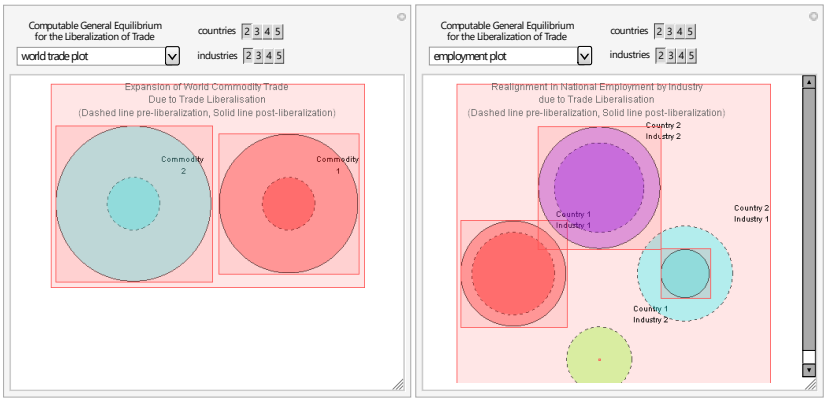


Figure 5: Manipulated model of General Equilibrium of Multiregion Input-Output
Source: Wolfram demonstrations projects

However, in advanced Macroeconomics, time series and other methods of statistics are applied. Although EViews is most commonly used for time series analysis in academics, business, and government, from students it requires some advancement in knowledge of statistics from students. And this is where the Wolfram Mathematica package might be helpful in providing possibilities for students in reconstruction and in depth analysis of various methods of statistics and models.

For example, in Figure 6, the autoregressive moving-average process (ARMA) as a discrete-time and continuous-state random process manipulated in Wolfram Mathematica package is presented. This generator randomly chooses parameters of the model from the interval (-1,1); and that can be set to the condition for (weak) stationarity.

Part of the output includes the autocorrelation function (ACF), partial autocorrelation function (PACF) and their samples (SACF, SPACF), which serve as a basic tool for model identification in the Box–Jenkins approach by looking for so-called cut-off points.

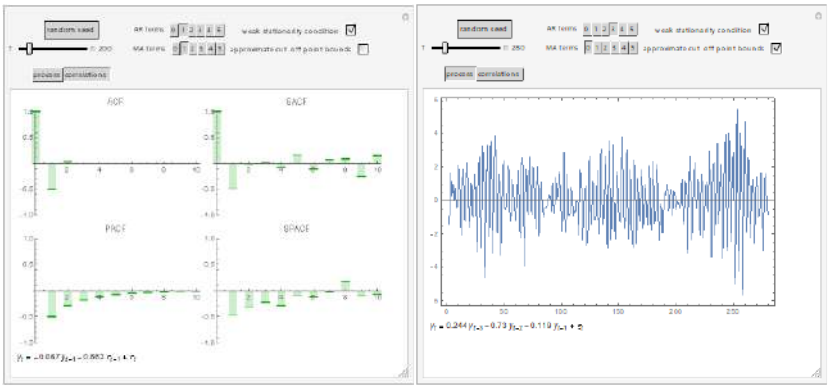


Figure 6: Manipulated model of Autoregressive Moving-Average
Source: Wolfram demonstrations projects

When students learn ARMA process with the help of Wolfram Mathematica, they will be ready for more complicated and advanced analysis of the same kind with EViews package.

5 Conclusions

Although many studies reveal the predominance of lecture as the main choice of instructors from the whole variety of teaching methods that are at hand for them, it does not prevail in student outcomes. The research-based instructional strategies (RBIS) based on cognitive psychology show the most promising results in advanced students learning.

Contemporary advancements in teaching methods have taken many different forms and one of the core methods is creating experiential lessons that transcend the boundaries of the classroom. Many studies confirm the fact that experiential lessons enable students to reshape their understanding of a concept through experience, develop self-confidence and self-efficacy by applying their capabilities to achieve success, challenge prevailing thoughts and attitudes

through problem-solving and debate, and enhance attitudes and beliefs about learning by experiencing ideas as relevant and meaningful.

The pedagogical assumption followed in the development of the Wolfram Mathematica package is that a student learns better and in a more stimulating way using the strategy of learning by doing. Manipulating data and observing the results of their manipulation, a learner can reach a deeper knowledge of the subject.

Teaching Advanced Macroeconomics and Statistics inevitably involves calculations with a statistical package. One of the most used is EViews, or Econometric Views – the statistical package used for time series oriented econometric analysis. However, this program requires some advancement in knowledge of statistics and this kind modelling from students. This is where the Wolfram Mathematica package might be helpful. Unfortunately, the literature analysis reveals that this possibility is almost not utilised.

References

Bandura, A. (2012). On the functional properties of perceived self-efficacy revisited. *Journal of Management*, *38*, 9–44.

Bass, B. M. (1985). *Leadership and performance beyond expectations*. New York: The Free Press.

Becker, W. E., & Watts, M. (1996). Chalk and talk: A national survey on teaching undergraduate economics. *The American Economic Review*, *86*(2), 448–453.

Becker, W. E., & Watts, M. (2001a). Teaching economics at the start of the 21st century: Still chalk-and-talk. *The American Economic Review*, *91*(2), 446–451.

Becker, W. E., & Watts, M. (2001b). Teaching methods in US undergraduate economics courses, *The Journal of Economic Education*, *32*(3), 269–279.

Beichner, R. J., M. Saul, J. M., Abbott, D. S., Morse, J. J., Deardorff, D., Allain, R. J., … Risley, J. (2007). The student-centered activities for large enrollment undergraduate programs (SCALE-UP) project. *Research-Based Reform of University Physics*, *1*(1), 2–39.

Belsley, D. A. (1997). Generating Random Numbers in Mathematica. In H. Amman, B. Rustem, & A. Whinston (Eds.), C*omputational approaches to economic problems* (pp. 71–77). Advances in Computational Economics, vol. 6.

Bodkhe, N. (2015). Principles of econometrics: A modern approach using EViews. *Artha Vijnana*, *57*(3), 252–252.

Bower, G. H., & Gilligan, S. G. (1979). Remembering information related to one's self. *Journal of Research in Personality, 13*(4), 420–432.

Boyatzis, R. E. (2006). An overview of intentional change from a complexity perspective. *Journal of Management Development*, *25*(7), 607–623.

Crouch, C. H., Watkins, J., Fagen, A. P., & Mazur, E. (2007). Reviews in PER Volume 1: *Research-Based Reform of University Physics*, 7, 35–44.

D'Apice, C., Manzo, R., & Tibullo, V. (2003). Enhancing mathematical teaching-learning process by Mathematica. In P. Mitic, P. Ramsden, & J. Carne (Eds.), *Challenging the Boundaries of Symbolic Computation*: *Proceedings of the 5th International Mathematica Symposium:* (pp. 137–144). London: Imperial College Press.

Deslauriers, L., Schelew, E., & Wieman, C. (2011). Improved learning in a large-enrollment physics class. *Science*, *332* (6031), 862–864.

Djelassi M. (2012). Manuel Pedagogique En Panels Dynamiques Non Stationnaires: Application sur Stata et Eviews. *SSRN Electronic Journal*, 5, 20–27.

Evans, B. L., Karam, L. J., West, K. A., & McClellan, J. H. (1993). Learning signals and systems with Mathematica. *IEEE Transactions on Education*, *36*(1), 72–78.

Edgeworth, F. Y. (1899, December). Review of the book *Introduzione alla Economia Mathematica*, by F. Virgilii & C. Garibaldi C. *The Economic Journal, 9*(36), 560–560. doi:10.1126/science.290.5495.1304

Ferstl, R. (2016). Spatialf with EViews and MATLAB. *Austrian Journal of Statistics*, *36*(1), 17–26.

Jensen, J. L., & Lawson, A. (2011). Effects of collaborative group composition and inquiry instruction on reasoning gains and achievement in undergraduate biology. *CBE – Life Sciences Education*, 10(1), 64–73.

Lage, M., Glenn, J., Platt, J., & Treglia, M. (2000). Inverting the classroom: A Gateway to creating an inclusive learning environment. *The Journal of Economic Education*, *31*(1), 30–43.

Johannesen, I. G. (2015, June). Stimulating the learning process in mathematics and numerics by use of computer programs like Mathematica. Paper presented at *2015 ASEE Annual Conference and Exposition*, Seattle, Washington. 10.18260/p.24739

Judd, K. L., & Guu, S.-M. (1993). Perturbation solution methods for economic growth models. In Varian H. R. (Ed.), *Economic and Financial Modeling with Mathematica*® (pp. 80–103). New York: Springer.

Goffe, W. L., & Kauper, D. (2014). A survey of principles instructors: Why lecture prevails. *The Journal of Economic Education*, *45*(4), 360–375.

Gross Davis, B. (2009). *Tools for teaching*. San Francisco: Jossey-Bass.

Holland, A. C., & Kensinger, E. A. (2010). Emotion and autobiographical memory. *Physics of Life Reviews, 7*(1), 88–131.

Hopkins, E. (1996). Mathematica 2.2.3 for Windows. *Journal of Economic Surveys*, *10*(2), 233-239.

Kaziro, R. W. (1999). Mathematica-assisted learning in physical chemistry. *Journal of Chemical Information and Computer Sciences*, *39*(1), 96–103.

Kang, L. (2011). Time-series data analysis using EViews. *Journal of Applied Statistics*, *38*(8), 1744–1745.

Kendall, W. S. (1993). Itovsn3: Doing stochastic calculus with Mathematica. In H. R. Varian (Ed.), *Economic and financial modeling with Mathematica* (pp. 214–238). Santa Clara, California.

Lord, T. R. (1997). A comparison between traditional and constructivist teaching in college biology. *Innovative Higher Education, 21*(3), 197–216.

Maiti, M. (2017). [Review of the book *Principles of Econometrics: A Modern Approach Using EViews*, by S. K. Bhaumik]. *Vision: The Journal of Business Perspective*, *21*(2), 239–240.

Mezirow, J. (2000). *Learning as transformation: Critical perspectives on a theory in progress*. San Francisco: Jossey-Bass.

O'Rorke, P. (1987). Experimental results of applying explanation-based learning to the logic of principia mathematica. *Proceedings of the Fourth International Workshop on machine learning*, Morgan Kaufmann, Los Altos, California, 148–159.

Peymany, M. (2009). A simple Eviews program for ARMA selection. *SSRN Electronic Journal*, *10*, 31–43.

Roddick, C. D. (2001). Differences in learning outcomes: Calculus & Mathematica vs. traditional Calculus. *Primus*, *11*, 161-184.

Rübenkönig, O., & Korvink, J. (2007). Interactive learning. *The Mathematica Journal*, *10*(3), 40–48. dx.doi.org/10.3888/tmj.10.3-9

Ruize, W., & Ning ,Y. (2010, March). Test on the economics cobweb model by using Eviews programming. In *2010 Second International Workshop on Education Technology and Computer Science*, (Vol. 1, pp. 785-788). IEEE.

Simkins, S., & Maier M. (2004). Using Just-in-Time teaching techniques in the Principles of Economics course. *Social Science Computer Review*, *22*(4), 444–456.

Slavich, G. M., & Zimbardo P. G. (2012). Transformational teaching: Theoretical underpinnings, basic principles, and core methods. *Educational Psychology Review*, *24*(4), 569–608.

Spady, R. H. (1990). [Review of the book *Mathematica*, by S. Wolfram, D. Grayson, R. Maeder, H. Cetjin, T. Gray, S. Omohundro, D. Ballman, & J. Keiper]. *The Economic Journal*, *100*(402), 1018–1026.

Singh, P. (2016). [Review of the book *Principles of econometrics: A modern approach using Eviews,* by S. K. Bhaumik]. *Journal of Quantitative Economics*, *14*(2), 355–358.

Steele, J. M., & Stine, R. A. (1993). Mathematica and Diffusions. In H. R. Varian (Ed.). *Economic and Financial Modeling with Mathematica*® (pp. 192–213). New York: Springer.

Stine, R. A. (1993). Time series models and Mathematica. In H. R. Varian (Ed.). *Economic and Financial Modeling with Mathematica*® (pp. 368–406). New York: Springer.

Stockdale, S. L., & Williams, R. L. (2004). Cooperative learning groups at the college level: Differential effects on high, average, and low exam performers. *Journal of Behavioral Education*, *13*(1), 37–50.

Thompson, C. P., Skowronski, J. J., Larsen, S. F. & Betz, A. L. (1998). *Autobiographical memory: Remembering what and remembering when*. Hillside: Lawrence Erlbaum Associates.

Tong, H., Chen, D. & Yang, F. (2012). Fast learning rates for regularized regression algorithms. *Scientia Sinica Mathematica*, *42*(12), 1251–1251.

VanderStoep, S. W., Fagerlin, A., & Feenstra, J. S. (2000). What do students remember from introductory psychology. *Teaching of Psychology*. *27*(2), 89–92.

Watts, M. & Becker W. E. (2008). A little more than chalk and talk: Results from a third national survey of teaching methods in undergraduate economics courses. *The Journal of Economic Education*, *39*(3), 273–286.

Watts, M., & Schaur, G. (2011). Teaching and assessment methods in undergraduate economics: A fourth national quinquennial survey. *The Journal of Economic Education*, *42*(3), 294–309.

Westmacott, R., Black, S. E., Freedman, M., & Moscovitch, M. (2003). The contribution of autobiographical significance to semantic memory: Evidence from Alzheimer's disease, semantic dementia, and amnesia. *Neuropsychologia*, 42, 25–48.

Xu T.-T., Peng J.-L., & Ding F. (2013). Linkage relationship between port logistics and regional economy based on EViews software. *Journal of Software*, *8*(4), 52-61.

Varian, H. R. (Ed.). (2013). *Economic and financial modeling with Mathematica*®. New York: Springer.

Yamarik, S. (2007). Does cooperative learning improve student learning outcomes?. *The Journal of Economic Education*, *38*(3), 259–277.

ZongBen, X., Yan, Y., & Jian S. (2017). A new approach to solve inverse problems: Combination of model-based solving and example-based learning. *Scientia Sinica Mathematica*, *47*, 1345–1354.

PROCEEDINGS OF THE 2ND INTERNATIONAL SCIENTIFIC CONFERENCE
»TEACHING METHODS FOR ECONOMICS AND BUSINESS SCIENCES«
7 MAY 2018, MARIBOR, SLOVENIA
N. Gajšt & A. Plos (eds.)

University of Maribor Press

E-Learning: Theory and Practice

AURELIJA BURINSKIENE

Abstract It is not easy to find out when e-learning concept was started. Apparently, it began from the development of the first learning tools. In long term, tools that are more sophisticated emerged and brought advance e-learning systems. This also involved understanding that e-learning means much more than just organisation of course. In the beginning of popularity of the topic, e-learning was called just as interaction with students. Development processes helped work out platforms which delivered great e-learning results. The author collected requirements for virtual environment, also presented the variety of e-learning platforms and their specifics. The author of the article investigated e-learning, its static and dynamic approach, and main principles. As a result, learning pyramid was identified, for which construction, scientific literature analysis and synthesis methods were used in the paper. The author presented a learning cube which integrates learning material system, course content management system and virtual learning environment. Finally, the assessment framework for e-learning tools is given.

Keywords: • e-learning • platforms • learning pyramid • principles • terminology •

CORRESPONDENCE ADDRESS: Aurelija Burinskiene, PhD, Associate Professor, Vilnius Gediminas Technical University, Business Management Faculty, Vilnius, Lithuania, e-mail: aurelija.burinskiene@vgtu.lt.

DOI https://doi.org/10.18690/978-961-286-285-5.5 ISBN 978-961-286-285-5
Dostopno na: http://press.um.si

1 Introduction

The requirement to integrate virtual environment and learning framework into the web-based platform has created a debate among ICT engineers and education specialists. Apparently, e-learning began from the 'learning-by-doing' phase. It created understanding that e-learning means much more than just computer-based learning program. After a decade, e-learning involved interaction with the participants element. In the pick of popularity of the topic, e-learning is called the usage of tools and methods which are combined in learning platform.

The terminology of 'e-learning' was launched in 1999. Before that, some investigations were carried out: (1) the first test instrument became available in 1924; (2) the first learning instrument appeared in 1954; (3) the first computer-based learning program examined in 1960; (4) distance learning launched in Britain by the Open University: interaction with participants created via emails around 1970; (5) the first distance e-courses given in 1990. Finally, companies started to use e-learning tools and methods for teaching employees in 2000.

Before 2000, e-learning was a more static or virtual environment. Much more studies came in 1999. Researchers started to focus on e-learning platform functionalities, hybrid e-learning methods and models. The peak of the studies was reached in 2012 (Figure 1).

In literature, the concept of e-learning is also analysed by the authors as follows: Ayres, Marcus, Chan, and Qian (2009), Chou and Liu (2005), Fallahkhair, Pemberton, and Griffiths (2007), Hassan and Selim (2010), Huang and Chiu (2014), Klašnja-Milićević, Vesin, Ivanović, and Budimac (2011), Laurillard et al. (2011), Lewalter (2003), Letrud and Hernes (2015), Monahan, McArdle, and Bertolotto (2008), Sander and Golas (2012), Schuster andHoltbrügge (2012), Soroush (2016), Zhang (2005), etc.

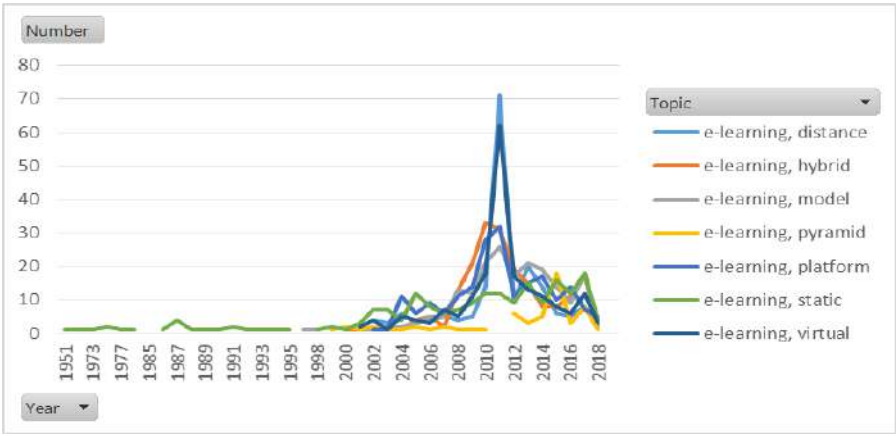


Figure 1: The number of literature sources on e-learning topic

Talking about e-learning, some of these authors use terms 'platform' or 'system' or 'environment'. Such requires proper technology infrastructure. System, in particular technological, can refer to technology. However, it should be noted that technology means the process of carrying out the e-learning ways and means (gr. techne - art, logos – knowledge; this word shows the link between science and knowledge).

1.1 E-learning: review

A literature search since 1976 using subject related words ('e-learning', 'platform', 'model', 'pyramid', 'static', 'hybrid', 'virtual, 'distance') found over 250 Crossref papers (Table 1). Many of reviewed publications focus on hybrid and virtual learning subject and the least number of publications on pyramid topic. Talking about papers on topic, the ranks of articles vary from 29 to 155.

Table 1: Top cited publications since1976.

Author	Paper	Subject	Citation	Citation per year
Monahan, McArdle, and Bertolotto (2008)	Virtual reality for collaborative e-learning	e-learning, virtual	103	10.3
Fallahkhair, Pemberton, and Griffiths (2007)	Development of a cross-platform ubiquitous language learning service via mobile phone and interactive television	e-learning, platform	30	2.73
Lewalter (2003)	Cognitive strategies for learning from static and dynamic visuals	e-learning, static	93	0.94
Zhang (2005)	Interactive Multimedia-Based E-Learning: A Study of Effectiveness	e-learning, distance	59	4.54
Laurillard et al. (2011)	A constructionist learning environment for teachers to model learning designs	e-learning, model	41	5.86
Klašnja-Milićević, Vesin, Ivanović, and Budimac (2011)	E-Learning personalization based on hybrid recommendation strategy and learning style identification	e-learning, hybrid	140	20.00
Letrud and Hernes (2015)	The diffusion of the learning pyramid myths in academia: an exploratory study	e-learning, pyramid	2	0.67

E-learning tool is working according six principles, which are important for teachers.

1. Multimedia principle – Three elements used in practice: video, sound and text. At least two elements out of three have to be linked to learn the material better.
2. Compatibility principles – Ability to review sound and text at the same time.
3. Segmentation principle – material is provided in parts.
4. Close principle – Linked material is placed together.
5. Knowledge control principle – introduction of material (share slide principle), ability to return and repeat material.

6. Preparation for e-learning principle – terminology, explanations are placed at the beginning of course.

Any e-learning platform has to follow these above-mentioned principles. There are a bit different requirements for academic education and corporate training. Some of these differences are listed below.

For academic education users, e-learning saves expenses on travel, removes the difference on geographic place, timeline and distance, borders and limitations. It does not disturb employment/career opportunity; it is suitable for many social science programmes except engineering and medicine; it provides direct link to library sources, the reduction of time for individual search; it gives possibility for clusters of universities to organize common learning courses (as example, Coursera); and it suggests possibility to listen on phone, tablet at work place during breaks.

For companies (corporate training users), e-learning tool is useful because it introduces processes, new products and services. It is important for employees working in distance locations; it helps to improve employees' skills, and it provides standards for the execution of functions.

2 Learning material system (LMS), Course content management system (CCMS), Virtual learning environment (VLE)

In e-learning environment, students' learning objectives and outcomes are the the most important. In addition, they are delivered through different systems: learning material system, course content management system, virtual learning environment.

Learning material system (LMS) is an e-platform built to launch and track courses, and for interaction with participants (one-to-many, one-to-one, some-to-one). The platform has learner record for academic education and corporate training. Some of such platforms have included e-commerce functions, performance and skills improvement dashboards, communication module and synchronised integration with other systems, such as library or resource management system. The main requirements for LMS are: easy to use, easy configurable and multi-language environment, design is adopted to mobiles, it

has modular construction, forums, messaging and newsletters, and ability to track students' appearance.

Course content management system (CCMS) is a user-friendly environment. The content is catalogued in system and easy updatable (orientation into new, extra knowledge and skills). System lets to choose language; it helps to share content and provides electronic support. At the same time, it follows e-learning standards and deadlines. Feedback collection is important for e-learning platform development.

Participants could have different expectations. First of all, they expect to have system flexibility, save time for searching information, get easy access to support and receive attention on-line in specified time frame. Second, knowledge will be used in future or knowledge is important now. Therefore, the content has to be adequate and available after the course is closed.

Virtual learning environment (VLE) integrates multiple-tools (visuals, sound, text and experience). The environment is developed to provide text-based material to video and 3D graphical outputs. Herein it is important that different tools are placed on the same website. It also contributes to new teaching methods: elemental learning (real-life or simulation-based learning) and synthetic learning (combining new de-conceptualised outcomes). Synthetic learning is the second level after elemental learning, which provides context, as synthetic learning mainly supports the given context. Chou and Liu (2005) give more details on VLE.

Table 2: Development of e-learning platforms.

Aspects	Early phase	1990	2000-2010	2010-2015	
Multi-language	Sharp & Jennings		Claroline (2000), aTutor (2002), Moodle (2002)	Chamilo (2010), Totara LMS (2011)	
E-commerce				Forma LMS (2012)	
Advanced integration		OLAT (1999, 2004)	LAMS (2003), Ilias (2004), Sakai (2005), Dokeos (2007)	Eliademy (2013), Opigno (2013)	
Investigations	Computer-based learning program (1960)				

The terminology of 'e-learning' was lunched in 1999 – the same year when OLAT was built. Development timeline in Table 2 shows that systems became more complex with years.

Some specific features are emphasised below by couple of examples such as:

1. Ilias has dropbox functionality, also content is visible for non-registered users.
2. Opigno has e-commerce and editorial tool.
3. Sakai has tasks appointment and e-communication tools, also document management tool.
4. OLAT integrates messaging system and support the synchronous communication processes.

The information is collected from the Internet, which was not easy to find or the newest information was not available. Also all LMS have integration with mobiles; it is treated as their standard functionality.

Most of placed systems belong to LMS (Claroline, Moodle, Ilias, Sakai, Dokeos, Chamilo, Opigno, etc.); an exception is Drupal, which is CCMS tool.

Learning outcomes are interlinked with teaching and learning methods, tools provided, assessments given, and quality assurance. The role of teacher is to ensure that all sections are connected to the whole course line; students have the possibility to reach stated objectives and are capable to pass assessments.

3 Learning frameworks

The participants have different expectations before starting e-learning. Three main expectation types are identified: micro-learning, fast-learning, individualised and differentiated learning. Each of them is presented below.

Micro-learning is oriented to learning in small steps, and for not difficult technical tasks. It has shorter video time, it has to demonstrate to participant the possibility to learn step by step (at day-time, during breaks, at traffic jumps, at waiting for public transport time). Due to this, it is important not to overload the material with many data at once.

Fast-learning aims to introduce material in short time where content is linked with calendar (specified concrete days and weeks). Material has to be placed in easy to use e-learning platform. Fast-learning could be linked with macro learning.

Individualised and differentiated learning presents a course which is developed towards students' activities and needs. Students could choose the learning method. Also, each student is able to identify their needs (specific competences). Therefore, material is updated up to the date.

All these frames are the part of Course content management system. Below, three systems, i.e. Learning material system (LMS), Course content management system (CCMS), Virtual learning environment (VLE) are integrated into e-learning cube, as presented in Figure 2.

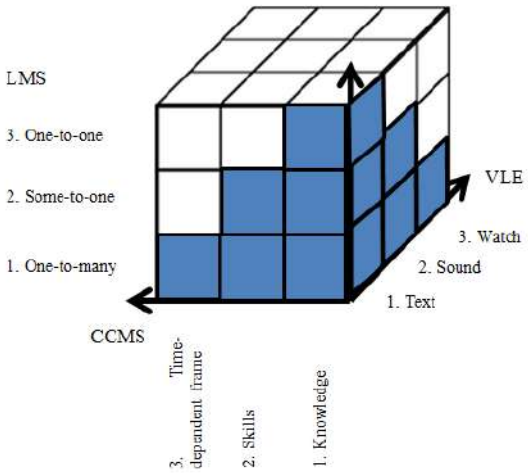


Figure 2: E-learning cube.
Source: own

In the e-learning cube, attention is paid to different communication models: one-to-many, some-to-one and one-to-one. To follow communication models, LMS has to follow segmentation and preparation for e-learning principle. Each LMS platform has a minimum number of learners' restrictions, which it is able to support. On the CCMS side, the focus is on skills, knowledge and time-dependent frame (micro-, macro-, fast learning). There are cases when entrance to the course is restricted by time or is open for learners to start the course at any time. To follow students' needs, CCMS is constructed according close principle, knowledge control principle and also preparation for e-learning principle. Finally, VLE represents the way the material is given to students. By reading the books, students could learn 10 percent of material; by listening audio students could learn 20 percent; by watching slides – 30 percent; but by watching and listening to a video – 50 percent; by having discussions in seminars – 70 percent and by presenting orally – 90 percent. VLE functionality has to follow multimedia and compatibility principles.

That is why it is recommended to have not just basic functions used in e-learning platform (slides, self-control tests, tasks, instructions), but also extra functions such as forums, group tasks, calendar, personal distance consultations, video material, video conferences on-line, also answers to learners' messages on the „Now and here" principle). Platforms, which have just basic functions, are

named as static, and those which have more features (extra functions) are called dynamic.

4 Comparison of e-learning tools

For a comparison of e-learning tools, multi-criteria evaluation method COPRAS and the set of six criteria is used. The set consists of the following criteria:

1) Content tool,
2) Administration tool,
3) Learner friendly environment,
4) Communication tool,
5) Static platform,
6) Dynamic platform.

Each user is a decision-maker has ihis or her own preferences. Each alternative e-learning tool in the quantitative evaluation is described by six criteria. Quantitative evaluation of such aspects allows scoring the e-learning tool. Some of criteria have different optimization directions: maximising and minimising.

In Table 3, the direction of criterion (maximising – max and minimising – min) is defined in column 2. The differences among criteria are the following: (1) for maximizing criterion, the biggest value is the best while (2) for minimizing criterion the smallest value is the best.

Table 3: The list and direction of criteria.

Criteria	The direction of criteria
1) Content tool	Max
2) Administration tool	Max
3) Learner friendly environment	Max
4) Communication tool	Max
5) Static platform	Min
6) Dynamic platform	Max

Source: prepared by author

Among scientists, multi-criteria methods are widely used in learning topics. Some of the authors who are working on this topic are Begičević, Divjak and Hunjak (2007), Belacel, Raval and Punnen (2007), Cobo, Rocha and Rodríguez-Hoyos (2013), Dombi and Zsiros (2005), Doumpos and Zopounidis (2011), Guelfi, Norese and Saluto (2016), Petasakis, Theodosiou, Kazanidis and Valsamidis (2015), Soroush (2016), Sousa, Yevseyeva, Joaquim, Costa and Cardoso (2013), Szeląg, Greco and Słowiński (2014).

During the application of COPRAS method, the weight of each criterion is defined. Usually, for the estimation of weights, experts are used. In case studies, the minimum of seven experts has to be used. For the checking consistency of experts' judgments, the coefficient of concordance is calculated. Based on COPRAS method, the multi-criteria problem is presented in a matrix. In our case, the matrix contains six criteria (rows) and X alternative e-learning tools (columns).

In order to avoid the difficulties caused by different dimensions of six criteria, the normalization has to be used. Before normalisation, the weights of criteria have to be placed into the decision table. After this, the matrix is normalized according formula (1).

$$D_{ij} = \frac{d_{ij} \cdot q_i}{\sum_{j=1}^{n} d_{ij}}, i = \overline{1,6}; j = \overline{1,n} \quad , \quad \sum_{i=1}^{6} \sum_{j=1}^{n} D_{ij} = 1 \tag{1}$$

Here D_{ij} is normalised value, d_{ij} is the value of each criterion, i – criterion value at j e-learning tool, n – number of e-learning tools (alternatives) included into comparison.

The following calculation of store j describing minimizes and maximizes the normalized indicator is used. In any case, the alternative of e-learning tool and the sum is always equal to the maximizing $S+$ and minimizes $S-$ criteria weight amounts:

$$S_{+j} = \sum_{i=1}^{6} D_{+ij}, , j = \overline{1,n} \quad S_{-j} = \sum_{i=1}^{6} D_{-ij}, , j = \overline{1,n} \quad S_{+} = \sum_{j=1}^{n} S_{+j} = \sum_{i=1}^{6} \sum_{j=1}^{n} D_{+ij}, \quad S_{-} = 1 - S_{+} \tag{2}$$

The alternatives are determined taking into account the lowest with minimizing the value. The relative importance of alternatives is determined by the following formula:

$$Q_j = S_{+j} + \frac{S_{-\min} \cdot \sum_{j=1}^{n} S_{-j}}{S_{-j} \cdot \sum_{j=1}^{n} \frac{S_{-\min}}{S_{-j}}}, j = \overline{1,n} \quad (3)$$

Now, using equations 1-3, we get the result – priority sequence (rank for each alternative). For example, alternative A1 gets rank 3, A2 – 1, A3 – 2,…. In the final stage, the priority sequence is set. The greater the number Q_j, the higher the priority is. According to priority sequence $Q_1 > Q_2 > Q_3$, the institution should choose the e-learning tool, which appears in the first place.

Formulated decision-making framework could be used for ranking e-learning tools in proper priority sequence. It could be used for decision on e-learning tool selection. In addition, the proposed tool could be useful for authors who analyse e-learning and for the developers of e-learning tool aiming to follow contemporarily needs of learners. Also, the developed profile further on has to be applied to case study searching for practical evidence. There are different directions of its practical application: when group or individual decision-makers use it.

4 Conclusions

Scientific and practical discussion on e-learning topic is ongoing. This is reflected in literature as the number of scientific publications is constantly increasing from 2000. Previous researches were simply looking at how to place the course on the environment, but nowadays this might be out-of-date as environment has become more global and complex. For teaching purposes, any e-learning platform has to follow the main six principles: multimedia principle, compatibility principle, segmentation principle, close principle, knowledge control principle, and preparation for e-learning principle.

In the paper, the development timeline of e-learning platforms is provided. The author presents the features of three systems: learning material system (LMS), course content management system (CCMS), and virtual learning environment (VLE), and later integrates them into the e-learning cube.

A review of literature shows that for the comparison of e-learning tools, criteria that emphasize the differences among e-learning tools have to be involved as there are more issues essential for the institution's decisions. New decision-making framework is developed to capture the nature of e-learning tools. Herein, COPRAS method, as one from other multi-criteria methods, is used for the development of the decision-making framework.

Finally, the decision-making framework is presented. Formulated framework is useful for the ranking of e-learning tools in proper priority sequence and choosing among them. Moreover, the proposed framework is not limited. It could be used for the comparison of technologies from single category (LMS, CCMS, and VLE). The possible application of the decision-making framework allows the linguistic and quantitative evaluation in the comparison. In addition, single or multiple decision makers could use this framework. The developed tool could be useful for authors who analyse e-learning.

The research has its limitations. Therefore, future studies should expand this research to the following directions:

- First, to the direction when the same e-learning tool has multiple opportunities (e-learning and e-commerce);
- Second, to the direction of e-learning tools selected from different categories;
- Third, to the direction of learners' demographic characteristics;
- Fourth, the practical case assessment of proposed decision-making framework is also suggested.

References

Ayres, P., Marcus, N., Chan, C. & Qian, N. (2009). Learning hand manipulative tasks: When instructional animations are superior to equivalent static representations. *Computers in Human Behavior*, *25*(2), 348–353.

Begičević, N., Divjak, B., & Hunjak, T. (2007). Prioritization of e-learning forms: a multicriteria methodology. *Central European Journal of Operations Research*, *15*(4), 405–419.

Belacel, N., Raval, H. B., & Punnen, A. P. (2007). Learning multicriteria fuzzy classification method PROAFTN from data. *Computers & Operations Research*, *34*(7), 1885–1898.

Chou, S-W., & Liu, C.-H. (2005). Learning effectiveness in a Web-based virtual learning environment: a learner control perspective. *Journal of Computer Assisted Learning*, *21*(1), 65–76.

Cobo, A., Rocha, R., & Rodríguez-Hoyos, C. (2013). Evaluation of the interactivity of students in virtual learning environments using a multicriteria approach and data mining. *Behaviour & Information Technology*, *33*(10), 1000–1012.

Dombi, J., & Zsiros, A. (2005). Learning multicriteria classification models from examples: Decision rules in continuous space. *European Journal of Operational Research*, *160*(3), 663–675.

Doumpos, M., & Zopounidis, C. (2011). Preference disaggregation and statistical learning for multicriteria decision support: A review. *European Journal of Operational Research*, *209*(3), 203–214.

Fallahkhair, S., Pemberton, L., & Griffiths, R. (2007). Development of a cross-platform ubiquitous language learning service via mobile phone and interactive television. *Journal of Computer Assisted Learning*, 23(4), 312–325.

Guelfi, S., Norese, M. F., & Saluto, P. (2016). An integration of theoretical knowledge, day by day experience and multicriteria methods to support the entrepreneurial learning process. *Measuring Business Excellence*, *20*(1), 12–20.

Hassan, M., & Selim, A. (2010). Hybrid e-learning acceptance model: Learner perceptions. *Decision Sciences Journal of Innovative Education*, *8*(2), 313–346.

Huang, Y-M., & Chiu, P.-S. (2014). The effectiveness of a meaningful learning-based evaluation model for context-aware mobile learning. *British Journal of Educational Technology*, *46*(2), 437–447.

Klašnja-Milićević, A., Vesin, B., Ivanović, M., & Budimac, Z. (2011). E-Learning personalization based on hybrid recommendation strategy and learning style identification. *Computers & Education*, *56*(3), 885–899.

Laurillard, D., Charlton, P., Craft, B., Dimakopoulos, D., Ljubojevic, D., Magoulas G., … Whittlestone, K. (2011). A constructionist learning environment for teachers to model learning designs. *Journal of Computer Assisted Learning*, *29*(1), 15–30.

Lewalter, D. (2003). Cognitive strategies for learning from static and dynamic visuals. *Learning and Instruction*, *13*(2), 177–189.

Letrud, K., & Hernes, S. (2015). The diffusion of the learning pyramid myths in academia: an exploratory study. *Journal of Curriculum Studies*, *48*(3), 291–302.

Monahan, T., McArdle, G., & Bertolotto, M. (2008). Virtual reality for collaborative e-learning. *Computers & Education*, *50*(4), 1339–1353.

Petasakis, I., Theodosiou, T., Kazanidis, I., & Valsamidis S. (2015). Multicriteria analysis of e-learning courses. *International Journal of Data Analysis Techniques and Strategies*, *7*(2), 203–215.

Sander, B., & Golas, M. M. (2012). HistoViewer: An interactive e-learning platform facilitating group and peer group learning. *Anatomical Sciences Education*, *6*(3), 182–190.

Schuster, T., & Holtbrügge, D. (2012). Market entry of multinational companies in markets at the bottom of the pyramid: A learning perspective. *International Business Review*, *21*(5), 817–830.

Soroush, H. M. (2016). Multicriteria scheduling with controllable processing times, setup times, and learning, ageing and deterioration effects on a single machine. *European Journal of Industrial Engineering*, *10*(4), 455–455.

Sousa, R., Yevseyeva, I., Da Costa, J. F. P., & Cardoso, J. S. (2013). Multicriteria models for learning ordinal data: A literature review. In *Artificial Intelligence, Evolutionary Computing and Metaheuristics* (pp. 109–138). Springer, Berlin, Heidelberg.

Szeląg, M., Greco, S., & Słowiński, R. (2014). Variable consistency dominance-based rough set approach to preference learning in multicriteria ranking. *Information Sciences*, 277, 525–552.

Zhang D. (2005). Interactive multimedia-based e-learning: A study of effectiveness. *American Journal of Distance Education*, *19*(3), 149–162.

PROCEEDINGS OF THE 2ND INTERNATIONAL SCIENTIFIC CONFERENCE
»TEACHING METHODS FOR ECONOMICS AND BUSINESS SCIENCES«
7 MAY 2018, MARIBOR, SLOVENIA
N. Gajšt & A. Plos (eds.)

University of Maribor Press

Active Learning Successful Case Studies

TERESA DIEGUEZ, ISABEL FERREIRA & PAULA LOUREIRO

Abstract Complexity, unpredictability and interdependence are some of the 21st century's characteristics. Students must be prepared for this environment and a focus on creativity, critical thinking, communication and collaboration is essential to prepare them for the future. In an era dominated by digital transformation, active learning is a key aspect of the flipped classroom and can be applied to any learning environment from online to standard lectures or as a blend of these. The aim of active learning is to provide opportunities for learners to think critically about content through a range of activities that help prepare learners for the challenges of professional situations. This paper aims to present and describe some active learning strategies implemented by the authors, teachers at the Management School of Polytechnic Institute of Cávado and Ave (IPCA), in Portugal. The expected result of this article is sharing successful case studies in Higher Education Institutions.

Keywords: • active learning • critical thinking • learning skills • innovation skills • learning strategies •

CORRESPONDENCE ADDRESS: Isabel Ferreira, PhD, Adjunct Professor, Escola Superior de Gestão, High Management School of Polytechnic Institute of Cávado and Ave, Barcelos, Portugal, e-mail: iferreira@ipca.pt. Paula Loureiro, PhD, Adjunct Professor, Escola Superior de Gestão, High Management School of Polytechnic Institute of Cávado and Ave, Barcelos, Portugal, e-mail: ploureiro@ipca.pt. Teresa Dieguez, PhD, Adjunct Professor, Escola Superior de Gestão, High Management School of Polytechnic Institute of Cávado and Ave, Barcelos, Portugal, e-mail: tdieguez@ipca.pt.

DOI https://doi.org/10.18690/978-961-286-285-5.6 ISBN 978-961-286-285-5
Dostopno na: http://press.um.si

1 Introduction

Nowadays, we are at the beginning of a new industrial revolution, the so called Fourth Industrial Revolution that is fundamentally changing the way we live, work and relate to one another. Instead of previous industrial revolutions which liberated humankind from animal power, made mass production possible and brought digital capabilities to billions of people, this Fourth Industrial Revolution gathers a range of new technologies that are melting the physical, biological and digital worlds, impacting all disciplines, economies and industries, and even challenging ideas about what it means to be human (Moavenzadeh, 2015).

A changing educational paradigm is needed (Tomozii & Topalăa, 2014) and Higher Education can have an important role in this process by providing a culture of active learning that allows leveraging the students' activity through the development of new and creative ideas, actions, roles and projects. In fact, through meaningful activities, students think about and apply what they are learning. It is a deliberate contrast against passive learning (Pelley, 2014)

This paper aims to present and describe some active learning strategies implemented by the authors, teachers at the Management School of Polytechnic Institute of Cávado and Ave (IPCA), Portugal. The expected result of this article is sharing successful case studies in Higher Education Institutions.

2 Theoretical background

The Fourth Industrial Revolution impacts are higher than ever and distinctive in speed, scope, and systems impact. The speed of current breakthroughs has no historical precedent, the pace is rather exponential than linear, it is disrupting almost every industry in every country and transforming entire systems of production, management, and governance. Like the revolutions that preceded it, the potential to raise global income levels and improve the quality of life for populations around the world is a fact. In the future, technological innovation will also lead to a supply-side miracle, with long-term gains in efficiency and productivity (Schwab, 2016).

However, there are many concerns that technological innovation will lead to increased unemployment, suppressed wages and greater inequality. The impact of the Fourth Industrial Revolution will also be reflected on economic, legal, regulatory, and socio-political questions. These demand proactive roles from government policies and institutions at local, national and global levels. Governments as well as the United Nations can and should influence these processes (Bruckner, LaFleur, & Pitterle, 2017). The right policy mix and institutional arrangements can ensure that the benefits of innovation are shared broadly, an essential step to achieving Sustainable Development Goals for all (Brynjolfsson & McAfee, 2014).

But achieving Sustainable Development Goals, an ambitious and universal agenda to transform our world, requires transforming our world by undertaking the multiple challenges that humankind is facing through well-being, economic prosperity, and environmental protection. It is crucial to adopt a holistic and multidimensional view on development (Pradhan, Costa, Rybski, Lucht, & Kropp, 2017) which demands a profound transformation of how we think and act. Individuals must become sustainability change-makers: they require the knowledge, skills, values and attitudes that empower them to contribute to sustainable development by taking informed decisions and responsible actions, for nowadays and future generations. Education for Sustainable Development (ESD) is a holistic and transformational education that addresses learning content and outcomes, pedagogy and the learning environment. Thus, ESD does not only integrate contents such as climate change, poverty and sustainable consumption into the curricula; it also creates interactive, learner-centered teaching and learning settings. It requires a shift from teaching to learning and asks for an action-oriented, transformative pedagogy, which supports self-directed learning, participation and collaboration, problem-orientation, inter- and transdisciplinary and the linking of formal and informal learning. Only such pedagogical approaches make possible the development of the key competencies needed for promoting sustainable development (UNESCO, 2017).

Students must be engaged in the learning process as well as do meaningful learning activities and think about what they are doing. Prince (2004) defines these instructional methods as 'active learning', the definition inspired from seed work done by Bonwell and Eisen (1991) and Eison (2010) which has been widely accepted. In a course focused on active learning, students are truly engaged in the learning process. They might be dealing with the course material by working

collaboratively on problems. They are constantly processing what they are learning. Students may look at PowerPoint slides, but they are also discussing or debating questions posed by the teacher/mentor and are asked to critically analyze the information presented. They may search the Internet, but they are looking for data and resources to support their arguments. In some cases, they are exposed to an extensive amount of material outside of class so that most of the in-class time can be devoted to hands-on learning. Active learning is a key aspect of the flipped classroom and can be applied to any learning environment from online to standard lectures or as a blend of these (Dunlosky, Rawson, Marsh, Nathan, & Willingham, 2013). The aim of active learning is to provide opportunities for learners to think critically about content through a range of activities that help prepare learners for the challenges of professional situations. Therefore, it is important to design activities that promote higher order thinking skills such as collaboration, critical thinking and problem-solving. Active learning activities can range from low-stakes (simpler) to high stakes (more complex) activities (Innovation Institute for Teaching and Learning, 2018).

3 Environment: IPCA campus

The Polytechnic Institute of Cávado and Ave (IPCA) was founded in 1994 and began its academic activity in 1996 with 74 students divided by two bachelor courses: Accounting and Public Finances and Accounting, each with 37 students. In the following year, IPCA began its offer of evening courses with evening classes of Accounting. Although created along with the Management School in 1995, the Technology School began its activity in 2004. That was a turning point in IPCA's history, as it assured its legal nature and autonomy according to the law. In 2009 IPCA created the Research Centre on Accounting and Taxation, Centre recognized by FCT (the national funding agency for science and research in Portugal).

The third school of IPCA, the Design School, was created in 2015 and began its activity with courses that were previously under the Technology School coordination: Graphic Design and Industrial Design as well as Masters in Illustration and Animation and Product Design and Development. In October 2014, IPCA became one of the first institutions to offer Professional Higher Education Courses, reaching the highest number of students in this new

academic offer. As a result, two more campuses were created: in Braga (2014) and in Guimarães (2015).

The fourth school, the Hospitality and Tourism School, was born in 2018 and is Tourism oriented. It will soon have its headquarters in the city of Guimarães.

3.1 Management School

The mission of the Management School (ESG) is to contribute to the development of society, stimulate cultural creation, research and applied research and promote reflective and humanistic thinking, providing areas of knowledge for the exercise of professional activities, namely:

- Students' high qualification, particularly in the areas of Management, Accounting, Taxation, Tourism, Finance and Legal Sciences in their cultural, scientific, technical and professional dimensions;
- Production and dissemination of knowledge;
- Development of research activities and applied research;
- Provision of services to the community, enhancing regional development;
- Cultural, scientific and technical exchanges with other national and foreign institutions.

The activity of this school is oriented by ethical values, excellence in teaching and research, promoting the enhancement and transfer of knowledge, openness and participation in society and promoting the culture of merit and social responsibility.

Figure 1: IPCA – Management school logo
Source: https://en.ipca.pt/schools/

3.2 Technology School

The Technology School (EST) started its activity in October 2004 and provides currently an educational offer focused on Engineering, offering bachelor's degree courses, master's and Professional Higher Education Courses, in the areas of information technology, digital games, computer graphics, electronics, automation, robotics, networks, machining and automotive mechanics. Over the last few years, the Technology School has been focusing on digital entertainment as one of the major opportunities for economic and academic potential, both in Europe and in the world. Because of this project, the school created in 2010 the first degree of the country in Engineering in Development of Digital Games, as well as the first Portuguese Research Center dedicated entirely to digital games, the Digital Games Lab.

The Technology School is in IPCA Campus in Barcelos, with a total area of over two thousand square meters, equipped to the highest level, promoting an education applied to practice and encouraging students to develop and get involved in innovative research and development projects, using the School's laboratories and available equipment. As a result of this work, students have been awarded in several national and international competitions. Alongside the teaching activity, the Technology School has organized school promotion events, including the iDroneCup, which has changed into Idrone Experience in 2016, JobShop and Open EST, among others.

Figure 2: IPCA – Technology School logo
Source: https://en.ipca.pt/schools/

3.3 Design School

Oriented towards higher education in design and applied research in this area, the Design School (ESD) begins its scientific and pedagogical activity in the academic year of 2015/2016, offering courses of 1st and 2nd cycle as well as Professional Higher Education Courses.

With a young teaching staff as well as classrooms, ateliers and laboratories with the latest technology, the school gathers all the conditions for the development of transverse and specific activities, allowing students to experiment, test and produce under teachers' orientation. Its scientific and training project has become a reference in the design area in Portugal.

Figure 3: IPCA – Design School logo
Source: https://en.ipca.pt/schools/

3.4 Hospitality and Tourism School

Oriented to higher education and applied research in the areas of hotel, tourism and food innovation, the Hospitality and Tourism School (ESHT) is attentive to the evolution of training needs in an expanding sector, offering 1st and 2nd cycle courses in Tourism Management and Professional Technical Courses in Events Organization and Management, Tourism, Nature and Adventure, Hotel Management, Cooking and Food Innovation.

ESHT is distinguished by its model of learning in real context, based on the teaching model of some of the best international hotel and tourism schools. This distinctive element will be brought by the Hotel-School which will provide students with an acquisition of transversal skills by experiencing the reality of hotel and tourism in various areas of intervention.

The Hotel-School is a unit of ESHT and will be in operation soon. Assuming itself as a charming hotel with a privileged location in the city center of Guimarães, the Hotel-School will function as an applied laboratory of the ESHT: the aim is to prepare students for application or laboratory classes. This unit will be an important connecting element from the ESHT to the local community.

Figure 4: IPCA – Hospitality and Tourism School logo
Source: https://en.ipca.pt/schools/

4 Methodology

The main purpose of this work is to present and describe some active learning strategies implemented by the authors, teachers at the Management School of Polytechnic Institute of Cávado and Ave (IPCA), Portugal.

The authors are from the Management School and work in all the Schools. They participate in various projects and act as the link between managers, engineers, digital game developers, designers and illustrators. The present study only relates to their activities at the Management School, at "Fundamental of Management", "Social and Cultural Institutions Management" and "Entrepreneurship" curricular units, under the scope of "Administration and Accountability", "Banking and Insurance Management", "Entrepreneurship", "Management of Tourist Activities" and "Public Administration and Accountability" (1st Cycle).

The authors, through active teaching / learning methodologies, intend to equip students with behavioral and social entrepreneurship skills, making them the catalytic leaders and transformational agents that effectively add value to organizations, markets, communities and societies, supported on fundamental values such as respect for human dignity and environment.

In this context and through a collaborative work among the teachers, at the beginning of every school year, challenges are well defined and presented to the students. With reflection and discussion in class, these challenges are worked out by teams, organized under the tutelage of teachers. Strategies are defined, and actions are programmed to achieve the proposed objectives. Verbal communication and interpersonal skills are trained, meant not to develop only the ability to communicate among them, but specially to be willing to listen to people without judging them, share ideas and pitch in when co-workers need help.

With this methodology, students are expected to reach the following learning outcomes:

- to approach and understand the strategic management process as an integrating area, emphasizing the importance of aligning change, strategy and performance through the involvement and empowerment of people (employees, partners and civil society);
- to understand the importance of developing sustainable solutions, thereby creating the necessary conditions to rearrange social transformation;
- to identify and apply the entrepreneurship and social innovation life cycle;
- to plan, manage and dynamize social innovation and volunteer projects into the local community.

Students who have successfully attained the above-mentioned learning outcomes should develop their behavioral entrepreneurship skills, improving: (i) negotiation skills; (ii) conflict management; (iii) leadership; (iv) communication; (v) group dynamics.

Also, they should develop social entrepreneurship skills, improving: (i) understanding the meaning of social economy, evolution concept and related dynamics; (ii) developing critical thinking regarding the challenges facing social economy organizations; (iii) understanding and discuss the importance of designing and developing innovative and sustainable solutions to social problems; (iv) knowing tools to support the development of sustainable business models; (v) identify, understand and apply the life cycle of social entrepreneurship; (vi) understanding the importance of developing a partnership strategy (networking development), between Government, Private sector and Civil society; (vii) develop critical thinking capacity for measure and evaluate the impacts of social projects in the community.

5 Results

Based on the active methodologies of teaching / learning defined and worked collaboratively among these teachers, this section intends to present some projects developed in IPCA and specially related to Solidarity Campaigns and Volunteer Projects.

A) Solidarity campaigns

A1) GAT Solidário

Figure 5: GAT Solidário project logo
Source: Project FB page (https://www.facebook.com/gatsolidario/)

GAT Solidário project started in 2011 and has remains active until today. It is specially dynamized by students from the 3rd year of GAT (Management on Touristic Activities), but it is important to note that these solidarity campaigns, despite being organized by specific student's groups, under their curricular unit of "Social and Cultural Institutions Management", are later widely disseminated and worked by the students of other degrees, within the scope of the curricular unit of "Fundamentals of Management". Every year, students identify a cause, develop ideas of projects and organize all the required logistic to implement them. Besides this, all students dedicate between 6 to 8 classroom hours to volunteer in non-profit organizations chosen by them and with which they identified themselves.

Teachers work with their student's areas of entrepreneurship, social innovation and volunteering, always having in mind that network is crucial, as well as collaborative spirit. We all are responsible for the place where we were born and where we live. "We must be the change that we want to see in the world" (Ghandi).

A 1.1) 2011/2012: "Vamos Ajudar" Mission – Kenya

Figure 6: Vamos ajudar! campaign poster
Source: Campaign participants' archive

GAT Solidário project started with a final work on Solidarity Tourism developed by Raquel Rodrigues, a student from GAT. Raquel identified ADDHU – Association for the Defence of Human Rights – an International NGO whose objective is to conceive, implement and support projects of information, education and development made to promote the liberties and the protection of the citizen's rights, in the full respect of the Universal Declaration of Human Rights.

At that time, ADDHU supported a primary school in Nodgo, in a very poor tin neighborhood from Nairobi, Kenya. Students from the 3rd year of GAT, motivated by the cause, joined their efforts and decided to program and organize a campaign for collecting school materials for that school.

The material was collected in 2011 and delivered to ADDHU. In 2012, a group of 3 students and 1 teacher carried out a volunteer mission and went for 12 days to Nodgo in Nairobi, Kenya, to that primary school.

Figure 7: School in Nodogo, Kenya
Source: Campaign participants' archive

A 1.2) 2012: "Food Collection" (GASC support - Christian Social Action Group)

In 2012, the students decided to support the Christian Social Action Group (GASC), a non-profit association based in Barcelos, which develops, among other services, actions to collect food for the homeless and needy families. The students were able to join several social institutions for this cause as well as the main radio and newspaper from Barcelos. Also, sports clubs (Club of Soccer - Gil Vicente, Hockey of Barcelos and Basketball of Barcelos) actively participated in it. Altogether, they carried out during a week a campaign for collecting food in favor of GASC.

Figure 8: Recolha de alimentos campaign poster
Source: Campaign participants' archive

A 1.3) 2013: "GalaGala" Mission: collection of school materials for the village of Fonte Boa, Tete province, Mozambique

In 2013, the students decided to support with great enthusiasm and commitment the village school of Fonte Boa, Mozambique. The challenge was made by Dr. Helena Sarmento, a physician of Hospital de Guimarães who had been on a volunteering mission in that location.

Figure 9: "GalaGala" Mission – campaign poster and team members
Source: Campaign participants' archive

The students organized the entire campaign. Also, they organized dissemination sessions for other classes and students, with the presence of Dr. Helena Sarmento who, in person, shared her experience and spoke about the importance of being global active citizen and build a better world.

Figure 10: "GalaGala" Mission – dissemination session
Source: Campaign participants' archive

The school material was collected among the entire IPCA's academic community as well as among several local institutions which joined the cause. The collected material was stored in a container and in December 2016, Dr. Helena Sarmento delivered the same material directly in Mozambique. Later, she returned to IPCA to share her experience with students.

Figure 11: Impressions from Mozambique
Source: Campaign participants' archive

A 1.4) 2016: "GalaGala" Mission: collection of school material for the village of Lifdizi in the province of Tete, Mozambique

Following the previous campaign of 2013, Dr. Helena Sarmento renewed its appeal with teachers and students in 2016. This time not to support Fonte Boa village school, but Lifdizi village school in Mozambique.

Figure 12: "GalaGala" Mission – presentation to students
Source: Campaign participants' archive

Motivated by the challenge, the students once again organized themselves around the GalaGala Mission. For 4 months, from October 2016 to January 2017, students planned the campaign, dealt with the logistics, disseminated the project among IPCA community and collected a lot of school materials.

Figure 13: "GalaGala" Mission – students work on campaign
Source: Campaign participants' archive

In January 2017, the material went to the collection point of the campaign and from there it was loaded to the container destined to Mozambique.

Figure 14: GalaGala" Mission – material ready for transport
Source: Campaign participants' archive

Figure 15: "GalaGala" Mission – campaign participants
Source: Campaign participants' archive

In March 2017, the teacher carried out the mission aimed for delivering the collected material in Mozambique. She had the opportunity to go abroad and directly deliver the material collected by the students to the various schools. This experience has been shared with the students with the aim of sensitize them to the importance of this kind of actions and make them feel that effort is valuable, that it can make the difference and the collected material reached its destination.

Figure 16: Materials delivered in Lifdizi, Mozambique
Source: Campaign participants' archive

A2) Collaboration protocol between IPCA and Padrinhos D´África

In July 2016, IPCA signed a Protocol of Cooperation with the Non-Governmental Organization (NGO), Padrinhos D'Africa, with the main purpose of disseminating the work done in Mozambique as well as encouraging the sponsorship of orphaned children supported by the NGO.

A2.1) 2017 e 2018: "Solidários vamos ser, para um futuro a Rosita ter!"

Due to the developed experiences in Mozambique and under the scope of the curricular unit of "Social and Cultural Institutions Management", students develop projects of entrepreneurship and social innovation oriented to the cause.

Figure 17: "Solidários vamos ser, para um futuro a Rosita ter!" campaign
Source: Campaign participants' archive

In 2017, through various initiatives, students were able to raise € 255, the amount needed to sponsor a child for 1 year (money intended to ensure the studies of the child). Through this action, the IPCA sponsored a girl named Rosita.

Figure 18: Campaign participants
Source: Campaign participants' archive

In 2018, students are developing 3 projects:

- Raising money to renew Rosita's sponsorship for another year;
- Redesign the association's web site; and
- Collect pieces with artisans and produce screens (developed by the students of the Master of Illustration and Animation) to be offered and

auctioned at the Annual Meeting of Sponsors of the NGO. The meeting took place on April 29, 2018 and on that day, the IPCA renewed the sponsorship, offered the pieces for the exhibition / auction and presented the new image of the web site.

Phase 1: Presentation of the entity; problem identification; generate ideas; presenting ideas to the class.

Figure 19: Work on the campaign
Source: Campaign participants' archive

Phase 2: Structuring the jointly initiative (3rd year GAT classes, day and post work regimen) under the *motto*: "Solidários vamos ser, para um futuro a Rosita ter" (Solidarity, let's be, for a future, Rosita can have!).

The students decided to raise the money through prize draw. As prizes, students get sponsorship from the Academic Association, which offered tickets for shows at the Academic Week. In addition, students decided also to collect handicraft items to be exhibited and auctioned at the NGO Annual Meeting taking place on 29 April 2018.

Figure 20: Work on the campaign
Source: Campaign participants' archive

Phase 3: Organization and logistics!

At this stage, students created an image, a poster, design and made raffles. During one week, students sold raffles to the entire IPCA community.

Figure 21: Preparing for campaign launch
Source: Campaign participants' archive

Phase 4: Presentation of the results!

With the campaign, the students managed to raise € 305. Rosita's annuity renewal was guaranteed! Regarding the support for the exhibition / auction, which the NGO was organizing, the students were able to gather 5 pieces of handicraft offered by craftsmen of the region, 12 screens offered by the students of the Master of Illustration and Animation of the School of Design.

Figure 22: "Solidários vamos ser, para um futuro a Rosita ter!" campaign poster and artwork

Source: Campaign participants' archive

Phase 5: Delivery of donations to the NGDO at the Annual Meeting of the Sponsors – 29 April – parts for exhibition and auction.

Students contacted artisans in the region, publicizing the cause, inviting them to participate and participate in the exhibition / auction. The students obtained 5 pieces offered by artisans of the region. Twelve students of the Masters of Illustration and Animation also offered 12 screens.

All these pieces were offered to the NGO and were part of the exhibition held on April 29 in Fatima, at the null meeting of the sponsors of the NGO. The funds were fully reimbursed to the NGO.

Figure 23: Artisan work exhibition and auction
Source: Campaign participants' archive

A2) "Operação Nariz Vermelho" Mission

"Operação Nariz Vermelho" is a Private Institution of Social Solidarity, without any political or religious ties, officially constituted on June 4, 2002. The main purpose is to ensure a continuous intervention program within the paediatric services of Portuguese hospitals through the visit of professional clowns. These artists have specialized training on hospital environment and work in a close relationship with the health professionals, performing actions adapted to each child and to each situation.

It is the responsibility of the association to form and guarantee the high quality of artists whose work is remunerated. Operation Red Nose offers hospitals visits, raising the necessary funds through donations, private and business, campaigns and merchandising.

Figure 24: "Operação Nariz Vermelho" – IPCA students
Source: Authors' archive

Until now, the association has already guaranteed weekly hospital visits, for 42 weeks a year, to the 15 hospitals covered by the program. The team of artists consists of 26 Doctor Clowns and behind the scenes work 14 professionals.

The association has visited more than 45,000 children per year. But the number that counts most is the number 1: 1 look at a time, 1 heart at a time, 1 smile at a time.

In the management school of IPCA, since 2015, the students who attend the curricular unit of "Fundamentals of Management", 'gave their noses' with the following objective: to publicize the association's work, to make students aware of the importance of volunteering and being active citizens, to raise funds, through the purchase of noses, for helping the association. From year to year the number of students has increased: in 2015 we raised about 150 noses; 2016 near 250 and in 2017 we reached 500.

Figure 25: "Operação Nariz Vermelho" – IPCA team
Source: Authors' archive

The project is developed as follows: (i) Teachers present the association and launches the challenge; (ii) Students communicate the project to colleagues of other courses and IPCA Schools; (iii) Students buy 1 nose (€ 1); and (iv) on December 19 (IPCA's day) students and teachers who join the campaign walk with the 'nose' on the School Campus.

Figure 26: "Operação Nariz Vermelho" – IPCA students
Source: Authors' archive

This project aims to develop skills such as: *teamwork, communication* and *leadership.*

Figure 27: "Operação Nariz Vermelho" – IPCA teachers taking part in the campaign
Source: Authors' archive

A3) SOLIDARITY CAMPAIGNS: "Natal Solidário"

Under the scope of "Entrepreneurship" curricular unit of the E-commerce Course and "Fundamental of Management" curricular unit of the Management Course, students decided to promote a social project oriented to different public: Seniors and children.

Students from different campuses (Barcelos and Braga), levels (Professional Higher Education Course and 1st Cycle) and backgrounds decide to offer a happier Christmas for:

- sick and hospitalized children of the Paediatric Hospital of Guimarães, and
- elderly people from a private institution (Centro Social Padre David) providing residential accommodations with health care.

Figure 28: "Natal Solidário" campaign poster
Source: Campaign participants' archive

All the action has been planned and developed by the students, with the teacher being only the person responsible for the linkage between all the involved stakeholders (IPCA itself, students and chosen entities), the mentoring, brainstorming sessions and design thinking.

Figure 29: "Juntos por um natal melhor" campaign poster
Source: Authors' archive

Students had the opportunity to apply their talents in the elaboration of logos and posters, image development, capacity to think critically and generate differentiating ideas with significant social added value. They also had the opportunity to contact the entities and companies to be part of the project. In the case of e-commerce students, their digital skills were relevant to help promoting near IPCA Community and friends, all potential 'donors of goods'. In the case of management students, their social responsibility concerns were crucial to get more institutions, from different regions and levels (high schools and secondary schools).

Figure 30: Students working on the campaign
Source: Campaign participants' archive

Figure 31: Students working on the campaign
Source: Campaign participants' archive

The campaign took place between December 4 and January 10. All students were committed and actively involved in the preparation of materials and containers where donations could be deposited (Braga and Barcelos) before going delivered to the institutions.

Figure 32: Students work on gifts collection
Source: Campaign participants' archive

Figure 33: Campaign participants and gifts collection
Source: Campaign participants' archive

Students went to visit the Hospital on December 19 and had opportunity to talk and share experiences with children and Health Professionals.

Figure 34: IPCA students' bring gifts to the hospital
Source: Campaign participants' archive

On January 10, students went to visit the Centro Social Padre David, social center for elderly people, sing traditional New Year Songs and heard beautiful singings and stories from more experienced human being.

Figure 35: Centro Social Padre David residents
Source: Campaign participants' archive

This project aimed to develop technical and soft skills such as: teamwork, communication, negotiation, citizenship, creativity and leadership. All the students loved the experience and promised to do their best to promote similar initiatives among their living community.

Figure 36: IPCA students' visit to Centro Social Padre David
Source: Participants' archive

B) Volunteering

Within the scope of the "Social and Cultural Institutions Management" curricular unit, the 3rd year of Tourism Activities Management, a minimum of 6 hours of volunteering in a non-profit institution is developed.

"Eu sou de GAT e sou Voluntário! E tu?! Junta-te a nós!" (I'm from GAT and I'm a Volunteer! And you?! Join us!) is the motto of this teaching / learning initiative.

Figure 37: "Eu sou de GAT e sou Voluntário! E tu?! Junta-te a nós!" initiative promotion
Source: Participants' archive

The implementation of a volunteer project is a part of the curricular unit evaluation. The students, individually or in groups, identify a non-profit institution, study it (statutes, valences, projects) and contact it. Students present themselves, highlighting the objectives of the volunteerism they wish to develop in the institution. There are institutions that ask students to support them in activities that have already been defined; other institutions ask students to suggest and develop different activities.

At the end, students report the project's results and its impact on learning (both as students and as individuals). To finalize this teaching / learning component, an exposition is carried out with the posters of the volunteer projects.

Over the last 6 years these projects represent: (i) 210 volunteer students; (ii) 1260 hours of volunteering; (iii) first volunteer experience for 90% of the enrolled students (a total of 210); (iv) very positive impact on personal student's life for 100% of the enrolled students; and (v) a continuous participation in other volunteering initiatives for 20% of the students.

Figure 38: Students' volunteering work
Source: Participants' archive

6 Conclusions

This article 'Active learning successful case studies' intends to present some of the projects that are being developed among the authors and the students within the scope of studying the contents of the curricular units where management, entrepreneurship, volunteering and social innovation are presented.

In the classroom context and starting from a theoretical study of the subjects under reflection, teachers use expository methodologies and stimulate students' research through identified community problems and needs that must be solved. Students are challenged to find solutions and work closer near their context. By

knowing the reality, students are more able and apt to identify other problems that can be solved by IPCA's community.

All the identified challenges are worked and planed in the classroom context (both in groups and in class). After these steps, all projects and actions are communicated and disseminated into IPCA's community. After the completion of the projects, students are encouraged to do a self-assessment to evaluate and remark the acquired skills both from an academic and technical point of view as well as from an active citizen's perspective.

Through these active teaching and learning methodologies, in addition to improving theoretical knowledge about the units' curricular content, it is expected to develop and improve student's behavioral entrepreneurship skills as well as social entrepreneurship skills. Additionally, it is important to notice that they also diminish the gap between IPCA's community and community itself: the community comes closer to IPCA and IPCA gets closer to the community.

Work with students on the message that we all are responsible for the place where we live can make a difference. If all dedicate some of their time to their closer community, the wellbeing of the community can be improved: more development, more proactiveness and more dreams for a better world. And these are the biggest challenges that the authors hope to see materialized with these active learning methodologies.

References

Bonwell, C., & Eisen, J. (1991). *Active Learning: Creating Excitement in the Classroom. School of Education and Human Development.* Washington DC: George Washington University.

Bruckner, M., LaFleur, M., & Pitterle, I. (2017). *The impact of the technological revolution on labour markets and income distribution.* United Nations Department of Economic and Social Affairs (DESA/DPAD), Affairs, Department of Economic & Social. Frontier Issues.

Brynjolfsson, E., & McAfee, A. (2014). *The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies.* New York, NY: W.W. Norton & Company, Inc.

Dunlosky, J., Rawson, K., Marsh, E., Nathan, M., & Willingham, D. (2013). Improving students' learning with effective learning techniques: Promising directions from cognitive and educational psychology. *Psychological Science on the Public Interest, 14*(1), 4–58.

Eison, J. (2010). Using active learning instructional strategies to create excitement and enhance learning. *Journal Pendidikantentang Strategi Pembelajaran Aktif (Active Learning) Books*, *2*(1), 1–10.

Innovation Institute for Teaching and Learning. (2 March 2018). *Active Learning*. Retrieved from http://www.uq.edu.au

Moavenzadeh, J. (2015). *The 4th Industrial Revolution: Reshaping the Future of Production*. Amsterdam: DHL Global Engineering & Manufacturing Summit.

Pelley, J. (2014). Making active learning effective. *Medical Science Educator, 24*(1), 13–18.

Pradhan, P., Costa, L., Rybski, D., Lucht, W., & Kropp, J. (2017). A systematic study of sustainable development goal (SDG) interactions. *Earth's Future, 5*(11), 1169–1179. doi:10.1002/2017EF000632

Prince, M. (2004). Does active learning work? *A Review of the Research. Journal of engineering education, 93*(3), 223–231.

Schwab, K. (2016). *The Fourth Industrial Revolution.* Switzerland: World Economic Forum.

Tomozii, S., & Topalăa, I. (2014). Why do we need to change the educational paradigms? *Procedia - Social and Behavioral Sciences, 142*, 586–591. doi: https://doi.org/10.1016/j.sbspro.2014.07.670

UNESCO. (2017). *Education for Sustainable Development Goals. Learning Objectives*. Paris, France: United Nations Educational, Scientific and Cultural Organization.

PROCEEDINGS OF THE 2ND INTERNATIONAL SCIENTIFIC CONFERENCE
»TEACHING METHODS FOR ECONOMICS AND BUSINESS SCIENCES«
7 MAY 2018, MARIBOR, SLOVENIA
N. Gajšt & A. Plos (eds.)

University of Maribor Press

Power-up with PowerApps

SØREN HANSEN

Abstract How can students' motivation be increased? As teacher in business economy, I regularly face students who are struggling with the calculations and in some cases; it seems to pull down their motivation. My approach is involving the students in making calculation tools in Excel and since recently PowerApps. PowerApps is a platform available in Office 365, which is used as standard in the Danish education system. The nice part here is that the platform is already available at your hand. Using apps opens up for a digital dimension of your teaching that fuels the students' creativity. For example, now, the students are keen to show each other what they have developed, as it simply looks much more exciting when running as an app on their mobile phones. The aim of my paper is to share my experiences of using PowerApps as part of my teaching.

Keywords: • Apps • digital pedagogy • motivation • teaching methods • wow effect •

CORRESPONDENCE ADDRESS: Soren Hansen, MSc in Economics and Business Administration - International Marketing, Assistant Lecturer, Business Academy SouthWest, Sønderborg, Denmark, email: shan@easv.dk.

DOI https://doi.org/10.18690/978-961-286-285-5.7 ISBN 978-961-286-285-5
Dostopno na: http://press.um.si

1 Introduction

The typical higher education classroom is a lecture-focused activity (Robertson, 2018). When I started as associate lecturer in 2015, I was doing exactly the same; giving lectures. Although the lectures were well prepared, it was from time to time a challenge to keep the students' full attention.

Figure 1: Power Apps logo

Business Academy SouthWest (where I work) encourages their teachers to work with various pedagogical tools. At the same time, the academy aims to increase digitalisation in the education.

I am teaching business economy and digital marketing. Earlier, I have worked with media planning, digital projects and market intelligence. In the latter function, SharePoint was a key tool to systemise market information. For some time, I have wondered if these experienced could be combined into a new way of teaching – a new technique along with relevant pedagogical methods.

Robertson (2018) finds there is a gap between increased student engagement because of a lack of implementation of digital pedagogy. That indicates there is a theoretical potential for improving the students' motivation via use of digital techniques in the classroom. Of cause, there are a number of other – more traditional - ways to fuel the motivation. In my opinion the teacher should vary his/hers teaching methods as no matter how exiting a method may be – if it is the same dish served every day the appetite will decrease over time. In other words, the tool I present here should be seen as part of a varied palette of techniques and methods in the education.

Participating in OEB, Berlin 2016 was a big source of inspiration for me. I heard Eric Sheninger who gave the speech "Schools that Work for Kids". Sheninger talked about bringing back the awe to the students. He advocated for assignments that allow students to be creative and innovative while supporting BYOD[1]. That gave me the idea of the *wow effect*. It is simply about including a factor in the learning process that the students find exiting and that comes somehow unexpected.

Figure 2: OEB, Berlin 2016

Another speaker at OEB 2016 was Jane Bozarth who leaded the workshop "Social Media for Learning Clinic". It was an eye opener in terms of using a variety of platforms in the classroom. Bozarth's experiences with using social media for student collaboration have also inspired me a lot.

Coming back to my earlier classes in business economy, I faced the challenge of students that where struggling with the often complicated calculations. There was not much variation in the lessons, as doing calculations in Excel is a big part of the learning process. Many of the students were not especially strong in mathematic – which did not make the situation better. I needed to do something and I wondered if we could do the same calculations in a more exiting way.

[1] Bring your own device.

2 PowerApps

I decided to do an experiment with my business economy class where I combined tools and methods from business economy, digital marketing and my earlier working experience with digital projects. Adding relevant pedagogical processes should help keeping the learning process on track.

Figure 3: Office 365 apps

The core tool in my experiment was PowerApps[2], which is a part of the Microsoft Office 365 platform. This app comes with a number of benefits: It is already available for our students as they have access to Office 365 and with the proper guidance, it is easy to get started, as the learning curve is relative flat. Furthermore, the formulas used in PowerApps are similar to Excel formulas so the students feel more familiar from the start.

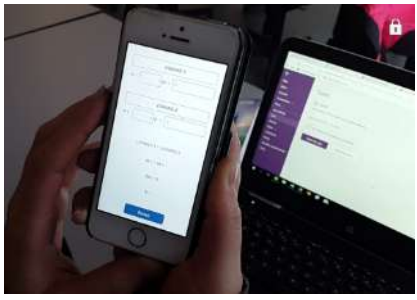


Figure 4: Mobile view vs. PC view

[2] For documentation on PowerApps see: https://powerapps.microsoft.com/

PowerApps are created and edited via a browser (i.e. via the students' own computers) and they can run on both computers and mobile phones. Students seem to give their mobile phones much attention so why not benefit from that? To run on mobile phones the students need to download PowerApps from App Store or Google Play. It is possible to share apps with fellow students. PowerApps is a business app for internal use in an organization. No programming skills needed to get started.

3 Methodology

The learning pyramid[3] places practice doing as one of the most effective methods for learning and retaining information. Therefore, learning by doing could potentially be an important element in the teaching process and I decided to make use of that method. Hands-on experience was obtained via app building where the students worked with integration of the behind lying formulas in the app.

The wow effect should be obtained by the output of the process; each student would make an app that works on his or her mobile phone. The wow effect should then fuel student involvement during the learning process. My idea is, the more different ways the students work with the formulas, the better understanding they will get. If I work too much in Excel, the involvement tends to decrease, where PowerApps offers a different way to work with the same formulas. Once, the students have been highly involved in making an app that can do a certain calculation, I expected them automatically to obtain better understanding, deeper learning and stronger retention of the formulas.

However, making an app might scare a few students as they may have the impression that it is something complicated. Therefore, I decided to apply the flow theory (Csikszentmihalyi, 2009) to ensure that the students did not become overwhelmed with too much new information at one time.

- I gave a clear picture of the outcome of the lesson. In this first session, I wanted the students to make an app that could calculate price elasticity based on an equation for the price curve.

[3] developed by the National Training Laboratory.

- I set the time limit to 1½ hour and explained the steps we needed to go through.
- To ensure match between competences and complexity we would go forward step-by-step.
- After each step, I would check with the class if everybody were following. In case of problems, I gave instant support to bring slow students up to speed. I also encouraged the students to assist each other. Maybe most importantly, I told the class you always will do some errors in the beginning and that would be no problem at all – we will fix it together.
- Giving sufficient time for each step there would be time for the students for doing hands-on and obtain a deeper understanding of the technique.

In connection with the flow theory, I also considered the concept of comfort zone (White, 2009). To learn new stuff it is obvious that the students need to step out of the comfort zone. The risk is however, that making an app is too far away from existing competences and that some students could glide into 'the danger zone' where they are not in a condition where they can learn. The step-by-step approach like described above was my way to keep the students in the optimal performance zone.

I already have close relations with the class where I carried out this app session. In general, it means they feel comfortable when asking questions. In daily teaching, that makes everything easier as you get instant feedback from the class if they are not on track. When making apps – where many technical things can go wrong – it is very important that the students tell you if a problem appears.

The teacher must be prepared for emotional resistance from students that think they never will be able to make an app. Here, the step-by-step progression will help the students to calm down. Furthermore, the teacher should also be open about he/she is also no expert, which creates a feeling of the teacher and the students being so to speak in the same boat.

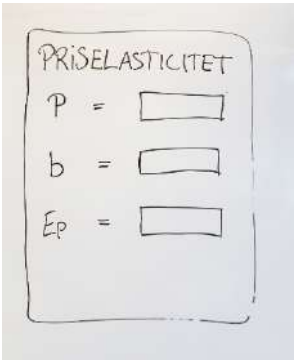


Illustration 6: The teacher

Figure 5: Design draft

At the beginning of the session – before producing the app – the students should be involved in the design. Given the task of making an app that can calculate price elasticity, the students can make a rough design together. I recommend that one student stand at the white board and ask the rest of the class for suggestions for what to draw. This gives an easy start where everybody can contribute. Furthermore, the class agree on a picture of the desired outcome. This part of the session is aimed to be a social learning experience where the students work together to create a solution. I expect them actually to pay more attention when they work with the challenge on their own rather having the teacher dictating how it should look.

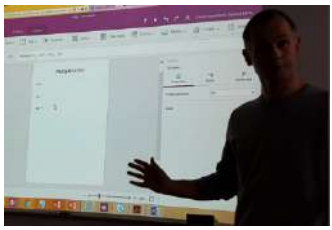


Figure 6: The teacher

As teacher, my style of leadership should be instructive as the students current competences in making apps are none existent. In case of later sessions my style of leadership could change to a more supportive style where I just brief the class of the desired outcome (here assumed the underlying business theory is already known by the students). However, with this current paper my focus is on first time app making.

During the session, I looked for signs that indicate if a student is following progress with rest of the class. I have here in mind the SMTTE model (Andersen, 2017). I looked simply at the body language where it is quite clear if a student is annoyed or exited. If a student is focused on the screen, he/she is probably trying to do the current step in the app development session and the teacher should not disturb as long as the student looks happy/exited/engaged. On the other hand, if another student is looking to the fellow students' screen it may be indication of things are not running totally fine. The teacher should wait a moment and see if the two students can help each other before interacting. If a student sits alone and looks very annoyed/resignedly the teacher can offer assistance.

Figure 7: An engaged student

In overview, here is the schedule of the session:

0) Before the lesson, the students are informed about they are to make an app that can calculate price elasticity. That gives them the chance to catch up on the theory if necessary.
1) At the start of the lesson: Briefing of exactly what the app should be able to calculate and what input the user should give.
2) Design of the app by the students themselves (look and user interface).
3) Short introduction to PowerApps and where to find it on Office 365.
4) Step-by-step building the app - teacher show and students do the same on their computer.
5) Make a computer preview to see if the app works as intended.
6) Save the app (save in cloud), give it a proper name and select an icon.

7) Install PowerApps on your mobile phone (from App Store or Google Play).
8) Try out your own app on your mobile phone.
9) Try to share the app with a fellow student or with the teacher.
10) If there is enough time; fine-tune the look and feel of the app.

I did not plan to do exercises with the app on the same day due to insufficient time.

4 Results

The session was running in a double lecture (1½ hour) in business economy in November 2017 with a class of Marketing Management students. From the very start it was clear that the students payed very high attention. For most students it was the first app ever they had made. For the individual student this very exiting experience clearly boosted their involvement. Nobody wanted to miss this opportunity to create something awesome and the students' attention was very high. After the app was in the air (i.e. published), there was no doubt for me that we had hit the wow effect. Several students were keen to go out and show their app to their friends. The app had street credit.

Figure 8: The final app

I got a lot of positive feedback from the students in connection with this session. But - besides being a funny experience – did this exercise also improve the students' understanding of the theory?

Well, the week after I gave same class an old exam exercise where they potentially could use the app for one of the calculations. Some of the students did not think of using the app and tried to calculate price elasticity in other ways. Therefore, it is also important to train the students in using the apps afterwards so they remember to use it – and so they can see when to use which tool.

With the same class, I later again made some different calculation apps along with more traditional calculation tools made in Excel. I had the feeling that the students got a better understanding of the formulas and due to less struggling with doing calculations they were more capable to understand the behind lying theory. In addition, having a palette of tools available the students can solve the exercises faster than if they start from scratch each time. However, the students need to be familiar with the tools – therefore it is necessary they have made the tools on their own (with a little help).

Business economy is running as an elective course at our academy. It means, only a part of our marketing management students may select the course. With a bit smaller classes, there is better time to do experiments in the classroom – like making calculation tools in PowerApps.

For an objective evaluation of the results, I have below the average exam grade for business economy for the current class (December 2017) compared with the class from the year before. The Danish grade scale goes from -3 to 12 (where 12 is the best).

To pass an exam the student need a grade of minimum 2. In the exam December 2017, the average[4] grade increased to 8.4, which is significant higher than December 2016 where it was only 3.3 in average.

[4] Average from the first exam – reexams not included. Based on grades from 9 students.

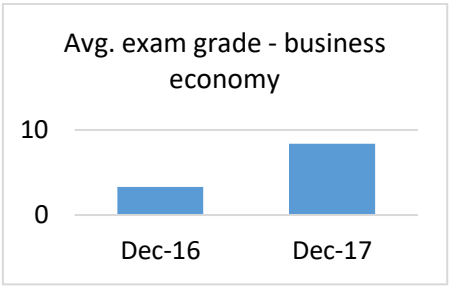


Figure 9: The result - average exam grades December 2017 vs. previous year

I made a similar exercise with another class in May 2018. In this connection, I run a quick poll to see what their immediate opinions were about using PowerApps as part of the teaching.

Table 1: Student survey May 2018

Question	Values
PowerApps is a useful tool for me.	**Likert scale:**
PowerApps contributes in reaching my learning goals.	*Fully disagree* •
PowerApps should continue as part of the teaching.	*Partly disagree* •
	Neutral •
	Partly agree •
	Fully agree •

A total of 9 students participated in this survey. The results obtained after examining the opinions are shown below in figure 2. The majority of the class agreed (blue bars) that PowerApps

– is a useful tool for them
– contributes to reaching the learning objectives, and
– the platform should be used in the classroom in the future.

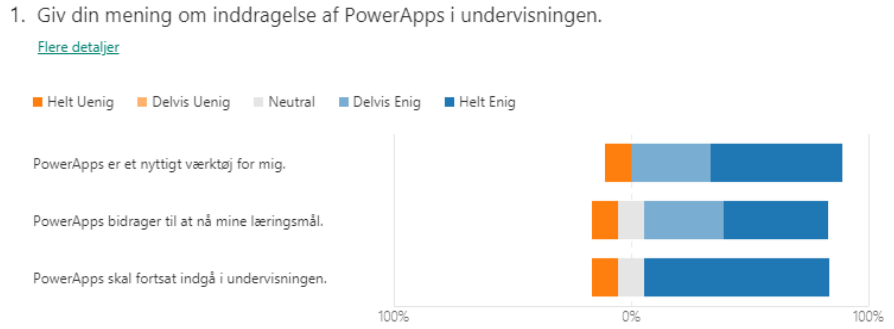


Figure 10: Student survey May 2018

A few where neutral (grey) and this will be a reminder of striving for a varied palette of tools and techniques in the classroom. Also, the teacher should keep in mind that some students may be having challenges working on the PowerApps platform (or for that sake; other new tools).

One student seemed negative - looking at the bars – but the same student gave one of the most positive verbal comments. Therefore, maybe he/she simply by mistake may have hit the opposite end of the scale.

All verbal comments where positive and many asked for more activities of this kind. It means that the students are very positive towards PowerApps.

Figure 11: Comments - Student survey May 2018

5 Conclusion

With the case presented in this paper, I demonstrate that PowerApps has high potential for a wow effect among the students. This increases student involvement and hereby student motivation. Making apps is a way to motivate students to work with formulas and theory in alternative ways and the effect by end of the semester is (in my case) significant higher grades.

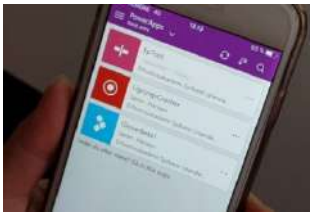


Figure 12: PowerApps on mobile phone

Remember to train using the apps in various assignments. The students must still know when to use which tool and that takes some exercise to get right. Just like any other new tool.

See PowerApps as part of a varied palette of tools/techniques in your classroom. Overuse of the tool will probably make the magical feeling might fade out. Be aware there probably will be students who need extra support.

Examples of calculation tools easy to do with PowerApps are price elasticity (like current case), break-even and equation solver. You will discover that your students are keen to share their apps to show their work to their friends – i.e. there are also positive social aspects with this platform.

In addition, PowerApps is useful also in other courses – not only economy. It is for example possible to connect with SharePoint data lists allowing students to work with data and it is a great tool to make mock-ups of external apps in connection with consumer marketing. Next step for me is applying PowerApps across different courses with the same class allowing me to switch to problem based learning where I just brief the students of the desired outcome and they then are able to produce a solution on their own – with just a limited level of support from the teacher.

What does it take from the teacher? Well you need to invest a little time to try it out on your own before using PowerApps in the classroom. Start with a simple app so you and your class get a success experience and your students will most likely be keen to go on with more advanced apps. Enjoy.

References

Andersen, F. B. (2017). *SMTTE modellen - Tegn er noget vi bestemmer: Evaluering, kvalitet og udvikling i omegnen af SMTTE-tænkningen*. Copenhagen: Hans Reitzels Forlag.

Nakamura J., & Csikszentmihalyi, M. (2009). Flow theory and research. In C. R Snyder & S. J Lopez (Eds.), *Oxford handbook of positive psychology* (pp. 195-215). Oxford: Oxford University Press.

Robertson, S. L. (2018). Interactive digital instruction: Pedagogy of the 21st century classroom. In J. Keengwe & R. Byamukama (Eds.), *Handbook of research on promoting higher-order skills and global competencies in life and work* (pp. 166-180). Hershey, PA: IGI Global.

White, A. (2009). *From comfort zone to performance management*. Baisy-Thy: White & MacLean Publishing.

PROCEEDINGS OF THE 2ND INTERNATIONAL SCIENTIFIC CONFERENCE
»TEACHING METHODS FOR ECONOMICS AND BUSINESS SCIENCES«
7 MAY 2018, MARIBOR, SLOVENIA
N. Gajšt & A. Plos (eds.)

University of Maribor Press

Job Satisfaction of the Teaching Staff in Higher Education Institutions as a Factor Which Affects the Teaching Staff Performance with Students

MAJA IVANOVIĆ-DJUKIĆ & NEMANJA VESELINOVIĆ

Abstract Content teaching staff strives to motivate their students to engage in active learning and this results in an enhanced student performance. Such employees build team dynamics, use modern teaching methods and focus on the process of learning. The subject of the paper is to examine whether job satisfaction affects differences in the teaching staff performance and to identify dimensions of job satisfaction which are the most important to academics. The aim of the paper is to propose measures to the management, whose implementation may contribute to an increase of job satisfaction among employees in the higher education institutions. The initial hypothesis of the paper is that academics, who are more satisfied with their jobs, perform better in their work with students. Statistical methods will be used in order to check this assumption. The analysis will be based on data obtained by primary research at universities in the Republic of Serbia.

Keywords: • job satisfaction • teaching staff • performance • higher education • management •

CORRESPONDENCE ADDRESS: Maja Ivanović-Djukić, PhD, Associate Professor, University of Niš, Faculty of Economics, Niš, Serbia, e-mail: majaidj@gmail.com. Nemanja Veselinović, MSc, University of Niš, Faculty of Economics, Niš, Serbia, e-mail: nemanjaveselinovic@gmail.com.

DOI https://doi.org/10.18690/978-961-286-285-5.8 ISBN 978-961-286-285-5
Dostopno na: http://press.um.si

The digital transformation process in recent years has led to a change in the habits and behavior of the population. People are increasingly using digital media in everyday life and at work. This is especially characteristic for the younger generation. Changing habits and behavior leads to changed expectations of young people in the educational process, which requires new methods of work. The classroom will no longer present a place where students learn, but the place where they can be guided by tutors face-to-face. Education is constantly changing taking into account the digital transformation process. The change will be visible rapidly at a global scale and education will soon be everywhere. Under such circumstances, higher education is ready for numerous breakthroughs since a democratization of the access to knowledge is omnipresent via the Internet.

A great discrepancy between the amount of information produced and the ability to sort, prioritize, and understand represents one of the characteristics of current digital transformation process. It can be described in terms of information overload. Not only educational process but also teachers and students must adapt to such changes and show the ability to multi-task, prioritize and use relevant information. The essence of teaching has been changed as teachers get different roles nowadays. There is a probability that the transformation of the teaching profession can be a strong differentiation between a small number of teachers producing lectures and a large number of teachers not transmitting knowledge, but directing students and acting as tutors. The digital age has changed the educational system which has forced students to engage more in searching, sorting, evaluating and implementing knowledge. The focus is changed from the transmission of knowledge to the learning process.

As transition from the industrial age to a digital age is in progress, new tools, which facilitate studying, are becoming available. Some of them are connected screens and mobile display screens, interactive whiteboards, audio and video content and presentations, etc. Also, mobile devices enable students to have interaction with their teachers. If we consider virtual or remote dimension, we can find several tools which represent modern digital transformation process, such as video conferencing, virtual classrooms, instant messaging, social networking, e-portfolio, tools for digital creation, etc. Applying new methods of work gives better results in working with students, but requires a large number of educations, acquiring certain skills and knowledge by teaching staff and a high level of commitment. The commitment of teachers and the results achieved in

working with students can be influenced by a large number of factors. One of the most important factors is job satisfaction.

Job satisfaction can be defined as a job attitude that arises as a result of a cognitive, affective and evaluative reaction of the individual to a large number of different job dimensions (Judge, Thorensen, Bono, & Patton, 2001). There are a number of approaches and models in the literature that outline the different dimensions of job people react to and affect the level of their satisfaction/dissatisfaction. In this paper, job satisfaction will be analyzed through a nine-dimensional model developed by Spector (1985), which is very often quoted in the literature. The subject of the paper is to examine whether job satisfaction affects differences in the teaching staff performance and to identify dimensions of job satisfaction which are the most important to academics. The aim of the paper is to propose measures to the management, whose implementation may contribute to an increase of job satisfaction among employees in the higher education institutions and to an improvement of their perfromance.

The paper is based on primary research conducted in 2016, by interviewing employees at the Universities in Serbia. After an introductory consideration, this paper contains a review of the literature related to job satisfaction, followed by an explanation of the methodology. In the end, the results and the conclusion of this research will be presented.

2 Literature review

For institutions in the field of education, ensuring continuing excellence in service delivery is becoming a key success factor in an increasingly competitive knowledge market. Educational institutions are expected to show excellence in the provision of services and some authors view this as some kind of imperatives (Sallis, 2002):

- the moral imperative – educational institutions have a moral obligation to provide the users of their services (students, the community) with the highest quality education;
- the professional imperative – commitment to the needs of students, whereby they should be met with the best pedagogical practices. In order

to succeed in this, educational institutions have a professional obligation to exert continuous pressure on their teaching and technical staff to attain the highest possible standards in the provision of services to students;

- the imperative of competitiveness – this imperative arises from the fact that competition becomes a reality in the field of education. Educational institutions can successfully choose their place in this increasingly competitive market only by improving the quality of services provided and the way in which their curricula are realized. In other words, the basic way to distinguish these educational institutions from the competition is to better and more responsibly respond to the needs of the users of their services;
- the imperative of responsibility – educational institutions are an integral part of the community and, as such, have to respond adequately to their educational needs. Moreover, the greater their independence is, the greater is their responsibility.

If higher education institutions are not successful in achieving most of these imperatives, they may endanger their goodness and, finally, their survival (Sallis, 2002). Since these institutions are intensely knowledgeable, human resources play a very important role there (Machado-Taylor, 2011). For these reasons, one of the greatest challenges in managing higher education institutions is human resources management. Human resource management can be the most important skill to be developed in higher education institutions if they want to develop a sustainable competitive advantage (Ahsan, Abdullah, Fie, & Alam, 2009; Bentley, Coates, Dobson, & Meek, 2012; Machado-Taylor, Meira Soares, Ferreira, & Gouveia, 2011; Stevens, 2005; Ward & Sloane, 2000). Academic staff with appropriate support can build national and international reputation for themselves in the field of scientific research, the reputation which at the same time contributes to improving the reputation of the institution in which academic staff operates. Also, skills derived from such work may have an impact on the quality of the higher education institution.

In order to stimulate enthusiasm and engagement of employees in higher education institutions, an extremely important role can be a job satisfaction (Küskü, 2001; Lacy & Sheehan, 1997; Machado-Taylor, White, & Gouveia, 2013). Job satisfaction is the way in which employees experience work and

working conditions. In fact, it is a set of employees' attitudes about individual business segments and working conditions. There are very different explanations of the segments of the job in the literature that significantly have influence on the satisfaction of the employees. Starting with Hoppock (1937), he was the first to introduce the concept of job satisfaction. A lot of different approaches, models and explanations of job satisfaction have emerged that can generally be classified into two groups. On the one hand, there are authors who explain job satisfaction as a general attitude of the individual on the job, i.e. as a unique work-related feeling, which is a result of experience (Wright, 2006). On the other hand, other authors explain job satisfaction as a multidimensional concept, i.e. they think that job satisfaction is conditioned by a large number of different factors, such as: salary, working conditions, relationships with colleagues and superiors, and so on (Giri & Kumar, 2010; Oshagbemi, 1999; Spector, 1997).

Job satisfaction represents a person's evaluation of his/her job and work context (Weiss & Cropanzano, 1996). More precisely, job satisfaction represents individual's "pleasurable or positive emotional state resulting from the appraisal of one`s job or job experiences" (Locke, 1976). Job satisfaction can also be defined as a result of a cognitive, affective and evaluative reaction of an individual to various job dimensions (Judge, et al. 2001). Crucial for understanding the nature of job satisfaction is the opinion that job satisfaction represents the level of divergence between what a worker expects to receive and what he/she actually experiences in the workplace (McShane, 2004). In that line, Fako, Moeng, and Forcheh (2009) state that if one expects little from the job and gets little, he/she will be satisfied as much as the one who expects a lot and gets a lot. On the other hand, if one expects a lot from the job and gets little, he/she will be dissatisfied with it (Fako et al., 2009).

Job satisfaction can have a major impact on employee performance (Gu & Chi, 2009; D'Amato & Zijlstra, 2008; Karatepea, Uludagb, Menevisc, Hadzimehmedagicc, & Baddarc, 2006). This is confirmed by many studies which have indicated that job satisfaction influences turnover intentions (Azeez, Jayeoba, & Adeoye, 2016; Larkin, 2015; Saeed, Waseem, Sikander, & Rizwan, 2014), organizational citizenship behavior (Foote & Li-Ping Tang, 2008; Swaminathan & Jawahar, 2013; Vatsa, 2013), organizational commitment (Azeem, 2010; Azeez et al*.,* 2016), job performances (Bin, 2016; Chamundeswari, 2013; Gu & Chi, 2009). These studies mainly relate to the corporate sector

(Volkwein & Parmley, 2000). The sector of education is specific. Academics are a unique group worth studying. Their primary tasks are defined as teaching, research and community service, although they also have administrative and management tasks. Academics have to keep abreast of new development in other fields that influence the way they work, such as computer and computer-related development. Added to this is the issue of control over their teaching, research and community service functions. Thus, research findings on the job satisfaction of employed in other professions may not be useful for understanding causes and consequences of job satisfaction of employees in the field of education (Sadeghzadeh, Nassiriyar, Haghshenas, & Shahbazi, 2015).

More recently, there has been more research related to job satisfaction in higher education (Volkvein & Parmlei, 2000). Many of these studies are based on the motivational models of Herzberg's (1965) theory that distinguishes internal and external factors (Judge, Thorensen, Bono, & Patton, 2001), or examines the differences in the level of job satisfaction of academics of various positions (full professors, associate professors, docents and assistants) in achieving results. All these studies implicitly or explicitly prove that there is a significant statistical relation among job satisfaction, achieved results and job satisfaction of academics in higher education institutions (Küskü, 2003; Oshagbemi, 1997; Tack & Patitu, 1992). The achieved results indicate that academics want work assignments that match their personal interests and allow them significant autonomy in the choice of tasks and in decision-making; they want to have the feeling of success, backed up by feedback from the supervisor; they want clarity about what is expected of them and the harmony among the different people they work with; they want appropriate salaries and rewards at a level that meets their costs, as well as adequate promotions (Kelly, 1989). Studies conducted in Serbia show that job satisfaction of employees in the field of education affects their achieved results with service users (Simić, Mladenović, & Stojković, 2015; Ugrinović, Dobrijević, & Đorđević–Boljanović, 2015), but these studies mostly referred to lower levels of education, such as primary and secondary schools. There is not empirical research in the field of higher education in Serbia. Commencing from the results of previous research, our first hypothesis is:

H1: Employees at the Universities in Serbia who are more satisfied with their job achieve better results in working with students.

As people are different, various job dimensions affect their job satisfaction. Research conducted in the field of higher education shows that the causes of dissatisfaction of employees in higher education are mainly related to lack of time for research, pressure to publish as many works as possible, lack of time for personal development and specialization in a particular field, problems in obtaining research scholarship, lack of funds for research, difficulties in attracting PhD students, etc. (Oshagbemi, 1997). Contrary to Herzberg's (1965) theory, there are cases where one same element can be the cause of job satisfaction and job dissatisfaction. Other aspects of academics' jobs that caused dissatisfaction were: poor communication with university authorities, failure to provide agreed job description, authoritarian management structure, lack of consultation and top down communication, government policy towards universities, working hours, lack of coordination in management, not getting promoted unless one applies for it, lack of proper departmental strategy on teaching and research, poor retirement benefits, excessive bureaucracy, lack of leadership from the center of the university, inconsistency in planning, location of university, changes in university funding mechanisms, not being able to retire with full benefits at 60, lack of time to think, difficulty with managing the separate responsibilities of administration, teaching and research, and indifferent and inefficient management (Oshagbemi, 1997). The factors that most often stand out as the cause of dissatisfaction are salary (Kelly, 1989; Küskü, 2003; Oshagbemi, 1997), university administration policy, availability of resources, working conditions (Kelly, 1989) and system of improvement (Lacy & Sheehan, 1997; Oshagbemi, 1996).

On the other hand, there are many factors that positively affect job satisfaction. Some of the factors that positively affect job satisfaction are: academics consider their work challenging; it brings them a number of challenges whose fulfilment leads to personal satisfaction (Venter, 1998). Factors influencing the job satisfaction of academics in higher education are academic freedom, participation in the decision-making process, identification with the organizational mission and strategy, creativity and innovation in the work, reputation and position of the institution that influence reputation of individual employees, conditions of employment, rewards, the possibility for development of careers, employment security, personal and professional development, a good work-life balance, working with young people, recognition of teaching achievements, recognition of research achievements, the availability of research support, and so on (Machado-Taylor, 2014; Schulze, 2016).

A number of research in the field of education, carried out in Serbia, indicate that satisfaction with each job dimension is quite different considering employees in Serbia. Research in secondary schools indicates that the greatest impact on employees' satisfaction has: praise, being respected by the principal and colleagues, additional training and development (Ugrinović et al., 2015). Considering primary schools, research showed that employees were not satisfied with salary, rewards and benefits, but the common sources of their satisfaction are relations with colleagues, nature of work, good formal and informal communication (Simić et al., 2015). In the field of pre-school education, well-established communication has the largest impact on job satisfaction, while promotion is the least satisfactory job dimension (Pećić, Jocić-Jauković, & Stojanović, 2016). Since there is no empirical research in the field of higher education in Serbia, we based next two hypotheses not only on the current state of lower levels of education in Serbia, but also on the current state of research in the field of higher education in other countries. Our hypotheses are:

H2: Good communication, contingent rewards, fringe benefits and promotion have the largest impact on the achieved results of employees working with students in the field of higher education in Serbia.

H3: Salary, relationship with co-workers, relationship with supervisors and operating procedures have the smallest impact on the achieved results of employees working with students in the field of higher education in Serbia.

3 Research methodology

People work in order to achieve certain performance. Examining the performance of employees as a concept can be done in many ways. Most commonly, it implies an employee's ability to achieve his/her goals and organizational standards (Bohlander, Snell, & Sherman, 2001; Eysenck, 1998; Mathis & Jackson, 2000). Campbell (1993) defines performance as a "synonym for behavior which describes his/her actual actions and can be viewed through a large number of different accomplished results". Corporate-type organizations mainly analyze the material performance of employees that affect profit, such as: quantity of manufactured products, realized income, costs, labor productivity, and so on (Aziri, 2011). In non-profit organizations such as higher education institutions, performance is not exclusively related to profit, since the mission of

these institutions is not making profits. The mission of higher education institutions is to educate the population for specific business profiles, so their goals are different in relation to profit organizations. The key task of teaching staff in higher education institutions is to provide services in the field of higher education and scientific research. Possible performance measures are the quality of lectures, the relationship with students, the quality of teaching material (literature) offered by professors to students, the number of conducted research, etc.

In order to examine and measure the job satisfaction, many instruments have been developed so far. The most known are Minnesota Satisfaction Questionnaire (MSQ) (Weiss, Davis, England, & Lofquist, 1967), Job Descriptive Index (JDI) (Roznowski, 1989), Job Diagnostic Survey (JDS) (Hackman & Oldham, 1974), Job in General Scale (JIG) (Ironson, Smith, Brannick, Gibson, & Paul, 1989), Global Job Satisfaction (GJS) (Rice, Gentile, & McFarlin, 1991), Job Satisfaction Survey (JSS) (Spector, 1985), etc. Variety of instruments and aspects of job that can be measured somehow show that there is no 'gold standard' about which job aspects should be taken into account when job satisfaction is measured (Saane, Sluiter, Verbeek, & Frings-Dresen, 2003). A very often used instrument for monitoring job satisfaction in empirical research is Spector's (1997) job satisfaction survey. According to this author, job satisfaction could be seen as a global feeling about the job or as a constellation of attitudes about various aspects of the job, such as: salary, promotion, fringe benefits, contingent reward, supervision, co-workers, operating procedures, the nature of work and communication (Spector, 1997). Therefore, he made a questionnaire which examines satisfaction with every above-mentioned job dimension. Also, the questionnaire is often used and modified for the examination of job satisfaction in the field of higher education.

For example, in his study of employees in the UK, Oshagbemi (1997) uses eight levels to measure the various components of overall job satisfaction of university teachers, such as teaching, research, administration and management, salary, promotion, behavior of the supervisor, behavior of associates and physical (working) conditions. Also, Küskü (2003) measured job satisfaction of academics at the Universities in Turkey using seven determinants: general satisfaction, satisfaction with the possibility of promotion, satisfaction with the relationship with colleagues, satisfaction with teamwork and group-work, satisfaction with

working conditions, satisfaction with working environment and satisfaction with salary. Ssesanga and Garrett (2005) measured job satisfaction of academics in Uganda using nine general job elements that can affect employees' satisfaction: organization of lectures, opportunities for scientific research, time management, reimbursement, career opportunities, independence at work, relationships with associates, operating procedures and characteristics of working environment and nature of work. Sabharwal and Corley (2009) used 9 satisfaction variables for monitoring job satisfaction: salary, opportunity for advancement, benefits, degree of independence, intellectual challenge, location level of responsibility, job security and contribution to society. We used the original Spector's (1985) questionnaire for monitoring job satisfaction.

In order to verify the validity of hypotheses we will use the methods of correlation and regression analysis. A dependent variable in the model is the results of teachers who work with students. We used two measures to calculate the results of teachers: the weighted average grade that a teacher gets from students during the regular estimation of teacher's performance (questionnaire) and the percentage of students who attended the lectures. All faculties in Serbia are obligated to carry out the self-evaluation process. For this reason, each year at the end of the semester students evaluate the work of their professors with grades from 1 to 5 (1 lowest grade, and 5 the highest grade). At some faculties the questionnaires differ, but at all faculties the quality of lectures and the attitude of teachers towards students are evaluated. That is why we considered only these two dimensions and calculated their average grade. Then it is multiplied by the degree of students' interest in teaching of a certain professor. Since there is no compulsory student presence at many faculties, the student attendance rate is calculated (as a ratio of the number of students who filled the questionnaire and the total number of students). An independent variable in the first model is a general job satisfaction, measured by the average rating of the respondents (on the Likert scale from 1 to 5, 1 means completely dissatisfied, and 5 means completely satisfied). In the second model, independent variables are the average values of satisfaction with each job dimension specified by Spector (1985).

3.1 Sample and procedure

In order to verify the validity of these hypotheses, primary research was conducted. We examined the attitudes of employees at universities in Serbia about the impact of individual job dimensions on their job satisfaction. The survey was conducted in the period from June 2016 to September 2016. The questionnaire included two sets of questions. The first group of questions contained general questions about gender, age, education, the length of service and the position of employees at faculties. The other group consisted of questions about the attitude of employees on nine job dimensions that Spector (1985) mentioned. Employees were required to use marks from 1 to 5 of the Likert scale (1 means 'completely disagree' and 5 'completely agree'), and evaluate each job dimension on the basis of questions that were used in the original questionnaire developed by Spector in 1985.

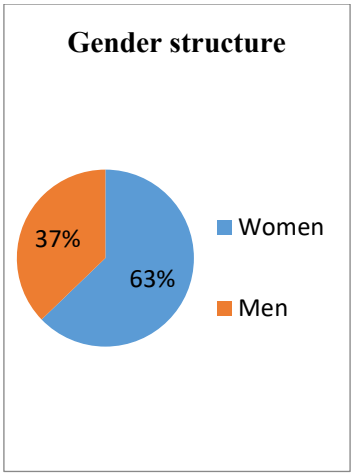


Figure 1: Gender structure
Source: Authors

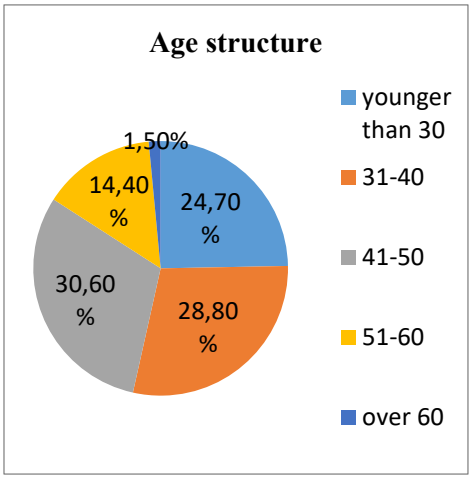


Figure 2: Age structure
Source: Authors

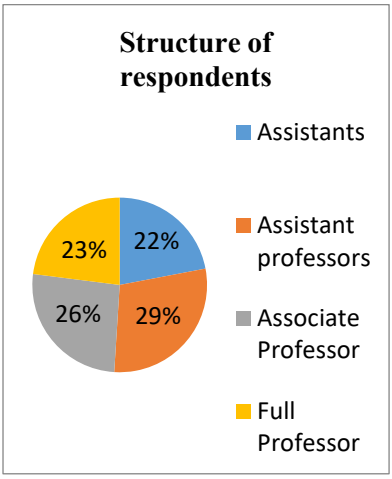


Figure 3: Structure of respondents
Source: Authors

The sample included 200 employees at 5 universities operating in the territory of the Republic of Serbia. Out of the total 200 questionnaires distributed, 24 were rejected due to incomplete responses and the rest of 176 questionnaires were retained. In the structure of the sample, female participants participated with 62.8%, while men consisted of 37.2% of the respondents. Regarding the age structure - 24.7% were respondents younger than 30 years, 28.8% were

respondents between 31 and 40 years, 30.6% were respondents between 41 and 50 years, 14.4% were respondents between 51 and 60 years and 1.5% of respondents were older than 60 years. Looking at the structure of respondents, assistants participated with 22%, docents with 29%, associate professors with 26% and full professors with 23%.

4 Results and discussion

In order to check the consistency of the questions in the questionnaire, firstly the Cronbach Alpha was calculated. The values of Cronbach's Alpha of 0.906 indicate a really good reliability and internal compliance of the scale in the sample. Compliance of individual items with total results is shown in Table 1.

Table 1. Measuring scale compliance.

Questions	Total correlation of questions	Cronbach's Alpha in case of excluding questions
Salary	.809	.886
Promotion	.795	.886
Fringe benefits	.721	.892
Contingent rewards	.641	.899
Supervision	.621	.900
Co-workers	.809	.886
Operating procedures	.440	.905
Nature of work	.558	.901
Communication	.748	.891
Cronbach's Alpha	.906	
Sample size	176	

Source: Authors

According to the data in Table 1, in the column of total correlation of questions, there is a high degree of correlation of each item with total results. Since all values in the column of the Cronbach's Alpha in case of excluding questions are less than the final alpha value (0.906), we find it instructive that all items in the existing scale remain and this scale is comparable to a number of research that are based on this scale. Also, the mean of correlation among items is 0.513, and the correlation of the pairs of the items ranges from 0.384 to 0.767. It indicates the strong correlation among the items.

In order to check validity of the first hypothesis a linear correlation was done. The primary objective of the correlation is to measure the strength of the linear association between two variables (Gujarati, 2004). Based on the value of the correlation coefficient r the strength of the linear association between two variables can be determined. If the value of r is close to +1 there exists strong positive linear correlation, and if the value is close to -1 there exists strong negative linear correlation. Values between 0.2 and 0.5 in both directions indicate moderate correlation, while values below 0.2 indicate low correlation between analysed variables. In this case, the value of the coefficient of correlation is r=0.389. This means that there exists a moderately strong relation between achieved results of academics in working with students in the Republic of Serbia and their job satisfaction. In other words, an increase in job satisfaction of teaching staff in higher education institutions in Serbia contributes to improvement of their work with students. Since this coefficient is statistically significant (sig. = 0.052), our conclusions can be generalized.

In order to check the validity of the second and the third hypothesis the multiple correlation was done. Results are shown in Table 2.

Table 2. Correlations.

	Perfor-mance	Salary	Promo-tion	Fringe benefits	Contin-gent reward	Super-vision	Co-workers	Operat-ing proce-dures	Nature of work	Communi-cation
Perfomance	1	.392*	.701**	.647*	.582	.254**	.550	.335	.754*	.435
Salary		1	.588**	.517**	497**	.582**	.383**	.383**	.645**	.557*
Promotion			1	.719*	.643**	.605**	.363**	.343**	.639**	.398*
Fringe benefits				1	.571**	.686**	.421*	.247**	.747**	.673*
Contingent reward					1	.693**	.860**	.723**	.517**	.532**
Supervision						1	.832**	.439**	.729**	.796**
Co-workers							1	.628**	.693	.795**
Operating procedures								1	.571*	.571*
Nature of work									1	.361
Communi-cation										1

*Correlation is significant at the 0.05 level (2-tailed).

**Correlation is significant at the 0.01 level (2-tailed).

Source: Authors

Table 2 shows that there is a direct correlation between each job related characteristics and teaching staff performance with students in higher education institutions in Serbia. However, only the correlation with promotion is strong and statistically significant at a level of significance of 1% (0.701**). This means that an increase in satisfaction with promotion of teaching staff is accompanied with the growth in teaching staff performance with students in higher education institutions in Serbia. Since this correlation is strong and statistically significant, the conclusion of our research can be generalized.

Table 2 also shows that there is strong and statistically significant correlation, at a 5% significance level, between nature of work and fringe benefits on the one hand, and, teaching staff performance with students on the other. This means that increases in satisfaction with the nature of work and fringe benefits also lead to increases in teaching staff performance with students in higher education institutions in Serbia. The correlation between satisfaction with all other job related characteristic (salary, contingent rewards, relationship with supervisors and co-workers, operating procedures and communication) and teaching staff performance with students is low or insignificant.

In order to examine the impact of each job related characteristic on teaching staff performance with students, a regression analysis was performed. The results are shown in the Table 3.

Table 3: Regression Analyses.

	Unstandardized B	Standardized B	Significance
(Constant)	4.225		.423
Salary	.034	.008	.007
Promotion	.215	.148	.003
Fringe benefits	.209	.109	.006
Contingent rewards	.192	.106	.102
Supervision	.020	.002	.001
Co-workers	.248	.096	.134
Operating procedures	.025	.005	.508
Nature of work	.223	.163	.003
Communication	.082	.048	.518
Job satisfaction	.242	.089	.005
R	.218	.232	
R Square	.121	.129	

Source: Authors

Regression analysis suggests similar conclusions to correlation ones. The greatest and statistically significant impact on teaching staff performance with students in higher education institutions in Serbia have satisfaction with the nature of work, promotion and fringe benefits, but the smallest and statistically significant impact have salary and relationship with supervisors. Examined variables explain 12.1% of the variability of the teaching staff performance with students in higher education institutions in Serbia (R Square – 0.121).

Also, average job satisfaction has a statistically significant impact on teaching staff performance with students in higher education institutions in Serbia (B – 0.242). This means that an increase in job satisfaction for one rating on the Likert scale, influence an increase in the quality of teaching staff activities with students per 0.242 marks. Job satisfaction explains 12.9% of the variability of the teaching staff performance with students in higher education institutions in Serbia (R Square – 0.129).

5 Conclusion

On the basis of the above-mentioned, it can be concluded that employees play a very important role and have a huge impact on the success of higher education institutions. The performance of the institution, in which they operate (quality of teaching, relationship with students, reputation of the institution), depends on their knowledge and skills, dedication to work, behavior and reputation. A very significant element that affects the behavior of the employees and their performance is job satisfaction. Our research has shown that satisfaction has had a great impact on the behavior of employees at universities in Serbia and on the results in working with students. In particular, the great influence on the work of academics and the achieved results had promotion, fringe benefits and the nature of work.

Promotion is a job dimension that had the greatest impact on the achieved results of academics in Serbia. This can be explained by the fact that at universities are mainly working people who were good students, who are by nature ambitious and one of their key drivers is desire for success. For these reasons, the possibility of promotion and building a good career are job segments which lead these people to the greatest satisfaction. Furthermore, it causes their greater dedication and the achievement of good results in working with students. In order to get

promoted and acquire higher titles at universities in Serbia, employees mainly need to fulfil a large number of formal requirements and there are long and complex procedures of selection, which may negatively affect job satisfaction and the performance of employees. A proposal can be made to rectors and it would include the formulation of real formal conditions that are feasible for the employees and the simplification of the complex selection procedure. It is also desirable to provide faster progression to employees who are more successful, because such progression can motivate them to do even more and achieve better results with students.

A significant job segment which affects job satisfaction and achieved results of the employees of higher education institutions in Serbia are fringe benefits. The employees at universities of Serbia have a large number of standard and non-standard benefits. Among the compulsory benefits are: pension and health insurance, paid transport, warm meal, while non-standard benefits are numerous and differ from faculty to faculty. Non-standard benefits mainly include: paid scientific training (master and doctoral studies), professional development, participation in scientific conferences and seminars, etc. A very significant benefit of the employees at universities in Serbia is flexible working time. At most of the faculties in Serbia, employees aren't obligated to spend 40 hours each week at the faculty, so they can finish a large number of obligations at home. This is a very important benefit for women because of numerous obligations at home related to their family and children. Since fringe benefits have a great influence on satisfaction of the employees and achieved results, the supply of fringe benefits, both standard and non-standard, should be as high as possible.

Similar to fringe benefits, at the faculties in Serbia there are many forms of contingent rewards which lead to greater job satisfaction and have positive influence on the achieved results. In contrast to the basic salary, which is not determined on the basis of achieved results and engagement, at most faculties there is a large number of different rewards for a higher level of engagement of employees in teaching and scientific work. These can be various forms of payment for mentoring, guidance and engagement on projects, paid participation in seminars and scientific conferences, paid publishing of scientific and professional publications, etc. Each of these rewards promotes engagement of the employees and at the same time increases their motivation and achieved results. Therefore, it is necessary to provide as many forms of these rewards as

possible, as this can result in multiple benefits for the employees and the institutions in which they work.

References

Ahsan, N., Abdullah, Z., Fie, D. Y. G., & Alam, S. S. (2009). A study of job stress on job satisfaction among university staff in Malaysia: Empirical study. *European Journal of Social Sciences*, *8*(1), 121–131.

Azeem, S. M. (2010). Job satisfaction and organizational commitment among employees in the Sultanate of Oman. *Psychology*, *1*(4), 295–300.

Azeez, R. O., Jayeoba, F., & Adeoye, A. O. (2016). Job satisfaction, turnover intention and organizational commitment. *Journal of Management Research*, *8*(2), 102–114.

Aziri, B. (2011). Job satisfaction: A literature review. *Management research and practice*, *3*(4), 77–86.

Barrett, P. T., Petrides, K. V., Eysenck, S. B. G, & Eysenck, H. J. (1998). The Eysenck Personality Questionnaire: An examination of the factorial similarity of P, E, N, and L across 34 countries. *Personality and Individual Differences*, *25*(5), 805–819.

Bentley, P. J., Coates, H., Dobson, I. R., & Meek, V.L. (2013). Academic job satisfaction from an international comparative perspective: Factors associated with satisfaction across 12 countries In P. J. Bentley, H. Coates, I. R. Dobson, L. Goedegebuure, & V. L. Meek (Eds.), *Job satisfaction around the academic world*, 239–262. Berlin: Springer.

Bin, A. S. (2016). The relationship between job satisfaction, job performance and employee engagement: An explorative study. *Issues in Business Management and Economics*, *4*(1), 1–8.

Bohlander, G., Snell, S. & Sherman, A. (2001). *Managing human resources*. New York: South-Western College.

Campbell, J. P., McCloy, R. A., Oppler, S. H., & Sager, C. E. (1993). A theory of performance. In E. Schmitt, W. C. Borman, & Associates (Eds.), *Personnel selection in organizations,* 35–70. San Francisco: Jossey-Bass.

Chamundeswari, S. (2013). Job satisfaction and performance of school teachers. *International Journal of Academic Research in Business and Social Sciences*, *3*(5), 420–428.

D'Amato, A., & Zijlstra, F. R. H. (2008). Psychological climate and individual factors as antecedents of work outcomes. *European Journal of Work and Organizational Psychology, 17*(1), 33–54. doi:10.1080/13594320701307420

Fako, T. T., Moeng, S. R. T., & Forcheh, N. (2009). Gender differences in satisfaction with the type of work university employees do: Evidence from the University of Botswana. *Journal of Service Science and Management*, *2*(4), 404-417. doi: 10.4236/jssm.2009.24049

Foote, D. A., & Li-Ping Tang, T. (2008). Job satisfaction and organizational citizenship behavior (OCB): Does team commitment make a difference in self-directed teams*?*. *Management Decision*, *46*(6), 933–947.

Giri, V. N., & Kumar, B. P. (2010). Assessing the impact of organizational communication on job satisfaction and job performance. *Psychological Studies*, *55*(2), 137–143.

Gu Z., & Chi, R. S. S. (2009). Drivers of job satisfaction as related to work performance in Macao casino hotels: An investigation based on employee survey. *International Journal of Contemporary Hospitality Management*, *21*(5), 561–578.

Gujarati, D. N. (2004). *Basic Econometrics* (4th ed.). The McGraw-Hill Companies.

Hackman, J. R., & Oldham, G. R. (1980). *Work redesign*. Reading, MA: Addison Wesley.

Herzberg, F. (1965). The new industrial psychology. *Industrial and Labor Relations Review*, *18*(3), 364-376.

Hoppock, R. (1937). Job satisfaction of psychologists. *Journal of Applied Psychology*, *21*(3), 300–303.

Ironson, G. H., Smith, P. C., Brannick, M. T., Gibson, W. M., & Paul, K. B. (1989). Construction of a Job in General scale: A comparison of global, composite, and specific measures. *Journal of Applied Psychology*, *74*(2), 193–200.

Judge, T. A., Thorensen, C. J., Bono, J. E., & Patton, G. K. (2001). The job satisfaction - job performance relationship: A qualitative and quantitative review. *Psychological Bulletin*, *127*(3), 376–407.

Karatepea, O. M., Uludagb, O., Menevisc, I., Hadzimehmedagicc, L., & Baddarc, L. (2006). The effects of selected individual characteristics on frontline employee performance and job satisfaction. *Tourism Management*, *27*(4), 547–560.

Kelly, J. D. (1989). Gender, pay, and job satisfaction of faculty in journalism. *Journalism Quarterly*, *66*(2), 446–452.

Küskü, F. (2001). Dimensions of employee satisfaction: A state university example. *METU Studies in Development*, *28*(2), 399–430.

Küskü, F. (2003). Employee satisfaction in higher education: The case of academic and administrative staff in Turkey. *Career Development International, 8*(7), 347–356.

Lacy, F., & Sheehan, B. (1997). Job satisfaction among academic staff: An international perspective. *Higher Education*, *34*(3), 305–322.

Larkin, I. M. (2015). *Job satisfaction, organizational commitment, and turnover intention of online teachers in the K-12 setting*. Doctor of Education in Instructional Technology Dissertations. Paper 2. Retrieved from http://digitalcommons.kennesaw.edu/instruceddoc_etd/2

Locke, E. A. (1976). The nature and causes of job satisfaction. In M. D. Dunnette (Ed.), *Handbook of Industrial and Organizational Psychology,* 1, 1297–1349. Chicago: Rand McNally College Publishing Company.

Machado-Taylor, M. L., Meira Soares, V., Ferreira, J. B., & Gouveia, O. M. R. (2011). What factors of satisfaction and motivation are affecting the development of the academic career in Portuguese Higher Education Institutions? *Revista de Administração Pública* (RAP), *45*(1), 33–44.

Machado-Taylor, M. L, White, K., & Gouveia, O. (2013). Job satisfaction of academics: Does gender matter? *Higher Education Policy*, *27*(3), 363–384.

Machado-Taylor, M. L. (2011). Complex adaptive systems: A trans-cultural undercurrent obstructing change in higher education. *International Journal of Vocational and Technical Education, 32*(2), 9–19.

Machado-Taylor, M. L. (2014). A cross national study of job satisfaction of academics in Portuguese Higher Education. *Revista Universidade em Debate*, *2*(1), 38–50.

Mathis, R. L., & Jackson, J. H. (2000). *Human resource management* (9th ed.). Cincinnati, Ohio: South Western College Publishing.

McShane, S. (2004). *Canadian Organizational Behaviour* (5th ed.). Toronto: McGraw-Hill Ryerson.

Oshagbemi, T. (1996). Job satisfaction of UK academics. *Educational Management and Administration*, *24*(4), 389–400.

Oshagbemi, T. (1997). Job satisfaction and dissatisfaction in higher education. *Education and Training, 39*(9), 354–359.

Oshagbemi, T. (1997). The influence of rank on the job satisfaction of organizational members. *Journal of Managerial Psychology*, *12*(8), 511–519. doi: 10.1108/02683949710189111

Oshagbemi, T. (1999). Overall job satisfaction: How good are single vs. multiple item measures? *Journal of Managerial Psychology*, *14*(5), 388–403.

Pećić, M., Jocić-Jauković, K., & Stojanović, K. (2016). Uticaj obrazovanja i dužine radnog staža na zadovoljstvo zaposlenih u predškolskim ustanovama, *Ekonomija, teorija i praksa*, *4*(2), 33–49.

Rice, R. W., Gentile, D. A., & McFarlin, D. B. (1991). Facet importance and job satisfaction. *Journal of Applied Psychology*, *76*(1), 31–39. doi: 10.1037/0021-9010.76.1.31

Roznowski, M. (1989). Examination of the measurement properties of the Job Descriptive Index with experimental items. *Journal of Applied Psychology*, *74*(5), 805–814. doi: 10.1037/0021-9010.74.5.805

Saane, N., Sluiter, J. K., Verbeek, H. A. M., & Frings-Dresen, M. H. W. (2003). Reliability and validity of instruments measuring job satisfaction – a systematic review. *Occupational Medicine, 53*(3), 191–200.

Sabharwal, M., & Corley, E. A. (2009). Faculty job satisfaction across gender and discipline. *The Social Science Journal, 46*, 539–556.

Sadeghzadeh, A., Nassiriyar, M., Haghshenas, M., & Shahbazi, R. (2015). Higher education job satisfaction and relevance to workforce. *AASCIT Journal of Education*, *1*(2), 26–30.

Saeed, I., Waseem, M., Sikander, S., & Rizwan, M. (2014). The relationship of turnover intention with job satisfaction, job performance, leader member exchange, emotional intelligence and organizational commitment. *International Journal of Learning and Development*, *4*(2), 242–256. doi: 10.5296/ijld.v4i2.6100

Sallis, E. (2002). *Total quality management in education* (3rd ed.) London: Routledge.

Schulze, S. (2016). Factors influencing the job satisfaction of academics in higher education. *SAJHE*, *20*(2), 318–335.

Simić, I., Mladenović, J., & Stojković, N. (2015). Istraživanje zadovoljstva nastavnika u osnovnim školama u Republici Srbiji. *Ekonomske teme*, *53*(3), 425–443.

Spector, P. E. (1985). Measurement of human service staff satisfaction: Development of the job satisfaction survey. *American Journal of Community Psychology*, *13*(6), 693–713.

Spector, P. E. (1997). *Job satisfaction: application, assessment, causes, and consequences*. United Kingdom: Sage Publications Ltd.

Ssesanga, K., & Garrett, R. M. (2005). Job satisfaction of university academics: Perspectives from Uganda. *Higher Education*, *50*(1), 33–56.

Stevens, P. A. (2005). The job satisfaction of English academics and their intentions to quit academe. Paper presented at the WPEG annual conference, New York, US. Retrieved from http://econwpa.repec.org/eps/lab/papers/0512/0512005.pdf

Swaminathan, S., & Jawahar, D. (2013). Job satisfaction as a predictor of organizational citizenship behavior: An empirical study. *Global Journal of Business Research*, *7*(1), 71–80.

Tack, M. W., & Patitu, C. L. (1992). *Faculty job satisfaction: Women and minorities in peril.* ASHE-ERIC higher education report no. 4. Washington, DC: Association for the study of higher education.

Ugrinović, D., Dobrijević, G., & Đorđević–Boljanović, J. (2015). The impact of job satisfaction on the teachers' motivation in the secondary schools in Serbia.

Socioeconomica – The Scientific Journal for Theory and Practice of Socio-economic Development, 4(7), 197–206. doi: 10.12803/SJSECO.4712515

Vatsa, N. (2013). Relationship of job satisfaction with organization behavior. *International Journal of Education and Applied Research*, *3*(2), 17–21.

Venter, E. J. (1998). *Gehalte van werklewe van dosente aan die Universiteit van die OranjeVrystaat.* Unpublished M.BA. degree. Potchefstroom: Potchefstroom University for CHE.

Volkwein, J. F., & Parmley, K. (2000). Comparing administrative satisfaction in public and private universities. *Research in Higher Education*, *41*(1), 95–116.

Ward, M. E., & Sloane, P. J. (2000). Non-pecuniary advantages versus pecuniary disadvantages; job satisfaction among male and female academics in Scottish universities. *Scottish Journal of Political Economy*, *47*(3), 27–303. doi: 10.1111/1467-9485.00163

Weiss, D. J., Davis, R. V., England, G. W., & Lofquist, L. H. (1967*). Manual for the Minnesota Satisfaction Questionnaire.* The University of Minnesota Press, Minneapolis.

Weiss, H. M., & Cropanzano, R. (1996). Affective events theory: A theoretical discussion of the structure, causes and consequences of affective experiences at work. In B. M. Staw & L. L. Cummings (Eds.), *Research in organizational behavior: An annual series of analytical essays and critical reviews*, 18, 1-74. Greenwich, CT: JAI Press.

Wright, T. (2006). To be or not to be (happy): The role of employee well-being. *The Academy of Management Perspective*, *20*(3), 118–125.

PROCEEDINGS OF THE 2ND INTERNATIONAL SCIENTIFIC CONFERENCE
»TEACHING METHODS FOR ECONOMICS AND BUSINESS SCIENCES«
7 MAY 2018, MARIBOR, SLOVENIA
N. Gajšt & A. Plos (eds.)

University of Maribor Press

Building Higher Education Learning Environment for Twenty-First Century

ROMANA KOREZ VIDE

Abstract This paper aims to introduce the holistic perspective on building higher education learning environment for the development of students' requisite competencies. We researched the concept of twenty-first century competencies and most appropriate teaching methods for the development of key cognitive, intrapersonal and interpersonal competencies. In this relation the relevance of student-centered education and its approaches is established. It is argued, however, that for the successful transition of higher education learning environment institutional systemic changes are inevitable. Possible strategies for implementation of changes on the path towards responsive higher education institution in twenty-first century are examined.

Keywords: • higher education learning environment • twenty-first century competencies • student-centered education • problem-based learning • strategies for change •

CORRESPONDENCE ADDRESS: Romana Korez-Vide, PhD, Assistant Professor, University of Maribor, Faculty of Economics and Business, Maribor, Slovenia, e-mail: romana.korez@um.si.

DOI https://doi.org/10.18690/978-961-286-285-5.9 ISBN 978-961-286-285-5
Dostopno na: http://press.um.si

1 Introduction

Due to a new phase of globalization over the past three decades, characterized by global production, intense competitive pressures and digital revolution, individuals are strongly faced with volatile, uncertain, complex and ambiguous (VUCA) (Lemoine & Bennet, 2014) contemporary working and living environments. As a consequence of numerous new socio-political, economic and environmental challenges, the conditions and needs of the twenty-first century workplace have been transformed and the necessity to contribute more responsibly at local, regional and national levels as informed voters and citizens has been increased. At the same time, higher education institutions have been faced with new learning styles, lack of motivation, disengagement and high dropout rates of millennials (Cisco Systems, 2010). Higher education institutions (HEIs) of economics and business, whose research areas are related to several sub-disciplines of social sciences, are particularly strongly challenged to best motivate and prepare their students for solving complex problems, spanning across multiple domains.

Contemporary working and living environments reward people with inclusive competencies, such as the ability to make local-to-global connections, to recognize differing perspectives, to think critically and creatively to solve global challenges, and to collaborate respectfully in different types of social groups (Partnership for 21st Century Learning, 2007). Researchers (e.g. Global Cities Education Network, 2013; National Research Council, 2012; OECD, 2009; Ontario Public Service, 2016) increasingly call upon *the development of "twenty-first century competencies"*[1] that would enable graduates to thrive in the new globalized business landscape. Several studies (e.g. Friesen & Jardine, 2009; Partnership for 21st Century Learning, 2007a; Partnership for Global Learning, 2012; UNESCO, 2015) suggest that the new models of education are necessary for diverse challenges of twenty-first century prospective graduates. The education should be reformed away from passive transmission-based learning and the imparting of discrete skills (Scott & Friesen, 2013). Educational policies that support such educational environments are to be framed around "inspiring education" (Alberta Education, 2010), where rather than learning about a field of knowledge

[1] Other labels associated with the term »twenty-first century competencies« encompass »global competencies«, »twenty-first century skills«, »complex thinking and communication skills« etc.

(i.e., facts and definitions) or learning elements and pieces of a field (i.e., procedures and rules), students are given opportunities to "play the whole game". In this paper we discuss the concept of twenty-first century competencies and student-centered learning as a possible educational concept to support the development of these competencies. The organization of the paper is the following. In the second chapter, the concept "twenty-first century competencies" is presented. In the third chapter, the relevance of student-centered education is discussed and the problem-based learning (PBL) as the most well-known approach that enables students to become independent inquirers is examined. In the fourth chapter, we discuss the elements of conducive higher education learning environment in twenty-first century and the strategies for holistic institutional change that enable the implementation of student-centered learning. The fifth chapter is a conclusion.

2 Conceptualising twenty-first century competencies

Over the last three decades, several studies have proposed frameworks and outlined competencies needed to address twenty-first century challenges. The authors have exposed broad range of competencies. In one of the first frameworks of competencies, UNESCO (1996) proposed four pillars of twenty-first century learning: learning to know (integrated interdisciplinary content knowledge of core subjects, life-long learning aspirations), learning to do (active investigative thinking, problem-solving skills, communication and collaboration, creativity and innovation, information and communication technology (ICT) literacy), learning to be (personal responsibility, self-regulation and initiative) and learning to live together (social skills, seeking and valuing diversity, flexibility, civic literacy, global competence, intercultural competence). Sternberg and Subotnik (2006; as cited in UNESCO, 2015a) argued that the curriculum of the twenty-first century should be fostered on the development of 3 Rs of learners' capabilities: reasoning (analytical, critical thinking and problem-solving skills), resilience (flexibility, adaptability and self-reliance) and responsibility (wisdom or application of intelligence, creativity and knowledge for a common good). The "European Framework of Key Competences for Lifelong Learning" (European Commission, 2018) comprises eight key competencies considered as necessary for employability, personal fulfilment, active citizenship and social inclusion in a knowledge society: communication in mother tongue, communication in foreign languages, mathematical competence and basic competencies in science and technology, digital competence, learning to learn, social and civic competencies,

sense of initiative and entrepreneurship and cultural awareness and expression. Wagner (2010) stressed seven key skills of students to be prepared for twenty-first century work and life: critical thinking and problem solving, collaboration and leadership, agility and adaptability, initiative and entrepreneurialism, effective oral and written communication, accessing and analysing information, curiosity and imagination. Griffin, McGaw and Care (2012) categorized twenty-first century skills into four broad categories – ways of thinking, ways of working, tools for working and skills for living. Barry (2012, as cited in UNESCO, 2015a) quoted ten skills needed by students to survive as twenty-first century workers: critical thinking, communication, leadership, collaboration, adaptability, productivity and accountability, innovation, global citizenship, entrepreneurialism, and the ability to access, analyse and synthesize information.

Despite various conceptualisations of requisite students' competencies for the twenty-first century, researchers appear to be in broad agreement about their key characteristics. Generally speaking, these competencies refer to the set of knowledge, skills and attitudes that are believed to be critically important for success in contemporary global economy and society and can be applied in all academic subject areas and in all career settings. The basic idea of the term is that competencies of twenty-first century's graduates should reflect the specific demands that are placed upon these future professionals and citizens in contemporary interdependent, complex, highly competitive, knowledge-based and technology-driven economy and society.

Twenty-first century competencies can be classified into three broad domains: *cognitive, interpersonal and intrapersonal* (Global Cities Education Network, 2013; National Research Council, 2012). In each of these domains, numerous competencies can be placed and each domain overlaps with the other two to the certain extent. Apart to the importance of cognitive domain[2], to successfully navigate this new, globalized business landscape, characterised with automatized tasks by artificial intelligence, researchers (e.g. Brunello & Schlotter, 2011; Deloitte, 2016, 2017; Deming, 2017; Lundberg, 2017; OECD, 2014, 2017; World Economic Forum, 2016) increasingly recognize the value of non-cognitive domains (interpersonal and intrapersonal) and "essentially human skills" or "people aspects" of work respectively that involve intellect in a more indirect and less conscious manner than cognitive domain. According to the Big Five

[2] Remembering, comprehending, applying, analyzing, synthesizing (creating) and evaluating (Bloom et al., 1956).

Taxonomy (Goldberg, 1990) and several other taxonomies (Big Three, the MPQ, Big Nine)[3], the non-cognitive domains embrace five components: extraversion, agreeableness, conscientiousness, emotional stability and autonomy. Extraversion is defined as the preference for human contacts, gregariousness, assertiveness and the wish to inspire people. Agreeableness includes skills like empathy, perspective taking and cooperation. Conscientiousness includes grit, perseverance, impulse control, achievement striving, ambition, and work ethic. Emotional stability includes self-evaluation and self-esteem, self-efficiency and optimism. Autonomy indicates the individual propensity to decide and the degree of initiative and control. Goleman (2000) interprets non-cognitive capacities as crucial ingredients of emotional intelligence, comprised from social skills, motivation and leadership. Importantly, non-cognitive skills are more malleable at later ages than cognitive skills (OECD, 2014).

In this paper we focus on the cognitive, interpersonal and intrapersonal twenty-first century competencies of students that can be influenced and assessed by higher education teachers. We use the competencies framework of National Research Council (2012) that highlights three cognitive competencies, i.e. academic mastery, critical thinking, creativity, three interpersonal competencies, i.e. communication and collaboration, leadership, global awareness, and four intrapersonal competencies, i.e. growth mindset, learning how to learn, intrinsic motivation and grit (see Figure 1).

Figure 1: Key Twenty-First Century Competencies
Sources: Adapted upon National Research Council (2012).

[3] See Borghans et al. (2008) for comparisons of these taxonomies.

Mastery of academic content in various subjects serves as the basis for higher-order thinking skills[4], as well as the impetus to improve interpersonal and intrapersonal competencies. The competence of *critical thinking* is related to asking the right questions with the aim of continuous improvement of products, services and processes. *Creativity* is related to divergent thinking and could be helpful for creative problem solving in planning, organising, leading and controlling of organisations. *Communication* abilities comprise the capacity to express thoughts clearly and persuasively both orally and in writing, articulate opinions, communicate coherent instructions and motivate others through speech. *Communication* is vital to facilitate teamwork and is tightly related to *collaboration* that requires empathy, trust, conflict resolution and negotiation. *Leadership*, which includes aspects of communication and collaboration, can be defined as a set of competencies that involves initiative giving, building consensus, innovating new strategies and implementing programmes in collaboration with others. Being *globally aware* means that a person, firstly, feels empathy for people from different cultural or geopolitical environments, and secondly, shows an understanding of the interrelatedness of people, institutions and systems in the world. Students with *growth mindset* see intelligence as malleable and as a function of effort. *Metacognition* or 'thinking about thinking' refers to a student's ability to determine how to approach a problem or task, monitor his or her own comprehension, and evaluate progress toward completion. A student who understands his or her own learning processes is more self-motivated and self-regulated learner. *Intrinsic motivation,* as a force within the individual that activates behaviour, is an important element in complex problem solving and achievement. *Grit* refers to perseverance and passion for long-term goals.

3 The Relevance of Student-Centered Education

Student-centered learning, which shifts the focus of instruction from teacher to student, promotes learning in communication with teachers and other students, fosters problem-solving skills, critical thinking and reflective thinking (Attard, Iorio, Geven, & Santa, 2014; Hoidn, 2016) and aims to develop students' independence by putting responsibility for the learning path in their hands. It requires students to be active participants, with their own pace of learning

[4] In comparison to lower-order thinking skills, such as remembering, understanding, applying, higher-order thinking skills comprise for example analysing, evaluating and synthesizing and are related with the creation of new knowledge.

(Armstrong, 2012; Johnson, 2013). Through their own planning and organization of work within the time constraints they are learning to be self-reliant and responsible. They gain and upgrade knowledge by asking questions that have piqued their natural curiosity and herewith they are becoming independent thinkers and learners. Due to the requisite teamwork students enhance collaboration and communication skills, skills of creativity and leadership skills.

According to the student-centered learning concept, the teacher's task is not to be the primary source of knowledge (as in the teacher-centered learning), but to guide students into making new interpretations of the learning material, to engage them in metacognitive strategies about their learning and to monitor their thinking about the complex problems and their solutions (Windschitl, 2009). The teacher's role is to coach and facilitate. One of the most critical differences between teacher-centered learning and student-centered learning is that the latter involves more formative and less summative assessments. The intention of formative assessments is to identify group or individual deficiencies and to modify subsequent teaching and learning activities to improve students' attainment (Wiliam, 2006). This type of assessments aims to increase students' efficiency of learning, to reduce the negative impact of extrinsic motivation and to improve students' metacognitive awareness about their learning.

The most well-known student-centered learning approach is *problem-based learning (PBL)*. PBL's variations are, for example, project-based learning, scenario-based learning, inquiry-based learning, experiential learning, action-learning etc. (see Savin-Baden, 2006). In PBL, small groups of students learn about a subject through the experience of solving an open-ended problem with real-world application, based on various types of trigger material. In practice, PBL takes many forms, resulting in a plethora of PBL models, ranging from PBL lectures, where the teacher builds the presentation around a case from practice, to self-organized group work (De Graaff & Kolmos, 2007). The lectures, seminars and workshops support the inquiry process rather than transmitting subject-based knowledge. Problems can be solved in many different ways depending on their initial identification and may have more than one solution (Cotič & Valenčič, 2009). The teacher aims to build students' confidence when addressing problems, while also expanding their understanding (Schmidt, Rotgans, & Yew, 2011). Students activate their prior knowledge and the real life contexts make their learning more profound. Gained knowledge is more readily retained because it

has been acquired through experience and in relation to a real problem. Teamwork enhances students' interpersonal skills and leadership qualities.

Concerning major challenges of the implementation of student-centered learning, they can be found in traditional assumptions of the students about the role of the teacher in their learning process, in the lack of students' ability to simply wonder about something, in the teachers' (non)readiness for investing more time to prepare course materials and assess student learning with adapted assessment methods, etc. (Schmidt et al., 2011).

4 Building Conducive Higher Education Learning Environment in the Twenty-First Century

In the twenty-first century, higher education institutions are expected *to transform from organisations with a strong emphasis on teaching to organisations with an increased emphasis on learning*. Learning should be relevant, interesting and engaging. Pedagogy 2.0 educational concepts and approaches, like 'discovery learning', 'learning-by-doing', 'experiential learning', 'student-centered learning', 'participative learning', 'collaborative learning', 'problem-based learning', 'project-based learning', etc., which suggest exploiting human traits like curiosity, the sense of mastery and self-determination and lead learners to question their own beliefs, to enhance reflection, metacognition and the construction of new knowledge (McLoughlin & Lee, 2008), have become the core principles for innovations in higher education. According to their principles, the roles of teachers are transformed from experts on subjects to that of guides and coaches.

The *curricula should be relevant to students' lives* (Egbert & Roe, 2014). A very important step to do that is to choose generative topics that have an important place in the disciplinary or interdisciplinary study and resonate with learners. The next step would be *to help students see the holistic concept*, i. e. the big picture. To appreciate the relevance of a given generative topic, students need to understand how pieces of knowledge fit into the big picture and why the latter matters. It is required *to simultaneously develop lower- and higher-order thinking skills*. The latter demand to understand not only how different pieces of the whole relate to each other but also how to apply this understanding to a new context. To stimulate students for this type of learning and to involve them in the discovery of knowledge *teachers should support the development of students' information literacy* and

introduce to them various types of literature and approaches for searching and analyzing of various types of information and data.

Additionally, to support such learning and to unlock the millennials' engagement, *the skills of using digital technologies should be put to strong use* in the classrooms. The new generation of digital tools is allowing learners to become generators of content (Frey, 2007, as cited in UNESCO, 2015b), instead of passive consumers of knowledge, indicating a preference for active approaches to learning (McLoughlin & Lee, 2010, as cited in UNESCO, 2015). The participatory culture of Web 2.0 provides greater opportunities to initiate, produce and share new creations and to engage in peer-to-peer learning. It encourages users to become global citizens, capable to communicate and work in diverse contexts.

Due to the complexity of the transformation from teacher-centered to student-centered learning concept, several models of change have been developed. According to *the curriculum model* (see Kolmos & De Graaff, 2006), all educational elements must be included in the curriculum change processes in order to achieve change. The model features two layers – the curriculum layer and the organizational and values layer. Changing over to student-centered education entails changes in all six elements of curriculum layer: students' prerequisites concerning their previous learning experiences have to be reconsidered, teachers' qualifications have to be developed, new types of learning objectives and learning outcomes have to be set, the contents have to be reselected, the teaching and learning methods have to be reconsidered and the new forms of assessments have to be specified. At the same time, the organizational and values layers should be reconsidered to achieve *a system change*. According to Chin and Benne (1985, as cited in Kolmos & De Graaff, 2006), three types of strategies that rest on implicit beliefs about human nature can be applied when changing an organization: *empirical-rational strategies and normative-re-educative strategies as top-down strategies and power-coercive strategies as bottom-up strategies*. The first type of strategies treats an individual as a rational being. In the end, everyone is interested in personal gain, so in order to stimulate change, the advantages should be pointed out. The second type of strategies recognizes that an individual is conservative in nature. Consequently, to change an organization, you will have to change the value system and the culture of the people within the organization, respectively. Power-coercive strategies stem from the assumption that an individual primarily identifies with his/her personal profit and that most individuals do not care for the advantages or risks of the organization as a whole. Therefore, top

management needs to protect the larger interest at stake. Each type of strategy has advantages and drawbacks. When applying empirical-rational strategies, one should take into consideration the limitations of human rationality. For example, an advantage for the organization as a whole would not be perceived as an advantage by the individual teacher. A normative-re-educative strategies take a lot of time; however, they create conditions for growth and long-term effectiveness. Although the power-coercive strategies may be successful in solving the most urgent problems, it is recognized that they result in few long-term effects. In particular, the willing collaboration of all teaching staff is required for their successful implementation. Obviously, in order to establish change of an organization, it is necessary to use a proper combination of all strategies. According to Thousand and Villa (1995, as cited in Kolmos & De Graaff, 2006), the holistic change process of an organization is constituted from six elements: vision, consensus, skills, incentives, resources and action plan. One missing or deficient element causes different attitudes among teaching staff: confusion (missing vision), sabotage (missing consensus), anxiety (missing skills), resistance (missing incentives), frustration (missing resources) and treadmill (missing action plan). The strategies for change should be combined in a way to ensure the holism of the process of the institution's changes.

5 Conclusion

Complex contemporary economic, political and social environments are changing individual's circumstances for working and living. Globalization and technological progress are bringing several challenges to higher education institutions. Workplaces and social environments of young generations call upon new combinations of requisite graduates' competencies. Therefore, the twenty-first century higher education learning environments have to be correspondingly adapted. The recognition of the same or even higher importance of non-cognitive domains of individuals' competencies demands that higher education institutions reconsider the relevance of certain teaching methods. Higher education institutions of economics and business, whose graduates have the possibility to occupy workplaces related to several sub-disciplines of social sciences that demand a proper balance of cognitive and non-cognitive competencies, are particularly strongly challenged to best motivate and prepare their students for solving complex problems, spanning across multiple domains.

Our research shows that the key cognitive, interpersonal and intrapersonal competencies of students can be developed by various approaches of student-centered education. On the other hand, it indicates the obsolescence of transmission-based learning. While introducing the process and the effects of problem-based learning (PBL) and its variations, we show their relevance as teaching approaches for the development of students' key twenty-first century competencies. Students activate their prior knowledge while discussing the real-life situations (problems, projects) with teachers, peers and possible external stakeholders (communication). Through real-life problems (projects), they are offered to see and connect their varying perspectives and influential factors. Thus, they are becoming holistic learners. To solve or to find answers to questions, they have to upgrade and deepen their knowledge (academic mastery). While thinking about possible solutions and answers, they have to be creative and critical (creativity, critical thinking), they have to make local-to-global connections and communicate/collaborate respectively with teachers, peers and possible external stakeholders (global awareness). They are learning how to give initiatives and build agreements in cooperation with others (leadership). Active work stimulates students' thinking about their way of thinking, learning and communication processes (metacognition) and about their ability to control these processes with the aim to improve them (growth mindset). Students' preoccupation with possible solutions and answers to the real-life challenges that are to be communicated in a team strengthens their intrinsic motivation and grit.

In traditional higher education institutions, where little reflection on the task of teaching exists, the introduction of PBL curricula can help to break down these traditional boundaries. We claim that the implementation of PBL and similar learning approaches is an urge for each higher education institution in the twenty-first century; however, in this process each institution should consider the research disciplines' peculiarities and the institution's context of development. The teachers' trainings and students' awareness process are very important steps in the implementation of this form of learning. There are two main groups of challenges for higher education institutions: firstly, the motivational mechanisms for changes of teachers' perceptions about their necessary self-development, and secondly, the challenges related to delivering teaching activities to students who expect model answers, to passive students and to students who lack the motivation for learning and are reluctant to engage in discussions, teamwork and course activities.

To sum up, our paper stresses the importance of holistic view on the successful implementation of changes in higher education learning environment. The general reorientation from a teaching to a learning institution has to be promoted by a proper combination of top-down and bottom-up strategies, whereby all elements of the holistic change process have to be addressed.

References

Alberta Education (2010). *Inspiring education: A dialogue with Albertans*. Retrieved from https://open.alberta.ca/publications/9780778586104

Attard, A., Iorio, E. D., Geven, K., & Santa, R. (2014). *Student-centered learning SCL toolkit*. Brussels: European Students' Union. Retrieved from http://pascl.eu/publications/student-centered-learning-scl-toolkit/

Bloom, B. S., Engelhart, M. D., Furst, E. J., Hill, W. H., & Krathwohl, D. R. (1956). *Taxonomy of educational objectives, Handbook I: The cognitive domain*. New York: David McKay Co Inc.

Borghans, L., Meijers, H., & Weel, B. (2008). The role of non-cognitive skills in explaining cognitive test scores. *Economic Inquiry, 46*(1), 2–12.

Brunello, G., & Schlotter, M. (2011). *Non cognitive skills and personality traits: Labour market relevance and their development in education & training systems*, IZA Discussion Paper No. 5743. Retrieved from http://nbn-resolving.de/urn:nbn:de:101:1-201106013933

Cisco Systems (2010). *The learning society*. Retrieved from https://www.cisco.com/c/dam/en_us/about/citizenship/socio-economic/docs/LearningSociety_WhitePaper.pdf

Cotič, M., & Valenčič Zuljan, M. (2009). Problem-based instruction in mathematics and its impact on the cognitive results of the students and on affective-motivational aspects. *Educational Studies*, *35*(3), 297–310.

Deloitte (2016). *Talent for survival: essential skills for humans working in the machine age*. Retrieved from https://www2.deloitte.com/content/dam/Deloitte/uk/Documents/Growth/deloitte-uk-talent-for-survival-report.pdf

Deloitte (2017). *Rewriting the rules for the digital age. 2017 Deloitte global human capital trends*. Retrieved from https://www2.deloitte.com/content/dam/Deloitte/global/Documents/About-Deloitte/central-europe/ce-global-human-capital-trends.pdf

Deming, D. J. (2017). The growing importance of social skills in the labour market. *Quarterly Journal of Economics*, *132*(4), 1593–1640.

Egbert, J., & Roe, M. F. (2014). The power of why: Connecting curriculum to students' lives. *Childhood Education*, *90*(4), 251–258.

European Commission (2018). *Proposal for a Council recommendation on key competences for lifelong learning*. Retrieved from https://ec.europa.eu/education/sites/education/files/swd-recommendation-key-competences-lifelong-learning.pdf

Friesen, S., & Jardine, D. (2009). *21st century learning and learners*. Calgary, AB: Galileo Educational Network. Retrieved from

http://education.alberta.ca/media/1087278/wncp%2021st%20cent%20learning%20(2).pdf

Global Cities Education Network (2013). *Measuring 21st century competencies. Guidance for educators*. Retrieved from http://asiasociety.org/files/gcen-measuring21cskills.pdf

Goldberg, L. R. (1990). An alternative "description of personality": the big-five factor structure. *Journal of Personality and Social Psychology*, *59*(6), 1216-1229.

Goleman, D. (2000). Emotional intelligence: issues in paradigm building. In C. Cherniss, & D. Goleman (Eds.), *The emotionally intelligent workplace* (pp. 13–26). San Francisco: Josey-Bass.

Griffin, P. E., McGaw, B., & Care, E. (2012). *Assessment and teaching of 21st century skills (ATC21S)*. Retrieved from: www.atc21s.org

Hoidn, S. (2016). *Student-centered learning environments in higher education classrooms*. New York, NY: Palgrave Macmillan.

Johnson, E. (2013). *The student centered classroom: Vol 1: Social studies and history*. New York: Routledge.

Kolmos, A., & De Graaff, E. (2006). Process of changing to PBL. In E. De Graaff & A. Kolmos (Eds.). *Management of change* (pp. 31–44). Rotterdam: Sense Publishers.

Lemoine, G. J., & Bennett, N. (2014). A framework for understanding VUCA. *Harvard Business Review, January/February Issue.* Retrieved from https://hbr.org/2014/01/what-vuca-really-means-for-you

Lundberg, S. (2017). *Non-cognitive skills as human capital.* Retrieved from http://www.nber.org/chapters/c13701.pdf.

McLoughlin, C., & Lee, M. J. W. (2008). The three P's of pedagogy for the networked society: Personalization, participation, and productivity. *International Journal of Teaching and Learning in Higher Education*, *20*(1), 10-27.

National Research Council (2012). *Education for life and work: Developing transferable knowledge and skills in the 21st century.* Retrieved from https://www.nap.edu/catalog/13398/education-for-life-and-work-developing-transferable-knowledge-and-skills

OECD (2005). *The definition and selection of key competencies.* Retrieved from https://www.oecd.org/pisa/35070367.pdf

OECD (2009). *21st century skills and competences for new millennium learners in OECD countries.* OECD Education Working Papers, No. 41. http://dx.doi.org/10.1787/218525261154

OECD (2014). *Fostering and measuring skills: Improving cognitive and non-cognitive skills to promote lifetime success.* Retrieved from http://www.oecd.org/education/ceri/Fostering-and-Measuring-Skills-Improving-Cognitive-and-Non-Cognitive-Skills-to-Promote-Lifetime-Success.pdf

OECD (2017). *OECD Skills outlook 2017: Skills and global value chains.* Paris: OECD.

Ontario Public Service (2016). *21st century competencies.* Retrieved from http://www.edugains.ca/resources21CL/About21stCentury/21CL_21stCenturyCompetencies.pdf

Partnership for 21st Century Learning (2007). *P21 framework for twenty-first century learning.* Retrieved from http://www.p21.org/our-work/p21-framework

Partnership for 21st Century Learning (2007a). *21st century curriculum and instruction.* Retrieved from http://route21.p21.org/images/stories/epapers/ r21_ci_ epaper.pdf

Partnership for Global Learning (2012). *Teaching and learning 21st century skills: Lessons from the learning sciences*. Retrieved from https://www.aare.edu.au/data/publications/2012/Saavedra12.pdf

Savin-Baden, M. (2006). Challenging models and perspectives of problem-based learning. In E. De Graaff & A. Kolmos (Eds.). *Management of Change* (pp. 9-30). Rotterdam: Sense Publishers.

Schmidt, H. G., Rotgans, J. I., & Yew, E. (2011). The process of problem-based learning: What works and why. *Medical Education*, *45*(8), 792–806.

Scott, D., & Friesen, S. (2013). *Inquiry-based learning: A review of the research literature*. Retrieved from https://www.researchgate.net/publication/312592892/download

UNESCO (1996). *Learning: The treasure within*. Retrieved from http://unesdoc.unesco.org/images/0010/001095/109590eo.pdf

UNESCO (2015). *The futures of learning 1: Why must learning content and methods change in the 21st century?* Retrieved from http://unesdoc.unesco.org/images/0023/002348/234807E.pdf

UNESCO (2015a). *The futures of learning 2: What kind of learning for the 21st century?* Retrieved from http://unesdoc.unesco.org/images/0024/002429/242996E.pdf

UNESCO (2015b). *The futures of learning 3: What kind of pedagogies for the 21st century?* Education Research and Foresight Working Papers, WP no. 15. Retrieved from http://unesdoc.unesco.org/images/0024/002431/243126e.pdf

Wagner, T. (2010). *The global achievement gap: Why even our best schools don't teach the new survival skills our children need – and what we can do about it*. New York: Basic Books.

Wiliam, D. (2006). Formative assessment: getting the focus right. *Educational Assessment*, *11*(3–4), 283–289.

Windschitl, M. (2009). *Cultivating 21st century skills in science learners: How systems of teacher preparation and professional development will have to evolve*. National Academies of Science. Retrieved from https://sites.nationalacademies.org/cs/groups/dbassesite/documents/webpage/dbasse_072614.pdf

World Economic Forum (2016). *The future of jobs*. Retrieved from http://www3.weforum.org/docs/WEF_Future_of_Jobs.pdf

PROCEEDINGS OF THE 2ND INTERNATIONAL SCIENTIFIC CONFERENCE
»TEACHING METHODS FOR ECONOMICS AND BUSINESS SCIENCES«
7 MAY 2018, MARIBOR, SLOVENIA
N. Gajšt & A. Plos (eds.)

University of Maribor Press

The Experience of a Financial Mathematics Flipped Classroom

ANA PAULA LOPES & FILOMENA SOARES

Abstract Student-centred learning environments are gaining popularity in HEIs. Flipped classroom model strongly stimulates training design involving interactive pedagogy and technology. Authors describe flipped classroom as a type of blended learning. Teaching students who are prepared for class encourages student engagement and active learning, which could be the main reason for flipped classroom success. Authors show a flipped classroom model implemented in 2015-2016 and 2016-2017 in a Financial Mathematics Course at the Institute of Accounting and Administration of Porto (ISCAP), benefiting, exploring and using Moodle platform, implementing on-line exercises and quizzes reinforced by in-class activities, audio supported PowerPoint, YouTube tutorials and online reading materials before and after classes. The pedagogical switch from traditional academic procedure occurred as students' first contact with topics and themes was made outside the "four wall boundaries" and lecturers' role was reversed into a guide / facilitator indicating the way, motivating students in their own knowledge construction, letting them lead the way, only interfering when they deviate from the predefined learning goals. In a collaborative environment, classroom time was devoted to debates, problem-solving, explaining supporting fundaments in order to improve students' learning. The paper also presents the procedures and some results obtained with this experience.

Keywords: • flipped classroom • student engagement • higher education • teaching methods • financial mathematics • online learning • video lectures •

CORRESPONDENCE ADDRESS: Ana Paula Lopes, PhD, Senior Lecturer – Associate Professor, Polytechnic of Porto - Porto Accounting and Business School - CEOS.PP, S. Mamede de Infesta, Portugal, e-mail: aplopes@iscap.ipp.pt. Filomena Soares, PhD, Senior Lecturer – Associate Professor, Polytechnic of Porto - School of Hospitality and Tourism, Vila do Conde, Portugal, e-mail: filomenasoares@esht.ipp.pt.

DOI https://doi.org/10.18690/978-961-286-285-5.10 ISBN 978-961-286-285-5
Dostopno na: http://press.um.si

1 Introduction

'Flipped Classroom' is a term that is associated with a modern learning and teaching approach and frequently defined as a reversal of lecture and homework element allowing class time to become more interactive. The popularity of the flipped classroom model is reflected through the increase in educational expression of opinions through the literature and various online collaborative sites. The flipped classroom method or model, was developed by Bergmann and Sams (2012), the pioneers of this 'movement' (chemistry teachers, at Woodland Park High School in Colorado at that time) who, in an attempt to counter the effects of student's high absenteeism levels, began to record their lessons and post them online, allowing students to access them remotely. Therefore, the principal idea comes from reversing the traditional teaching paradigm, where the main phases of the teaching and learning process such as classroom activities and homework are reversed. The flipped classroom is then settled as a different course organization: where instructional content (e.g., pre-recorded video lectures) is assigned as 'homework' – analyzed before coming to class – and in-class time is spent working on problems, advancing concepts, and engaging in collaborative learning (Findlay-Thompson & Mombourquette, 2014). The flipped classroom may contain a big array of out-of-class activities further than lectures, including readings, homework, and supplemental videos (Bergmann, Overmyer, & Wilie, 2013; Chen, Wang, Kinshuk, & Chen, 2014; Gilboy, Heinerichs, & Pazzaglia, 2015; White et al., 2017). With this pedagogical teaching methodology, as theoretical/supporting materials must be delivered as a 'pre-class' tool for students to take and analyze individually, it is extremely important to examine what 'kind' of materials promote students' engagement, as they must be responsible for class preparation (Deperlioglu & Kose, 2013; Lopes & Soares, 2018; Roach, 2014; Thai, De Wever, & Valcke, 2017). With all these fundamental changes, instructors have been required to get used to fast to this reality, creating and developing a considerable variety of tools and resources to catch student's attention and to motivate them to support the knowledge in their own learning process actively.

The aim of this paper is to present the experience in a Financial Mathematics Course, using flipped classroom model as a pedagogical strategy to support Blended Learning – learning that combines features of both traditional and online education in integrated model, and win the maximum benefit from the

existing techniques respectively (McGee, 2014). With this study, we intend to analyse if the introduction of this flipped model can contribute to an improvement of the learning experience according to the final exam performance and students' perception.

2 Active Learning

2.1 Flipped Learning

The Flipped Classroom Model is an emerging learning model which intends to increase students' active learning, collaboration and support during the learning process, through a better allocation of teaching time (Bergmann & Sams, 2012). More specifically, this approach suggests that teaching time within the face-to-face school sessions should not be spent on teachers' lecturing, but instead should be invested to provide students with exceptional learning experiences within collaborative activities with their classmates as well as receiving scaffolding by their instructor (DeLozier & Rhodes, 2017). Flipped Learning Network suggests the following definition for Flipped Learning:

> Flipped Learning is a pedagogical approach in which direct instruction moves from the group learning space to the individual learning space, and the resulting group space is transformed into a dynamic, interactive learning environment where the educator guides students as they apply concepts and engage creatively in the subject matter" (2014, p. 1).

Bishop Lowel and Verleger (2013) defined the flipped classroom model as "an educational technique that consists of two parts: interactive group learning activities inside the classroom, and direct computer-based individual instruction outside the classroom" (p. 5). The flipped classroom model (see Fig. 1) consists of some form of pre-class activity (e.g., viewing videos) before class meetings and complete individual or group activities during face-to-face lessons. Most of these activities use smartphone apps, tablets, think pair-and-share activities and online formative assessments, with the main goal of providing immediate feedback concerning misconceptions or gaps in students' knowledge (Dove & Dove, 2015). Nevertheless, according to some authors (Guerrero, Beal, Lamb, Sonderegger, & Baumgartel, 2015; Larsen, 2015), there is no standard practice for the flipped classroom model. There are many different approaches to in-class activities, which may include a combination of small quizzes at the beginning of

lessons, reviews of video lectures, small-group or large-group discussions, student presentations, application projects, etc.

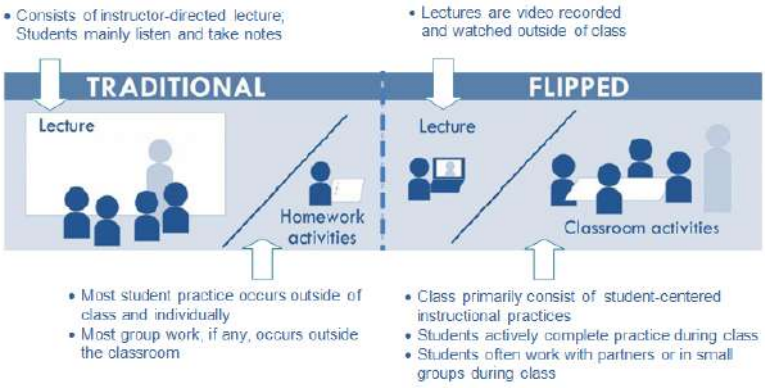


Figure 1: Flipped Model versus Traditional Classroom
Source: Adaption from DeLozier and Rhodes, 2017

Cognitive psychologist Benjamin Bloom (Bloom, 1956) made public his famous Taxonomy of Educational Objectives**,** commonly known as Bloom's Taxonomy, developed for classifying learning objectives in levels. Bloom's classification included three areas of learning: cognitive, affective and psychomotor. In his framework, he divided cognitive domain into six levels or categories, ranked from the simplest and most concrete to the more complex and abstract: knowledge, comprehension, application, analysis, synthesis and evaluation**.** The first three levels correspond to concrete thinking, while the top three fall into the field of creative and abstract thoughts. Anderson and Krathwohl (2001) revised Bloom's original Taxonomy that resulted in the so-called Revised Bloom Taxonomy (RBT). In this review, the categories were divided as follows: remember, understand, apply, analyze, evaluate and create**.** In contrast to the original taxonomy, here the choice relied on verbs rather than nouns, since these better reflect the active nature of the learning process. At home, with the student's preliminary study, they would work the first three areas from RBT – remember, understand, apply – while in class more complex levels can be approached – analyze, evaluate and create (Fig. 2).

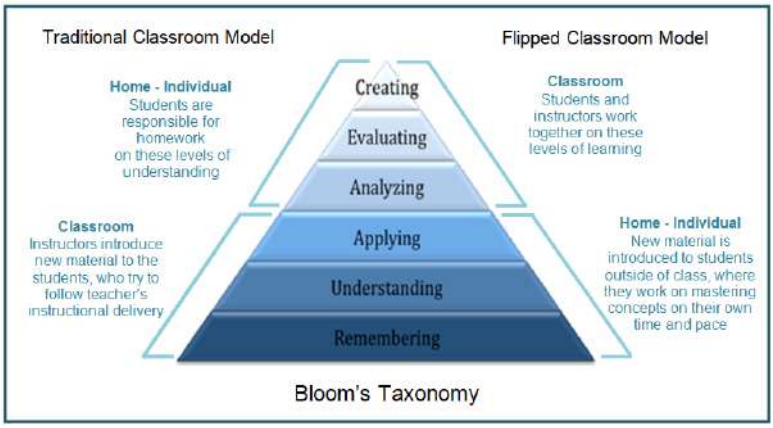


Figure 2: Connection between flipped and traditional model to bloom's taxonomy
Source: Adapted from Williams, B. (2013). How I flipped my classroom. In NNNC Conference, Norfolk, NE.

2.2 Blended Learning

On the basis of a brief research through the available literature, there is no clear and unambiguous definition of the concept of Blended Learning (Anohina, 2005; Bonk, Graham, Cross, & Moore, 2012). Definitions are somewhat exclusive and sometimes contradictory, and there are few common terms used regularly. It is not easy to distinguish the term 'blended learning' from other terms such as 'virtual learning', 'distance learning', 'network learning', 'online learning', 'web-enhanced learning', 'Internet-enabled learning', among others. According to Bonk et al., (2012), this approach is a learning process based on a combination of traditional class and activities in an online educational environment using elements of asynchronous and synchronous distance learning. In their opinion the most commonly definitions are the combination of:

- instructional modalities or delivery media and technologies (traditional distance education, Internet, Web, Video/audio, any other electronic standard, e-mail, online books, etc.);
- instructional modalities, learning theories, and pedagogical dimensions;
- e-learning with face-to-face learning.

In a blended learning course, for example, students might attend a class taught by a lecturer in a traditional classroom setting, while also individually carrying out online components of the course outside of the classroom. The generalized idea for Blended Learning models seems to be around the reduction of classroom lessons number, moving some lessons to an online environment.

3 Metodology

This paper reports a study on supporting higher education students through the implementation of a flipped classroom in an undergraduate Financial Mathematics Course (FMC) in the Institute of Accounting and Administration of Porto (ISCAP) at the Porto Polytechnic (P. PORTO). The course is a second-year one in the undergraduate Accounting degree.

Having some background analytics experience, granted by *Moodle* platforms, *MatActiva Project* (Lopes, Babo, & Torres, 2015) and MOOCs (Soares & Lopes, 2016), we have developed a FMC that used a flipped classroom model. MatActiva Project mission is to offer to ISCAP students a free, online tool, which stores wide variety of instructional Math resources, including video lectures and hundreds of exercises (all of them with a suggestion for the solution). It is a personalized learning platform in which students can individually and independently learn through an entire Math subject. One of the most engaging resources is the use of video lectures since, through them, instructors can provide multifaceted information to students and, if used creatively, videos are a powerful technological tool in the global and self-enrolment educational process (Lopes & Soares, 2016).

The sample of our study, from the Winter Semester FMC, in ISCAP, consisted of 803 students, 283 students enrolled in 2016, 262 students in 2015 and 258 students in 2014 semester. These students were divided in two groups: flipped and traditional group. In each year, the students from flipped group were the students of 2 classes from the total of 7 classes of Financial Mathematics. The flipped sample consisted of 80 students enrolled in 2016, 72 students in 2015 and 58 students in 2014 Winter semester. In both groups, approximately 90% of the students were attending the classes for the first time. The course entailed six subjects/sections (Simple Interest, Compound Interest, Ordinary Annuities, Annuity Due, Loan Amortization and Bonds) throughout the semester, and

students were provided with flipped classroom model opportunities in five sections out of these six. It means that, five sections were flipped and only one section was traditionally taught during the semester. Accessing the MatActiva site www.matactiva.com, participants could access all the available sections in the FMC. In each section, students had at their disposal video lectures, reading, forms and sets of online exercises and online quizzes (all with solution), related with the topic.

The flipped classroom approach entailed three classes per week, with 1 hour and 30 minutes duration. In advance of this class time, a set of short video tutorials, that covered the course content, were uploaded in the MatActiva site, for students to review in their own time. The first 20 min of the class involved skimming through the tutorials while addressing student questions on their content and any concepts they had struggle with. The remainder of the class time was spent explaining the subject by presenting PowerPoint slides, followed by exercises resolution and work activities either individually or in group. Each week a set of online assignments, from MatActiva Project, related with the subject they learned were given to the students to perform outside class. The attendance rate of students in the flipped classroom has been the same as the traditional class, without any drop-outs from flipped class.

Two types of data were collected: course performance and student perception data. The performance data shows the results of the FMC in relation to the percentage of students who passed the courses in both the traditional and flipped classroom model. So, the results from both groups were examined in relation to each other and in relation to their standing within a particular year. We also analysed if there was any relationship between the results obtained in the final exam and the classifications obtained in the online quizzes carried out by the students in MatActiva Project. Performance data was also studied through an analysis of the spread of grades, achieved by each group in their final exam.

We have also developed a short survey in an attempt to find out how the flipped classroom model affected ISCAP Financial Mathematics students' training, understanding and their performance. The survey was given at the end of the semester to analyse participants' global thoughts about the use of the flipped model in their classes.

4 Results

We have used the final exam results to try to measure the success of the inverted classroom model. If there were substantial changes in the course results from previous years or the average course results are very different in relation to existing traditional classes, then there might be evidence of impact. Table 1 shows the relationship of results of the 2014/15, 2015/16 and the 2016/17 in the traditional classroom group against flipped classroom group.

Table 1. Comparing results of Flipped Classroom and the Traditional Classroom.

	2014/2015	2015/2016	2016/2017
Flipped Classroom success rate	71.4%	90.5%	91.2%
Traditional Classroom success rate	49.2%	62.3%	62.7%

Source: Own elaboration

From this table, we can notice that the success rate for the flipped classroom version increased by 19.8% from the starting point set in 2014/15. We can also say that the success rate for the flipped classroom is bigger than the success rate for the traditional classroom in FMC. The average success rate across of flipped classroom outperform the average success rate across of traditional classroom, the average success rate for the traditional classroom improved by 13.1% in 2015/16 and 0.4% in 2016/17, while the average success rate for the flipped classroom improved by 19.1% in 2015/16 and 0.7% in 2016/17. From this we can see that there was a slight increase in overall performance in the flipped classroom version in relation to successful students. We are very pleased about the flipped classroom model results, and we plan to use it again next year 2017/18. The student success rate in the flipped class supplanted, in a perfectly visible way, those obtained by students in the traditional class. But also, the average grade achieved among the successful flipped students, was higher than the average grade achieved among the successful students of traditional class. For flipped classroom students, in 2014/15 the average grade for Financial Mathematics was 13.3, 14.5 in 2015/16 and in 2016/17 it was14.9 (out of 20), while the average grade for the students from traditional class was during this time: 11.2 in 2014/15, 12.1 in 2015/16 and 12.3 in 2016/17.

In addition to examining the performance data of the course, results were also extracted from the data obtained from the students' perceptions, and these revealed the different types of training that the students did before facing the sessions that were explored in the individual moments of the room class. Table 2 summarizes the frequency of student preferences.

Table 2.Student's preferences in their Flipped Classroom preparation.

	Watching flipped video	%	Watching other videos	%	Reading textbooks	%	Doing online exercises	%
2016 2017	65	81.3	42	52.5	31	38.8	78	97.5
2015 2016	63	87.5	34	47.2	25	34.7	70	97.2
2014 2015	49	84.5	28	48.3	39	67.2	50	86.2

Source: Own elaboration

From these results, it is clear that the majority of the students preferred video lectures and doing online exercises for training more often than all available written resources. The high number of students that used online exercises can, possibly, be explained by the fact that a Question Pool was created from the ground up, grouped into categories and subcategories, on Financial Mathematics Course content. The combination of questions in each category is randomized and it generates a huge number of different tests that students can solve online, wherever they are and at a time that suits them. The tests allow multiple attempts, providing automatically quantitative results and each attempt is corrected immediately. For each wrong answer the feedback is presented with a suggested step by step solution, in order to help students to understand what 'wrong' with their answer, providing and promoting self-assessment and skill development.

A large number of participating students (86.9%) stated that video lectures helped them understand the concepts studied in Financial Mathematics. No students indicated any negative thoughts about flipped classroom video lectures. It is amazing that in answering the question "Online exercises helped me gain solid knowledge and skills in Financial Mathematics", the majority of students (97.7%) indicated that online exercises with the detailed solution proposed helped them perform better. Only 2.3% of the participants were neutral about the benefits of the online exercises in the flipped classroom, in terms of providing them better performance. In this same survey, regarding the question about the

student's preferences in relation to the flipped classroom, 66% prefer a flipped classroom. 23.8% of the participants were neutral about the preferences related with the flipped classroom and 10% of the participants prefer the traditional classroom.

In the last few years, the implementation of flipped classrooms has been increasingly discussed. Some studies have revealed the advantages of inverted classrooms (Davies, Dean, & Ball, 2013; Forsey, Low, & Glance, 2013; Kurup & Hersey, 2013; Yelamarthi & Drake, 2015; Young, Bailey, Guptill, Thorp, & Thomas, 2014) and demonstrated that this learning approach can help students' learning. In this study, a flipped classroom approach was used, and a set of materials was developed to aid students' out-of-class learning and improving the quality of the in-class interaction with students and professor. A research was conducted in an undergraduate Financial Mathematics Course to evaluate the flipped learning approach. The flipped group learned with the flipped classroom approach, while the traditional group learned with the conventional classroom approach. The results showed that the flipped approach significantly benefited the flipped students' learning achievement.

5 Conclusions

The embracement of new teaching methods, course designs and technology allows more flexibility for all higher education agents and addresses the needs of students with differing learning styles. From the lecturer's point of view, teaching in flipped classroom courses may be, at the beginning, uncomfortable as it demands a complete role shift from presenter to facilitator. These challenges also include a huge increase in the time spent in course preparation to find and/or create quality online resources since it is not an easy or hasty task to create learning activities that foster student interaction and active learning. We cannot fail to mention that, initially, students may resist this method of learning and not putting the time required outside classroom, having some difficulty in completing the necessary preparation for in-class activities.

The main goal of this paper was to investigate how the integration of the flipped classroom model into a Financial Mathematics Course, in Institute of Accounting and Administration of Porto (ISCAP), affected students' class training, learning, and achievement. In agreement with other studies on flipped classrooms

(Arnold-Garza, 2014; Bishop Lowell & Verleger, 2013; Gilboy et al., 2015), we verified that students in the flipped classroom preferred watching video lectures than reading textbooks about the issue they are studying. We also found that for student is very important the opportunity of doing online exercises and have access to their solutions (explained in detail). This study also shown that flipped classroom model caused an increase in student achievement in Financial Mathematics Course.

References

Anderson, L. W., & Krathwohl, D. R. (2001). A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives. *Theory Into Practice*, *Complete edition*, xxix, 352 p. https://doi.org/10.1207/s15430421tip4104_2

Anohina, A. (2005). Analysis of the terminology used in the field of virtual learning. *Educational Technology and Society*, *8*(3), 91–102. https://doi.org/10.1.1.103.7742

Arnold-Garza, S. (2014). The flipped classroom teaching model and its use for information literacy instruction. *Communications in Information Literacy*, *8*(1), 7–22. https://doi.org/10.7548/cil.v8i1.260

Bergmann, J., Overmyer, J., & Wilie, B. (2013). The flipped class: Myths vs. reality. *Thedailyriff.Com*, 1–3. Retrieved from http://www.thedailyriff.com/articles/the-flipped-class-conversation-689.php

Bergmann, J., & Sams, A. (2012). *Flip your classroom: Reach every student in every class every day*. Eugene, OR, Arlington, VA: International Society for Technology in Education. https://doi.org/10.1111/teth.12165

Bishop, J. L., & Verleger, M. (2013). The flipped classroom : A survey of the research. In *Proceedings of the Annual Conference of the American Society for Engineering Education* (pp. 23.1200.1 - 23.1200.18). Atlanta, GA: ASEE. https://doi.org/10.1109/FIE.2013.6684807

Bloom, B. S. (1956). Taxonomy of Educational Objectives. *Educational and Psychological Measurement*, *16*, 401–405. https://doi.org/10.1177/001316445601600310

Bonk, C. J., Graham, C. R., Cross, J., & Moore, M. G. (2012). *The handbook of blended learning: Global perspectives, local designs*. John Wiley & Sons.

Chen, Y., Wang, Y., Kinshuk, & Chen, N. S. (2014). Is FLIP enough? or should we use the FLIPPED model instead? *Computers and Education*, *79*, 16–27. https://doi.org/10.1016/j.compedu.2014.07.004

Davies, R. S., Dean, D. L., & Ball, N. (2013). Flipping the classroom and instructional technology integration in a college-level information systems spreadsheet course. *Educational Technology Research and Development*, *61*(4), 563–580. https://doi.org/10.1007/s11423-013-9305-6

DeLozier, S. J., & Rhodes, M. G. (2017). Flipped classrooms: A review of key ideas and recommendations for practice. *Educational Psychology Review*. https://doi.org/10.1007/s10648-015-9356-9

Deperlioglu, O., & Kose, U. (2013). The effectiveness and experiences of blended learning approaches to computer programming education. *Computer Applications in Engineering Education*, *21*(2), 328–342. https://doi.org/10.1002/cae.20476

Dove, A., & Dove, E. (2015). Examining the influence of a flipped mathematics course on preservice elementary teachers ' mathematics anxiety and achievement. *Electronic Journal of Mathematics & Technology*, *9*(2), 166–179. Retrieved from http://ezproxy.acu.edu.au/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=111362987&site=ehost-live

Findlay-Thompson, S., & Mombourquette, P. (2014). Evaluation of a flipped classroom in an undergraduate business course. *Business Education and Accreditation*, *6*(1), 95–108. https://doi.org/10.1080/08832323.1963.10116709

Flipped Learning Network. (2014). What is flipped learning ? The Four pillars of F-L-I-P. *Flipped Learning Network*, *501*(c), 2. Retrieved from http://www.flippedlearning.org/definition

Forsey, M., Low, M., & Glance, D. (2013). Flipping the sociology classroom: Towards a practice of online pedagogy. *Journal of Sociology*, *49*(4), 471–485. https://doi.org/10.1177/1440783313504059

Gilboy, M. B., Heinerichs, S., & Pazzaglia, G. (2015). Enhancing student engagement using the flipped classroom. *Journal of Nutrition Education and Behavior*, *47*(1), 109–114. https://doi.org/10.1016/j.jneb.2014.08.008

Guerrero, S., Beal, M., Lamb, C., Sonderegger, D., & Baumgartel, D. (2015). Flipping undergraduate finite mathematics: Findings and implications. *PRIMUS*, *25*(9-10), 814–832. https://doi.org/10.1080/10511970.2015.1046003

Kurup, V., & Hersey, D. (2013). The changing landscape of anaesthesia education: Is flipped classroom the answer? *Current Opinion in Anaesthesiology*. *26*(6), 726–731. https://doi.org/10.1097/ACO.0000000000000004

Larsen, J. (2015). Adult students' experiences of a flipped mathematics classroom. *Adults Learning Mathematics*, *10*(1), 50-67.

Lopes, A. P., Babo, L., & Torres, C. (2015). The impact of an online mathematics education project (MATACTIVA) on higher education students. In L. Gómez Chova, A. López Martínez, & I. Candel Torres (Eds.), *Proceedings of the 9th International Technology, Education and Development Conference INTED2015* (pp. 2921–2927). Madrid: IATED Academy.

Lopes, A. P., & Soares, F. (2016). Video lectures and online activities to engage students in a flipped classroom. In In L. Gómez Chova, A. López Martínez, & I. Candel Torres (Eds.), *EDULEARN16 Proceedings* of the *8th International Conference on Education and New Learning Technologies* (pp. 8688–8695). Barcelona: IATED Academy. https://doi.org/10.21125/edulearn.2016.0890

Lopes, A. P., & Soares, F. (2018). Perception and performance in a flipped Financial Mathematics classroom. *The International Journal of Management Education*, *16*(1), 105–113. https://doi.org/10.1016/j.ijme.2018.01.001

McGee, P. (2014). Blended course design. *International Journal of Mobile and Blended Learning*, *6*(1), 33–55. https://doi.org/10.4018/ijmbl.2014010103

Roach, T. (2014). Student perceptions toward flipped learning: New methods to increase interaction and active learning in economics. *International Review of Economics Education*, *17*, 74–84. https://doi.org/10.1016/j.iree.2014.08.003

Soares, F., & Lopes, A. P. (2016). Teaching mathematics using massive open online courses. In L. Gómez Chova, A. López Martínez, I. Candel Torres (Eds.), *INTED2016* the 10th *International Technology, Education and Development Conference Proceedings* (pp. 2635–2641). Valencia: IATED Academy. https://doi.org/10.21125/inted.2016.1563

Thai, N. T. T., De Wever, B., & Valcke, M. (2017). The impact of a flipped classroom

design on learning performance in higher education: Looking for the best "blend" of lectures and guiding questions with feedback. *Computers and Education*, *107*, 113–126. https://doi.org/10.1016/j.compedu.2017.01.003

White, P. J., Naidu, S., Yuriev, E., Short, J. L., McLaughlin, J. E., & Larson, I. C. (2017). Student engagement with a flipped classroom teaching design affects pharmacology examination performance in a manner dependent on question type. *American Journal of Pharmaceutical Education*, *81*(9), 10–23. https://doi.org/10.5688/ajpe5931

Yelamarthi, K., & Drake, E. (2015). A flipped first-year digital circuits course for engineering and technology students. *IEEE Transactions on Education*, *58*(3), 179–186. https://doi.org/10.1109/TE.2014.2356174

Young, T., Bailey, C., Guptill, M., Thorp, A., & Thomas, T. (2014). The flipped classroom: A modality for mixed asynchronous and synchronous learning in a residency program. *Western Journal of Emergency Medicine*, *15*(7), 938–944. https://doi.org/10.5811/westjem.2014.10.23515

PROCEEDINGS OF THE 2ND INTERNATIONAL SCIENTIFIC CONFERENCE
»TEACHING METHODS FOR ECONOMICS AND BUSINESS SCIENCES«
7 MAY 2018, MARIBOR, SLOVENIA
N. Gajšt & A. Plos (eds.)

University of Maribor Press

Creative Education Shown in the Example of a Business Course on Innovation

BIRGIT OBERER, ALPTEKIN ERKOLLAR & ANNA STEIN

Abstract Creativity stands for the ability to identify and trial new solutions to problems within one's specific context. Skills associated with creativity include convergent and divergent thinking, collaboration, and problem-solving. This study, conducted in 2017, focuses on applying the RISE Framework of Creative Education in Higher Education to support an innovative learning environment when implementing creative learning elements in teaching and student learning. The results of this study revealed that the integration of Lego learning modules (LLM) for the course improved the students' performance significantly (considering the dimensions of quality, participation, grade, and student to analyze the outcome of student projects, the overall course results, and student satisfaction) and the application of the RISE framework improved the creative education development processes within the institution.

Keywords: • creative learning • module • LEGO • RISE • business course •

CORRESPONDENCE ADDRESS: Birgit Oberer, PhD, Associate Professor, Sakarya University, Sakarya Business School, Esentepe Campus, Sakarya, Turkey, e-mail: oberer@sakarya.edu.tr. Alptekin Erkollar, PhD, Professor, Sakarya University, Sakarya Universiti, MIS department, Sakarya, Turkey, e-mail: erkollar@sakarya.edu.tr. Anna Stein, PhD, ETCOP Austria, Klagenfurt, Austria, e-mail: a.stein@etcop.com.

DOI https://doi.org/10.18690/978-961-286-285-5.11 ISBN 978-961-286-285-5
Dostopno na: http://press.um.si

1 Creative Education

Historically, education models have focused mainly on standardized testing of knowledge rather than on explicitly developing skills such as problem-solving and collaboration. Creative Education is used to overcome this discord, bringing together the skills needed for flexibility and personal growth.

Creativity is a keyword in the business environment and is becoming increasingly important for education. Educators should support students in learning how to make use of their creative potential in integrating creative learning modules in course designs and the instructor-student interaction. Creativity is the ability to identify and trial new solutions to problems within one's specific context. Skills associated with creativity include problem-solving, convergent and divergent thinking, collaboration, and resilience (Beghetto & Kaufman, 2013; Robinson 1999). Creative Education promotes specific skills that assist students to strengthen their relationships, to collaborate and build teams, enhance flexible thinking, encourage open-mindedness and critical thinking, and enable the exploration of meaning and passion in life (Patston, 2015).

2 RISE Framework of Creative Education

In our rapidly changing world, students need the skills of collaboration, critical thinking, teamwork and problem-solving. This calls education to be (more) innovative and supportive of changing students' needs. To support educators teach both with and for creativity in their classroom Patston (2015) developed the **RISE Framework of Creative Education** for supporting Australian education institutions. Using a blended learning approach, teachers develop strategies to build creative skills in themselves and their students. The RISE Framework was designed for teachers at all levels of school education but should apply to Higher Education as well. Patston (2015) developed the framework within a grammar school and formed research partnerships with various universities, including University of Connecticut, University of South Australia and the University of Melbourne. The RISE Framework is being implemented at each of the campuses of the Grammar School, from years P-12. Currently, ten subjects incorporate the RISE Framework into their teaching practice.

RISE has four interconnected components: **Results, Investigation, Student, and Environment. Results** are the products or outcomes that are desired. They could take the shape of student work, student learning, classroom experiences, or teacher lesson plans. Important concepts include how educators are the most qualified people to rate student creativity, how creativity can be involved in rubrics or more substantial assessments, how creative work is evaluated, and how peer-to-peer interaction can improve results.

Investigation: People may investigate in many different ways, with individual preferences, styles, or strengths. Creative thinking skills are an essential part of the investigation process. The investigation may happen alone, but there are many benefits to creating with peers in small groups. Teachers play an active role in forming the creative process of students. Important concepts include the importance of teachers in nurturing student investigation, different stages of the investigation process, and how to construct groups with the best mix of diversity.

Environment represents the different systems that may influence creativity (for example, school, family, social, and classroom). Each environment can be affected by many different variables, from the school administration to the available resources and technology, to the classroom atmosphere. Important concepts include having each student feel that they are safe to be creative, creating and maintaining a supportive environment, and forming creativity within prevailing constraints. To train educators, the blended learning approach has to be applied, forming a three-phase process: (1) developing a series of online lessons based on the RISE approach. Within each lesson there is a link to an online sharing site where staff can put up their observations on the lessons and talk about new ideas they have tried; (2) Staff are encouraged to do the lessons in a variety of contexts, alone, in a pair or small group, within their own faculty, and with members of other faculties, in order to generate discussion and new ideas; and (3) teachers are asked to trial new ideas in their classes as a part of our professional development program. Educators try one new approach in one class for one month. Failure is an option and is treated as a part of the learning experience. All projects are shared on a website for others to look at and try for themselves.

3 Creative Learning Elements

Beghetto and Kaufman (2013) defined the following five fundamentals that could support educators in integrating creative learning models in students' curricula. **Creativity and originality:** Creativity is a combination of originality and task appropriateness, (2) Creativity Level (*Four C Model*): (a) Interpretative creativity ('mini-c creativity'), (b) Everyday creativity ('little-c creativity'), (c) Expert creativity ('Pro-C creativity'), and (d) Legendary creativity ('Big- C creativity'); (3) **Creativity Contex**t: Could creativity suffer when people are rewarded for their creative work? Could creativity suffer from stressful and competitive learning environments? Could creativity suffer in monitored situations?, (4) **Cost of creativity**: Potential costs for being creative have to be considered. Opportunity cost approach, and (5) **When to be creative**: When should creative structures be developed? What are students' creativity strengths and limitations? How should educators handle these capabilities?

To work on creativity actively it is not enough to just give students the freedom in education, follow a laissez-faire approach, and let them be; educators have to focus on teaching knowledge and skills, encourage student innovation and find a balance between a focus on creativity in curricula, teaching methods, and resources (Oberer, 2013).

The Four C Model (2) provides a framework for including creativity modules in student curricula. According to Robinson (1999), educators have three different dimensions for covering creativity in education: (1) developing curricula, (2) teaching, and (3) student learning. In this study, we focus on including creative elements in the course design and student learning, which could be included in the dimensions (2) and (3). According to CELT (2011), the elements of creativity could be affective, cognitive, motivational, social or environmental. The components of creativity are (1) expertise, (2) motivation, and (3) creative thinking skills. Educators could foster creativity in sharing their thinking with students and explaining how to develop innovative ideas (Adams, 2005).

4 Case Study: Applying RISE Framework for Creative Learning Element Development

In a previous study conducted in 2012, creative learning objects were included in a sample course on Management Information Systems, and course results (focusing on different dimensions) were measured (Oberer, 2013). The goal of that research in progress was to include creative education elements in a sample course, implementing this course in higher education and evaluating student performance before and after the implementation of the previously defined creative elements. The outcome should help educators in developing further innovative features to be included in curricula, teaching at universities and in a student learning environment. Course management and the adaptation of curricula were not an aim of that previous study, which mainly focused on the educator dimension (teaching, instructor-student interaction, and student learning). The results showed improved results for student performance but a lack of improved educator development.

In this study, a follow up of the one conducted before, a course on Innovation Management at the Bachelor's Degree Level was designed by applying the RISE Framework of Creative Education AND including creative education elements. Applying the RISE Framework should improve educators' performance as well.

4.1 Educator Development

To train the educator of the sample course and colleagues from other departments within the business faculty, the blended learning approach was applied, focusing on the following steps.

(1) 15 online lessons based on the RISE approach, such as introduction to business, introduction to finance, introduction to database management, innovation management, technology management, and management information systems were developed. These courses were not used for teaching students but for training purpose, i.e. to train educators.

(2) Within each lesson, a link to an online sharing site where staff can put up their observations on the lessons and talk about new ideas they have tried was defined. On a whole, 12 educators from business faculty contributed to this project, developing 15 online courses and observing and testing education structure, results and findings during three months.

(3) All contributing educators were encouraged to carry out their lessons in a variety of contexts, alone, in a pair or small group, within their faculty, and with members of other faculties, to generate discussion and new ideas; and

(4) All projects were shared on a website for others to look at and try for themselves.
(5)
At the end of the three-month period, project duration educators reviewed their course experiences and started to prepare the courses they intended to teach their students, applying the RISE Framework of Creative Education.

4.2 Course Environment

The designed course is intended for bachelor's degree level students from a European university's business faculty. There are no pre-requisites to attend the course. The course mainly focuses on innovation management and technology transfer. In the last two years, the course was given as a lecture, including assignments, but without any projects or active learning elements that the students had to work on, and without any active instructor feedback on student performance during the course. The grading was based on the results of a midterm and a final exam, mainly focusing on multiple choice questions. Student performance was sufficient (from 120 students, who attended the course within the last two years, fewer than 15 failed, 65% had a performance between BB and CB, and approximately 9% had a performance better than BB). To include creative learning elements in the course, the instructor focuses on adopting the course structure, teaching method, and course-related student learning and including several creative education elements. One primary aim of these activities was to engage students and other educators and provide a basis for active participation and lifelong learning.

4.3 RISE Framework of Creative Education Application

The RISE Framework dimensions were adopted for the course design purpose. Students have attitudes and attributes which help them to be creative. Students can develop these attitudes such as openness to new experience, curiosity, and enthusiasm. Characteristics such as risk-taking and resilience can also be developed in the classroom (Patston, 2015). Intended outcomes of student dimension were an improvement of critical thinking skills, problem-solving skills, collaborative skills and building creative capacities of students. In any classroom, there is both a physical and social environment. The physical environment relates to how and where students sit. A flexible physical environment will enhance creativity. A creative social context is one in which students feel a sense of psychological safety. One way to achieve this is by asking open-ended questions. Problem-solving can occur with individuals and groups. It is important to offer variety using techniques such as brainstorming or mind-mapping to maintain engagement. It is also important to consider how ideas are recorded and how appropriate solutions are selected (Patston, 2015).

For preparing the course content, the instructor focused on the **results**, which are the desired outcomes. Students learning, student work and class experiences were in the center of interest. Different **investigation** types, such as learning styles critical thinking elements were intended to be included in the course design. As regards the target group of the course, the **students**, their individual strengths, previous experiences as well as their personality and motivation attending the course were considered. Regarding the **environment,** it was designed to apply the flipped classroom approach, which means outside classroom learning, classroom discussions, and group work.

4.4 Course Content

Considering the RISE framework and the CELT approach, the educator focused on the following elements of creativity: motivation and creative thinking skills. Like in the previous study (to be able to compare the course results), the creativity element the instructor used for creating the sample course on Innovation Management is Lego Serious Play.

Lego Serious Play uses Lego bricks as a tool to enhance innovation and business performance. Working with Lego bricks offers people a 'language' to communicate with each other, a problem-solving tool, where everyone can contribute. Companies could use Lego bricks for strategic management, problem-solving, decision making, or merely for creating creative thinking. Lego serious play focuses on learning through storytelling and the use of metaphors, constructivism and constructionism, and descriptive and creative imagination (Oberer, 2013). Generally, for using Lego in higher education, the Lego company offers under 'Lego education' opportunities to use Lego in pre-school and school; with 'Lego engineering', the Center of Engineering Educational Outreach (CEEO), Tufts University, uses Lego and other tools to help students explore engineering processes, science, mathematics, and engineering.

Table 1 shows the course design for 14 weeks. Apart from the planned content for the course, which was taken from the already existing course syllabus, the teaching method(s) for each week/content was/were added. In addition to the lecture, the instructor included Lego learning module (LLM), student project, and a group project. The Lego learning modules are all involved in class activities while group projects and student projects (1 student, 1 project) include LLM as well, but most of them were used offline; this means students work on their projects using LLM outside the classroom, but present their results in class to the instructor and the other students or student teams.

Table 1: Course Design

Week	Content	Teaching method
1	Introduction to innovation management	Lecture
2	Innovation: what and why?	Lecture
3	Innovation as a core business process	Lecture, LLM
4	building the innovative organization	Lecture, LLM, student project
5	Developing an innovation strategy	Lecture, LLM, student project
6	Capturing value from innovation	LLM
7	Sources of innovation	LLM
8	Innovation Networks	LLM
9	Creating new products and services	Lecture, LLM
10	Exploiting open innovation and collaboration	Group project, LLM
11	Exploiting entrepreneurship and new ventures	Group project, LLM
12	Decision making under uncertainty	Lecture
13	Creativity in the innovation process	LLM, group project
14	Industry 4.0 and Internet of Things	LLM, student project

* LLM … Lego learning module * FC ... Flipped Classroom

In Table 2, we show how some of the LLMs were concretely implemented. Generally, the students were given a case study: a sample company, the 'Innovation Company' (IC), has to become more innovative to remain competitive, starting with understanding innovation as a core process of business (week 3), building the innovative organization (week 4), developing an innovation strategy and capturing value from innovation (week 5–6), sources of innovation and innovation networks (week 7-8), creating new products and services (week 9), Exploiting open innovation and collaboration, and entrepreneurship and new ventures (week 10–11), understanding creativity in an innovation process (week 13) and finally focusing on industry 4.0 and the Internet of things (week 14). Table 3 gives a short overview of how the instructor prepared himself for the creation and implementation of the Lego learning models, applying the RISE framework.

Table 2: LLM Implementation

Week		Lego learning modules (description)
5	Developing an innovation strategy	Using LEGO to create different variations of an innovation strategy for the sample company
7	Sources of innovation	Using LEGO bricks to define various sources of innovation within and without the company
9	Creating new products and services	Using LEGO bricks for developing new products and product variations for the sample company
13	Creativity in the innovation process	Using Lego for adding a creative dimension to the innovation process defined in week 5

Table 3: RISE preparation for LLM design

Week	LLM design (RISE preparation)
3	Rehearsal of a process role play, to be used in class (tested in the instructor RISE environment)
4	Development of strategies to activate students' creativity and prepare a suitable class environment
5	Development of strategies to activate students' creativity and prepare a suitable class environment
6	Flipped classroom approach, role play
7	Flipped classroom approach
8	Preparation of a process role play, to be used in class (tested in the instructor RISE environment)
9	Development of strategies to activate students' creativity and prepare a suitable class environment

5 Results and Conclusions

For analyzing the study results, the instructor focused on the dimensions of quality, participation, grade, and student (following the previous study). Table 4 demonstrates that student performance (applying the RISE framework, focusing on the CELT approach and developing Lego learning modules (LLM)) increased compared to the previous study results. For evaluating student satisfaction, we used the student satisfaction index model proposed by Zhang, Han, & Gao (2008), focusing on student activity, perception quality, perception value, and adding the dimension LLM to the model to find out if and how this dimension influences the student satisfaction index.

Table 4: Study results

Attendance			
Attendance indicator	*Previous study*	*The current study (RISE)*	*Explanation*
Attendance rate (LLM integration)	76% before LLM integration 92% with LLM integration	82% before LLM integration 98% with LLM integration	Attendance for Bachelor's Degree Level courses are mandatory
Attendance rate (student type)	Business background: +10% Engineering background: + 32%	Business background: +11% Engineering background: + 45%	Engineering students showed a higher influence factor from LLM than the others.
Project Quality			
Student performance category A cumulative grade of 3.00 or above A cumulative grade between 2.00 and 3.00 A cumulative grade below 2.00	95:100 70/100 before LLM, 90/100 with LLM 60/100 before LLM, 75/100 with LLM	98:100 65/100 before LLM, 97/100 with LLM 60/100 before LLM, 87/100 with LLM	There seems to be a positive relationship between cumulative grade and LLM influence on student activity
Course results			
Average Result	0.76 before LLM 0.89 with LLM	0.65 before LLM 0.97with LLM	Related to project quality and attendance

The results of the study revealed that by applying the RISE Framework of Creative Education the overall course performance improved significantly. According to **RISE (student dimension),** the instructor focused more on the target group, i.e. the students attending the course. By attracting students before and during the course, the attendance rate increased from 92% to 98%. Engineering students' attendance increased by 13%; business students' attendance remained at about 11%. The project quality **(RISE results dimension)** of students with a cumulative grade of 3.00 or above was 3% higher than it was before applying the RISE framework. Project quality of students with a cumulative grade between 2.00 and 3.00 increased by 7%; the quality of those students having an average below 2.00 increased by 12% (all values show a comparison between with and without RISE framework application, considering that in both cases LLMs were implemented). Preparing educators for the RISE application, designing creative learning modules with the flipped classroom approach and using Lego Serious Play, and offering students innovative ways to collaborate served the **RISE environment and investigation dimension.** The results of this study revealed that there is a positive relationship between the integration of LLM applying the RISE Framework of Creative Education.

References

Adams, K. (2005). Sources of innovation and creativity: A summary of the research, *National Center on Education and the Economy*. Retrieved from https://eric.ed.gov/?id=ED522111

Beghetto, R., & Kaufman, J. (2013). Fundamentals of creativity, *Creativity now!*, *70*(5),10-15.

Center of Excellence in Learning and Teaching (CELT) (2011), Elements of creativity, Iowa State University, http://www.celt.iastate.edu/creativity/elements.html

Oberer, B. (2013). Integrating creative learning elements in higher education shown in the example of a Management Information Systems (MIS) courses, *Education*, *3*(6), 319-324.

Patston. T. (2015). The RISE framework of creative education. Retrieved from https://hundred.org/en/innovations/the-rise-framework-of-creative-education

Robinson, V. (1999). *All our futures. Creativity, culture & education*. Department for Education and Employment (DfEE). Retrieved from http://sirkenrobinson.com/pdf/allourfutures.pdf

Zhang, L., Han, Z. & Gao, Q. (2008). Empirical study on the student satisfaction index in higher education, *International Journal of Business and Management*, *3*(9), 46-51.

PROCEEDINGS OF THE 2ND INTERNATIONAL SCIENTIFIC CONFERENCE
»TEACHING METHODS FOR ECONOMICS AND BUSINESS SCIENCES«
7 MAY 2018, MARIBOR, SLOVENIA
N. Gajšt & A. Plos (eds.)

University of Maribor Press

Supporting the Creation and Use of E-Learning Tools

IGOR PERKO & SONJA SIBILA LEBE

Abstract E-learning environment is developing extremely fast. It is hard for the students, the teachers and the educational organisations to exploit all available services, whereby the effects on the learning process are often not adequately elaborated. E-learning tools can be categorised into learning management systems (LMS), virtual classrooms (VC) and massive (open) online courses (M(O)OCs), video and podcast products, independent tools and communication support. In this paper, a state-of-the-art analysis for every group of the above-listed e-learning tools is performed, whereby the focus is set onto the new challenges the teachers are confronted with. A case of organisational support initiative, helping the teachers to use the new services level is explored. The state-of-the-art analysis and the posted challenges are determined by examining the published research reports on e-learning tools, while the properties of organisational support are elaborated using semi-structured interviews. The paper provides insights for teachers faced with challenges of the developing e-teaching environment and offers suggestions how to improve the support of the teaching process.

Keywords: • e-learning • learning management systems (LMS) • virtual classrooms • massive (open) online courses (M(O)OCs) • independent tools and communication support • organisational support •

CORRESPONDENCE ADDRESS: Igor Perko, PhD, Assistant Professor, University of Maribor, Faculty of Economics and Business, Maribor, Slovenia, e-mail: igor.perko@um.si. Sonja Sibila Lebe, PhD, Associate Professor, University of Maribor, Faculty of Economics and Business, Maribor, Slovenia, e-mail: sonjasibila.lebe@um.si.

DOI https://doi.org/10.18690/978-961-286-285-5.12 ISBN 978-961-286-285-5
Dostopno na: http://press.um.si

1 Introduction

The complexity and the dynamics of the teaching process is characterised by new technologies, upgraded content, student expectations and interaction methods. There are multiple research activities connected with them; yet, to provide a systems perspective, the subsystems and their interactions need to be examined and understood at a higher meta level.

The teaching process perspective is often analysed. Dafoulas et al. (2010), for instance, have been focusing on the feedback elements that support the sustainability of the entire teaching process. Additionally to examining learning management systems (LMS) in traditional teaching institutions, the research focus is frequently set to alternative learning models, as for instance lifelong learning (Sugiyama, Pathumcharoenwattana, Burasirirak, & Santiparp, 2016). The technology development is often examined, especially its effects on narrow student groups (Kaplan & Haenlein, 2016). Brahimi and Sarirete (2015) examined the potentials of learning outside the classroom, focusing on MOOCs, while Su, Huang, and Ding (2016), elaborated on the effects of MOOCs learners' social searching results on learning and on learning behaviours.

In the students-perspective focused research (Zhai, Gu, Liu, Liang, & Tsai, 2017), teaching methods are frequently examined (for instance, flipped learning). Vue, Hall, Robinson, Ganley, Elizalde, & Graham, (2016) examined a digital writing tool to support students with learning disabilities, while Hsieh, Lin, and Hou (2016) commented on the role of flow experience, learning performance and potential behaviour clusters in elementary students' game-based learning.

Teachers' competences and the process of teaching the teachers are even more interesting. On the one hand, Akyol (2016) dealt with teachers' self-efficacy perceptions and learning-oriented motivation, while Meza, Orza, and Vlaicu (2015), on the other hand, researched the training of higher education teachers in lifelong learning programs tailored to their need to better reach their counterparts, i.e. the students.

The effects of invoking new technologies in the learning process are multiple and well documented. They involve the user experience, the knowledge absorption level, the size and accessibility of the learners, and the learning/teaching speed (Bentes, Bravo, & Hernandez, 2017; Diaz-Moure, 2010; Rubio, Carballo, & San Roman, 2015). These researches nevertheless rarely focus on the teachers' perspectives in using new technologies, thereby the question on why teachers do (not) use the new technologies in their teaching process remains largely unanswered (Avalos, 2011).

A systems perspective (Espejo, Bowling, & Hoverstadt, 1999; van Weert, 2005) on the teaching organisations still needs to be elaborated. Our task in this paper is to examine the state of the art in the teaching environment, to examine the efforts in advancing the teaching environment on the case of the University of Maribor, and to use the systems perspective in suggesting modifications that support viable feedback mechanisms, helping us reach the next meta level.

In the second chapter, the state of the art on the basic elements of e-learning support is elaborated. Next, the results of the unstructured interviews are presented. This is used to propose modifications in the organisational learning processes, which is elaborated in the 'teach the teachers' chapter.

2 State of the art analysis of e-learning tools

The state of the art of e-learning tools in assessed by combining multiple perspectives. First, e-learning tools properties' and user feedback published by the providers is examined. The downsides are that new and innovative providers are hard to find; their reports are usually restricted to the tool's technical properties and focus on selective positive feedbacks by the users. Further, on the review sites the established providers are predominately compared, while the newcomers are often ignored. The third source is peer recommendations. Interestingly, the academic literature is focused on addressing specific topics, or on elaborating relations among the teaching process properties. Overviews regarding the state of the art of the teaching tools are rather rare in academic literature (Chang, Lai, & Hwang, 2018).

2.1 Learning management systems (LMS)

Learning management systems LMS (Figure1) focus on fostering the cooperation between administrative staff, teachers and students in all steps of the organised teaching process. Even though the main importance lays in learning itself, the supporting processes, e.g. preparing the environment and assessing the results, are equally important at the teaching organisation level (Wikipedia, 2018).

LMS prove to be a valid supportive tool in executing a sustainable multi-step teaching process. In the first step, the students and resources involved in the teaching processes are organised. This is mainly done by administrative staff and is based on the teaching plans and available curricula. Students and teachers participate in the process quite passively. Next, the preparation of teaching materials is provided by the teachers, with the assistance of administrative staff specialised in preparing advanced materials. The core process – teaching – is based on using the prepared materials in the interaction between teachers and students. One of the main criticisms of LMS systems is the inappropriateness of user interfaces for their use during the actual teaching. In the evaluation and reporting step, multiple student activities can be monitored, thus providing feedback loops required for the optimisation of the complete teaching process. The data can be used at the lecture-, student-, teacher-, course- and organisational levels. The data collected can reveal students' personal preferences and should therefore be treated with special care.

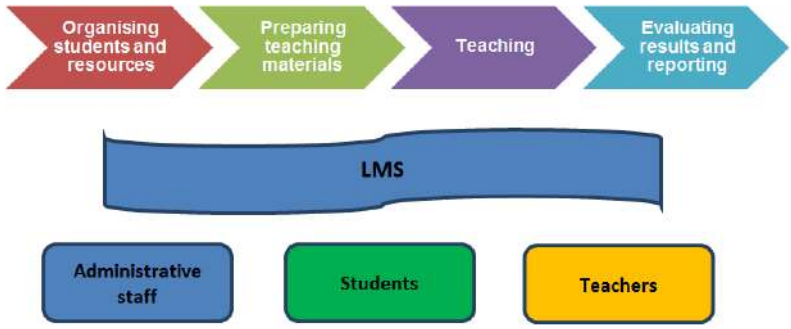


Figure 1: The LMS processes

In Figure 2, market scores offer insight into the leading LMS providers' market shares by measuring the number of customers (i.e. institutions using them), the number of individual users and the user affinity (measured by the number of likes on Facebook, LinkedIn and Twitter). When comparing the two market leaders, Edmodo and Moodle, we can observe Edmodo's advantage regarding the number of commercial customers, while Moodle has a higher number of users, which is probably due to its free availability. The higher number of Facebook likes and Tweet likes displays the positive user (probably student) feedbacks, whereas Moodle provides more LinkedIn links, probably due to the teacher community. All other players on the list are larger in size, suggesting higher potential in developing a working complex learning tool. Their customer/user ratio is quite high, suggesting relatively large organisations are using their products.

Figure 1: LMS systems market score
(SoftwareLab, 2017)

2.2 Virtual classrooms and MOOCs

Virtual classrooms and MOOCs enhance the classic on-site learning by enabling remote collaboration remote communication for students and teachers (Kaplan & Haenlein, 2016). Even though MOOCs and Virtual classrooms look very similar, it is important to know their properties to use the most appropriate tool for any occasion. Virtual classrooms provide support for synchronous real time communication and sharing of resources for on-site and remote students and

teachers. MOOCs, on the other hand, provide learning resources which can be used remotely at any time to large student groups. The communication between the teacher and students is asynchronous; it does however provide a clearly identified learning path that may be fully or partially automatized.

Table 1: When to use a classic lecture, Virtual Classroom or MOOCs.

What do we want to address?	Which type of teaching to use?
Students are on site	Mandatory for classic lectures, no need for virtual classrooms or MOOCs
Working remotely	Virtual classrooms or MOOCs
Large student groups	MOOCs
Real time communication	Virtual classrooms
Choose your own speed	MOOCs
Providing resources	Mandatory for MOOCs, and suggested in classic lectures or for virtual classrooms

Regardless of the teaching type, materials used in the teaching process can be self-prepared or, existing VC or MOOC materials can be integrated. There are multiple techniques to include external resources such as providing access to existing MOOCs, including links (free or paid), copying external materials, copying interaction tools, inviting students to use external VCs, study existing materials and redeploy, outsourcing testing, using external LMS, etc.

There are multiple considerations in incorporating external materials to the teaching processes, e.g. the content relevance and quality, the appropriateness to learners' knowledge level and learning goals, the author rights management and, in case of extensive use of external results, the actual value added of the teacher or the teaching organisation.

2.3 Video lectures

Creating a video lecture is a process related to multiple content, methodology, and technology-related issues. Some of the issues can be addressed by the teacher; for others, organisational and technology related support is necessary. Usually, the process of creating video lectures is divided into preparation, recording, video editing and publishing (Kind & Evans, 2015).

Before recording, both the content and technology are to be prepared. In learning environments, the preparation is usually limited to materials' presentation, rehearsals and technical equipment for capturing the desired video and audio quality level (van der Meij, 2017). The quality of the preparation phase significantly affects the quality of the materials recorded and the cost and time spent in the recording phase. We may expect to spend several hours in preparing the contents, the technology, and the contents to produce a 15-minutes video lecture.

The video recording process complexity depends heavily on the type of the recording we decide to produce. Recordings can range from simple screen recordings with voiceover with or without thumbnail picture of the presenter, which can be recorded on a personal computer, up to life classroom recordings that require advanced light and acoustic settings, and multiple audio and video recording devices.

To address the efficiency and the quality of the editing process, appropriate hardware, software and expertise are essential. Within the learning process, the teachers can rarely deliver these by themselves, therefore organisational support is necessary in this step (Hung, Kinshuk, & Chen, 2018). There is another positive effect of employing professional support in the editing process: video lectures edited in the same manner post the same quality features, and even similar style of representation. For the learners, a unified user experience means they can focus on the contents instead of on the presentation style.

To assure a functioning organisational video lectures design process, it is important to develop certain content and technology standards and guidelines. It is though important to know in which occasions these standards can be breached to satisfy the learner needs.

2.4 Independent tools and communication support

Are you innovative? Of course – yet, by using traditional, well established, proven technologies and methods. A nice oxymoron, right? But we are doing exactly that. Experimenting in the classroom? Risking that something might go wrong? Using untested approaches? Changing the things that have proven to work in the past? Invoking new tools, developed by new vendors?

Is this something, we want our students to be exposed to? Do we feel comfortable when imagining ourselves looking unsure at our presentations? Are we ready to take risk? Can we accept the fact that learners in some situations are more proficient than the teachers? The answer to these questions is (maybe not so) clearly: Yes!

The text in the above paragraph is intentionally formulated in a fashion, not traditionally used in a research paper. It is intended to attract the reader attention and define its perspective on the matter. Similarly, to gain the student attention, sometimes unconventional approaches are helpful, which can be attained by using unconventional tools. Using independent tools can be related to a certain level of exposure, where the teacher can be surprised by the unexpected behaviour of the learning tool.

Identifying new technologies and figuring out the best ways how to fit in the lecture is a question worth answering. There are multiple review sites (Customshow, 2017), peers' and learners' suggestions, but many of them lack the proficiency in teaching the teacher how to integrate these tools into his/her lectures. One of the approaches is to employ the peers' experience and to use the service's organisational support in researching new tools, providing access, and assisting the teachers in their integration attempts.

3 The teachers' perspectives on using software tools

To investigate the teachers' perspectives on using the software tools, semi-structured interviews were conducted with the Didakt.um members, i.e. the administrative staff at the University of Maribor whose main task is encouraging the teachers to advance their use of IT tools in the learning process.

The Didakt.um team offers individual support to the teaching staff at the University of Maribor and thus creates better opportunities for updating the knowledge, skills and competences of the staff in the field of didactic use of ICT (information and communication technology) in the higher education pedagogical process (Didakt.um, 2018). The Didakt.um team consists of four members focusing on delivering support in four major topics: LMS, VC and MOOCs, Video support as well as on the integration of new software in the teaching process. The topics on teaching gamification and the analysis of student performance are also available.

The semi-structured interviews were conducted with all Didakt.um team members. Their answers reflect the teachers' perspectives which the team members got while communicating with 17 faculties that form the University of Maribor. The interviews consisted of five sections: general introductory questions, LMS, virtual classrooms and (MOOCs), video lectures, as well as independent tools and communication support. In each section, several closed and open questions are posted, with the option of commenting on the results.

At the time of the interviewing, the Diadact.um team has already been in contact with 20-30 teachers who expressed their interest in using the support of the team's IT Administrative staff. All of them possessed at least basic IT skills while only one teacher was aspirated with advanced IT skills.

3.1 LMS

The LMS investigated in our study is Moodle since it is the primary teaching environment in the research group. The decision on the extent of using LMS elements is left with the teachers.

Moodle provides multiple options on how to prepare the materials, out of which teachers (based on our research) most frequently use file upload and literature review. They are particularly interested in learning about quizzes, student work uploading, workshops and advanced cooperation tools. Embedding external web elements (Iframe) and videos are identified as very important to expand beyond the original Moodle limitations. Since the video storage and the user interface in Moodle are not built-in, videos have to be stored externally.

The Didakt.um members report that lectures and books are the least used elements in Moodle. Following their perception, this lack of use is closely associated with the lack in understanding of the elements' concepts and their means of use; a further reasons are not dedicating enough time to explore the LMS capabilities, not focusing enough on the individual learning support and, lastly, being satisfied with the existing (present) work process. The workshops for teachers that the Didakt.um team offers often result in an 'AHA effect' and significantly increase the usage of LMS elements, even of more complex ones.

Communication and cooperation relate to the support that LMS provides during the actual teaching process. The access and use of the LMS should be easy by using native communication channels. In Moodle, this involves forums, chats messaging, emails, etc. This can be extended by external video conference systems. Providing a simple user interface could support teachers and students in using Moodle as a presentation or direct communication platform, and not merely as a materials storage repository.

Multiple tools such as quizzes, workshops, cross examinations, combined grading calculation etc. support the student's performance evaluation. Currently, not many teachers at the University of Maribor are using these tools. They rely on the existing, individually developed grading systems. The Didakt.um team members are trying to upgrade the level of performance evaluation with gamification concepts and student analytics. A gradual introduction of more sophisticated evaluation standards could lead to more proficient use of these tools.

The teaching support processes is complex: the coordination of multiple lectures, the timetables, the development of students in time in multiple programmes, the integration with the existing databases have to be organised. In our case, LMS is connected with a university wide information system for student related data management (RCUM, 2017). The integration enables automated student groups design and safe login using student digital identity.

The user experience (based on the user interface) produces mixed responses. Teachers recommend a simpler materials preparation user interface. The actual teaching environment should enable fast and seamless teacher-student interaction and simple use of the teaching materials. The Didakt.um members

are suggesting that with an appropriate teacher education, these limitations could be partially mitigated. Their experiences suggest that the affinity towards the LMS use rises after the teachers' participating in the LMS-related education lectures.

To successfully localise Moodle, users' involvement is required to design an inviting environment. At this stage, the Didakt.um members act as catalyst in the process, directly suggesting adaptation.

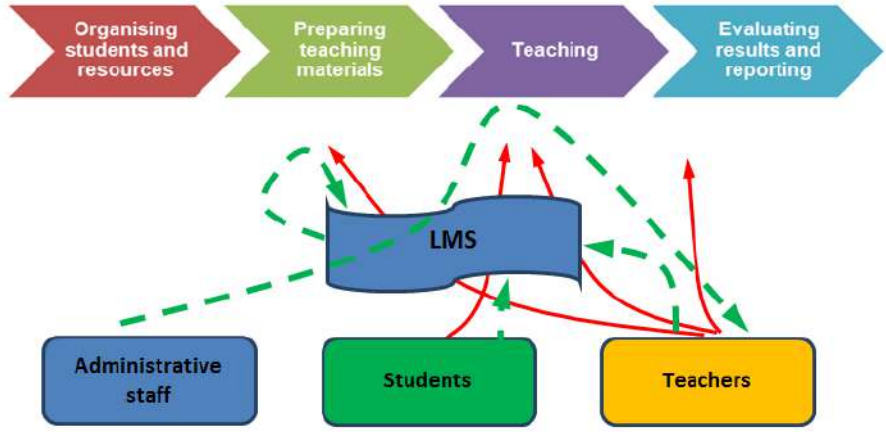


Figure 3: LMS issues and adaptation proposals

Source: own

In figure 3, the red solid lines → represent detected issues related to teacher issues regarding materials preparation, the execution of teaching and student evaluation and reporting.

The green dotted lines - - → represent proposed strategies for addressing the issues. First, the user experience feedback mechanisms by the students and the teachers should be established or upgraded – this is a repetitive process that requires special attention at each reoccurrence. As suggested by the interviewed experts, the perceived feedback can support LMS adaptation processes, while teaching the teachers activities could help enabling the most efficient use of the LMS services.

3.2 Virtual classrooms and MOOCs

Virtual classrooms and MOOCs provide support for remote cooperation with students. While virtual classrooms support real time communication, the MOOCSs focus on teaching large numbers of students. At this stage, the data on teachers' participating as listeners in virtual classrooms or MOOCs are not available to the Didakt.um members. The technology to execute a virtual classroom is available, and there are isolated examples of teachers who use them, but the Didakt.um members were not involved in the VC preparation or implementation process. The level of MOOC's elements inclusion into the teaching materials is also unclear at this stage.

Currently, no lectures are presented (nor planned) in a way to allow remote presence of students; additionally, the teachers are rarely providing the lectures remotely. In special occasions, guest lecturers are introduced remotely, using the on-site teacher as facilitator.

The virtual classrooms, organised by the Didakt.um for the teachers are well accepted. We can assess that teachers take place in the virtual classrooms and use resources provided by MOOCS. There have been, though, no requests by the teachers to provide support in designing virtual classrooms or MOOCs.

Didakt.um members have not identified obstacles or incentives, affecting the usage of VC and MOOCs in the teaching process at the University of Maribor. To identify and mitigate the potential technical, organisational or content based obstacles, pilot lectures in the form of VS and MOOC should be performed and discussed. The expected implications are twofold: first, pilot VS would provide a proof of the concept. Second, the potential obstacles regarding organisation of the teaching environments, material preparation, teaching and results evaluation can be assessed and mitigated.

3.3 Video lectures

Video lectures provide dynamics in the presentation by linking/pairing video and audio. They can be used to design tutorials, lectures, public presentations of events and commercial messages.

Attempts of recording video lectures were performed at the University of Maribor in the past. The technically complex, time consuming process, combined with high expectancies in audio, video and content quality resulted in low number of completed and published videos. According to the Didakt.um, only three out of 21 teachers recorded and published a video lecture; no information is available on how many teachers are familiar with the video publishing process. At the university level, several pieces of equipment are available. Nevertheless, a complete organisational/technical support to publish video materials for the teachers is not available. If and when the video lectures are planned, the organisational/technical support is to be organised to support creation of the planned video lectures.

3.4 Independent tools and communication support

Multiple independent tools and software services exist that are supporting communication and presentation and can be used in the teaching process. The landscape of these tools ranges from general presentation and visualisation, through specialised tools, to complex simulation and gaming tools.

At the University of Maribor, according to the Didakt.um members, Kahoot, e-mail, Skype, Vox Arnes (Adobe Connect), One Drive and some others are used by individual teachers; however, their use is not systemically supported. The Didakt.um members further report that there were several reasons preventing a wider use of independent tools, i.e. teachers are not aware of the tools or are not familiar with their technical details. A fast development of these tools results in constant changes in their use thus preventing a sustained use in the teaching process. It is important that the software tool's properties remain unmodified at least during one teaching cycle. Another issue preventing advanced use of software tools in the lectures is the time consumed to prepare and use the software. There is a high risk that the time which should be focused on the contents is spent on preparing and using particular software during the lecture.

4 Teach the teachers

In this chapter, the state of the art and the system inquiry are used as backgrounds to design a systems perspective and to articulate propositions on how to better include all the involved groups in creating a more efficient learning environment.

Successful teaching is a complex process with the goal to build up students' knowledge, competencies and abilities to become functional members of the community.

During the teaching process, the interaction between students and teachers occurs. Even though the teachers are coordinating the interaction, students decide on the level of their input, the imprint of the lectures on them. The toolset used in the teaching process should support reaching the organisational goals (maximising the student number vs. maximising value added), simplify the knowledge delivery by the teacher and maximise the student imprint. To address the students appropriately, it is meaningful to use their native communication channels.

Even though the most exposed part of the process is the teaching sui generis, generally judged by the student user experience, the preparation and evaluation processes ensure the viability of the process, providing quality teaching (to multiple student generations).

The dynamics in the teaching process is driven by the student ever-changing expectations and capacities to use new technologies. To follow this dynamic and at the same time to focus on their basic tasks, the teachers should gain the necessary support and use the opportunities offered to upgrade their teaching skills.

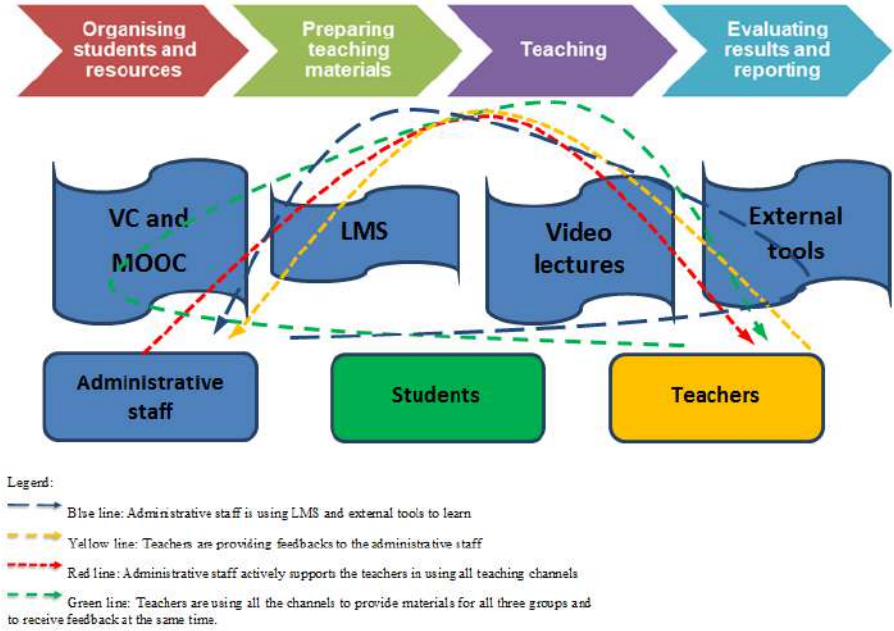


Figure 4: Teaching the teacher process
Source: own

Teach the teacher process involves introducing the new technologies, methods as well as advances in the content to the teachers. The process itself is quite complex. It involves administrative staff, such as the Didakt.um at the University of Maribor, further specialised learning environment, recording participation, recorded virtual classrooms, etc.

The University of Maribor makes significant organisational efforts to support the teachers to use adequate LMS tools, to invoke multimedia and independent tools and to raise the teachers' capacity and competences. These results in upgrading the entire system to a level where the teaching process could provide value added for the students.

Currently, multiple teaching activities are executed for the teachers and administrative staff at the University of Maribor. Interestingly, these teaching activities are not executed in the LMS used for the students. The downside of this approach is that the teachers do not experience the learning process of the students.

Thereby, our last proposal is to use the same LMS to teach both the students and the teachers. Doing so, the complete teaching process using existing IT services and administrative staff will be used to teach the teachers and the administrative staff. The feedbacks generated by the teachers and administrative staff can have a significant impact on the teaching toolset quality. New tools and pilot projects would have the opportunity to be tested on the staff and by the staff, providing a much faster feedback, and increase the quality of the teaching process.

There are some expected drawbacks: we may expect an organisational resistance arguing that the teaching process for the teachers is fundamentally different from the standard student teaching processes. We may also expect the LMS incapacity to deal with teaching the teachers dynamics. In our opinion, these and other considerations should be examined thoroughly; further, the organisational efforts to address them should be compared to potential value added delivered by the proposed approach.

5 Summary

The complexity of the available teaching tools has the potential to contribute in the process of redesigning the teaching process. These tools offer a high variety of options, from interactive work in small geographically dislocated groups to massive knowledge distribution. They redefine the relationships between the students and teachers and not to mention the administrative staff.

The use of the toolset depends on the strategies, a school decides to use to reach its goals. These can range from delivering high quality experience learning for each and every student, through active participation and cooperation in dynamic groups to mass produced best of breed content to reach high volumes of student. Simply using the most appropriate tool will probably not bring the desired results; therefore, finding a right combination of tools that should support the teachers and students in their learning process is essential.

Since learning is a dynamic process with expected learning outcomes, courses contents and teaching methods in constant change, the use of the teaching tools should be consistently adapted to provide maximum support.

A proficient use of the learning tools is difficult for the teacher. The sheer variety and emergence of new tools can be intimidating. Additionally, the focus on the content is radically expanded to the focus on the teaching methodology that should support institution goals (a peer to per or mass communication). Thereby active support is needed. The administrative services are to be involved in actively support the struggle to design the best possible learning environment and share the teaching related know how.

How to support the dynamic development of the student focused teaching environment? We argue that the environment for teaching students should be used in the organisational learning as well. This way, the teachers and administrative staff will experience the learning environment by themselves and find a faster loop to adapt to the new expectations.

References

Akyol, B. (2016). Teacher self-efficacy perceptions, learning oriented motivation, lifelong learning tendencies of candidate teachers: a modeling study. *Eurasian Journal of Educational Research, 65*, 19-34. doi:10.14689/ejer.2016.65.02

Avalos, B. (2011). Teacher professional development in teaching and teacher education over ten years. *Teaching and Teacher Education, 27*(1), 10-20. doi:10.1016/j.tate.2010.08.007

Bentes, J., Bravo, L. H. O., & Hernandez, F. A. C. (2017). The ICTs in the transversal curricular integration of the educational practice. *Conhecimento & Diversidade, 9*(17), 48-60. Retrieved from <Go to ISI>://WOS:000412302700004

Brahimi, T., & Sarirete, A. (2015). Learning outside the classroom through MOOCs. *Computers in Human Behavior, 51*, 604-609. doi:10.1016/j.chb.2015.03.013

Chang, C. Y., Lai, C. L., & Hwang, G. J. (2018). Trends and research issues of mobile learning studies in nursing education: A review of academic publications from 1971 to 2016. *Computers & Education, 116*, 28-48. doi:10.1016/j.compedu.2017.09.001

Customshow. (2017). 40 Presentation software & Powerpoint alternatives for 2017. Retrieved from https://www.customshow.com/best-powerpoint-alternatives-presentation-programs/

Dafoulas, G., Barn, B., Abeysinghe, G., Zheng, Y. J., Swigger, K., Brazile, R., . . . Cabrera, V. L. (2010). Using learning management systems as support mechanisms for formative feedback - the case of lifelong learning. *Edulearn10: International Conference on Education and New Learning Technologies*. Retrieved from <Go to ISI>://WOS:000318781702089

Diaz-Moure, L. (2010). E-learning as a teaching method to develop competencies in the context of governance. *Revista Del Clad Reforma Y Democracia, 47*, 167-+. Retrieved from <Go to ISI>://WOS:000280716800006

Didakt.um. (2018). About Didakt.um. Retrieved from https://Didakt.um.si/oprojektu/Strani/default.aspx

Espejo, R., Bowling, D., & Hoverstadt, P. (1999). The viable system model and the Viplan software. Kybernetes, *28*(6-7), 661-678. doi:10.1108/03684929910282944

Hsieh, Y. H., Lin, Y. C., & Hou, H. T. (2016). Exploring the role of flow experience, learning performance and potential behavior clusters in elementary students' game-based learning. *Interactive Learning Environments, 24*(1), 178-193. doi:10.1080/10494820.2013.834827

Hung, I. C., Kinshuk, & Chen, N. S. (2018). Embodied interactive video lectures for improving learning comprehension and retention. *Computers & Education, 117*, 116-131. doi:10.1016/j.compedu.2017.10.005

Kaplan, A. M., & Haenlein, M. (2016). Higher education and the digital revolution: About MOOCs, SPOCs, social media, and the Cookie Monster. *Business Horizons, 59*(4), 441-450. doi:10.1016/j.bushor.2016.03.008

Kind, T., & Evans, Y. (2015). Social media for lifelong learning. *International Review of Psychiatry, 27*(2), 124-132. doi:10.3109/09540261.2014.990421

Meza, S. N., Orza, B., & Vlaicu, A. (2015). Higher education teacher training and lifelong learning in the emerging social media driven society. *Smart 2014 - Social Media in Academia: Research and Teaching*, 417-421. Retrieved from <Go to ISI>://WOS:000367888300062

RCUM. (2017). AIPS. Retrieved from https://it.um.si/studenti/Strani/default.aspx?podrocje=Aplikacije

Rubio, D. F. G., Carballo, D. F. S., & San Roman, D. (2015). Analysis of the effectiveness of a teaching methodology based on the use of smartphones with communication students. *Prisma Social, 15*, 00–33. Retrieved from <Go to ISI>://WOS:000376826000001

SoftwareLab. (2017). LMS infographics. Retrieved from https://www.capterra.com/learning-management-system-software/#infographic

Su, Y. S., Huang, C. S. J., & Ding, T. J. (2016). Examining the effects of moocs learners' social searching results on learning behaviors and learning outcomes. *Eurasia Journal of Mathematics Science and Technology Education, 12*(9), 2517-2529. doi:10.12973/eurasia.2016.1282a

Sugiyama, L., Pathumcharoenwattana, W., Burasirirak, S., & Santiparp, P. (2016). A Learning process of self-development program to enhance potential in lifelong learning management of non-formal education facilitators in Thailand: a qualitative study. *Advanced Science Letters, 22*(5-6), 1197-1200. doi:10.1166/asl.2016.6653

van der Meij, H. (2017). Reviews in instructional video. *Computers & Education, 114*, 164-174. doi:10.1016/j.compedu.2017.07.002

van Weert, T. (2005). Lifelong learning in the knowledge society - implications for education. In T. van Weert (Ed.), *Education and the Knowledge Society: Information Technology Supporting Human Development*, (pp. 15-25). Boston (MA) : Springer.

Vue, G., Hall, T. E., Robinson, K., Ganley, P., Elizalde, E., & Graham, S. (2016). Informing understanding of young students' writing challenges and opportunities: Insights from the development of a digital writing tool that supports students with learning disabilities. *Learning Disability Quarterly, 39*(2), 83-94. doi:10.1177/0731948715604571

Wikipedia. (2018). Learning Management Systems. Retrieved from https://en.wikipedia.org/wiki/Learning_management_system

Zhai, X. S., Gu, J. B., Liu, H. F., Liang, J. C., & Tsai, C. C. (2017). An experiential learning perspective on students' satisfaction model in a flipped classroom context. *Educational Technology & Society, 20*(1), 198-210. Retrieved from <Go to ISI>://WOS:000392040600018

PROCEEDINGS OF THE 2ND INTERNATIONAL SCIENTIFIC CONFERENCE
»TEACHING METHODS FOR ECONOMICS AND BUSINESS SCIENCES«
7 MAY 2018, MARIBOR, SLOVENIA
N. Gajšt & A. Plos (eds.)

University of Maribor Press

What Drives Non-Economics Majors to Study Economics?

MARCUS SIDKI & DAVID BOLL

Abstract This analysis allows teachers of economics to understand better the reasons why students not majoring in economics attend economics lectures. We investigate whether the common factors that motivate economics majors to study also hold for non-economic majors. Using data from a survey among 252 business majors, we explore the reasons for increased interests in economics based on the perception of and opinion on economic studies. Results from ordered logistic regression analysis show the influence of opinions on economics to be in line with related research, i.e. future income and job expectations are relevant motivational factors also for non-economics majors. This is also true for the students' perception of economics teaching. The calculation of marginal effects allows gaining additional insights into the interdependencies of the identified factors. The influences do not only hold on average but also show a predominantly consistent pattern when moving by one point on the Likert-scale.

Keywords: • non-economic majors • opinion • perception • economic studies • survey •

CORRESPONDENCE ADDRESS: Marcus Sidki, PhD, Professor, Ludwigshafen University of Applied Sciences, Ludwigshafen, Germany, e-mail: marcus.sidki@hs-lu.de. David Boll, MSc, Lecturer, Ludwigshafen University of Applied Sciences, Ludwigshafen, Germany, e-mail: david.boll@hs-lu.de.

DOI https://doi.org/10.18690/978-961-286-285-5.13 ISBN 978-961-286-285-5
Dostopno na: http://press.um.si

1 Introduction

Economics education experiences only low significance in German secondary education curricula as it does not constitute a mandatory subject. Instead, most young people gather economics knowledge in a more informal manner (Macha, Neubauer, Rehm, & Schuhen, 2011). The first formal encounter with economic theory and thinking – if any at all– occurs when they enrol at a university. This does not only account for students majoring in economics but also for a much larger group of non-economics majors. While students of many fields of study such as political sciences, social sciences, information technology or engineering have the option to choose economics courses, they form a mandatory minor subject for business-related study programmes. In addition, within the German higher education system, there is a clear distinction between business and (classical) economics studies with an overlapping content of rarely more than 10-15%. Thus, business studies are an ideal focus group for the subsequent analysis.

Introductory courses on economics build the first encounter of many young people with economic theory and thinking – and often the last, as this is the only knowledge transfer channel in the educational lifecycle for a vast amount of students. Research generally indicates a considerable lack of economic knowledge in German society (Jappelli, 2010). Thus, economics taught to non-economics majors can be assumed to have a significant impact on how economic issues are dealt with in Germany (Wobker, Kenning, Lehmann-Waffenschmidt, & Gigerenzer,G. 2014).

This paper aims to contribute to the existing literature by improving the understanding of students' choices for studying economics with an emphasis on the significance of economics as subject for non-economics majors. We solely focus on the student's point of view, i.e. on their perception of and opinion on economics teaching and the field of economics in general in order to generate insights into the current state of economics education in Germany. The nucleus of our analysis is a survey carried out among business students at a German university during the winter term 2016/17. In the following section, we briefly discuss the relevant research background of our analysis and in section 3, we introduce our institutional setting and present descriptive statistics. In section 4, we present the empirical model and discuss the findings, followed by the conclusion in section 5.

2 Related Work

The justification of focusing specifically on the economics education of non-economists is based on differences in the perception of economic issues between people with and without economics education. Research indicates systematically distinct opinions between economists and the general public even when adjusting for economists' ideological and self-serving bias (Caplan, 2002). Haucap and Heimeshoff (2014) as well as Haucap and Müller (2014) analyse respective distinctions in academia and find significant differences for students of economics compared to students of different fields of study. This applies for specific characteristics such as prospective economists being less trusting and also less trustworthy (Haucap & Müller, 2014) while at the same time they experience a higher subjective life satisfaction which is driven by the motive of high expected future incomes and the motive of good future job expectations (Haucap & Heimeshoff, 2014). Willies and Pieper (1996) also find the job prospect motive as the explanation to study economics. Robst and VanGilder (2014) find that the income motive to study economics seems justified. Economics graduates tend to have higher incomes compared to business graduates and it is also less likely for them to work in a job related to their degree. Denny (2014) compares economics majors and non-economic majors with respect to their success in introductory economics lectures. The author identifies a path-dependency of secondary school performance, especially in mathematics, to be a more important factor of success for non-economic majors than for economics majors. Furthermore, the latter show better final grades, which is explained by motivation and interest in economics as the essential factor distinguishing the two groups. To summarise, various studies show students' opinions on economics, especially concerning their future income and job perspectives, to be influential motivational factors.

Webber and Mearman (2012) focus on students' perception of economics particularly to identify factors that induce students to demand more economics studies in their curriculum. Based on an online survey carried out among students taking economics courses from different countries and levels of study, the authors find master's students to be significantly less likely to want to study more economics. Students with work experience on the other hand are significantly more likely to want to study more economics. Not surprisingly, students with positive perception of economics with respect to general interest or usefulness (e.g. "easy to understand", "helps future career", "help makes better decisions")

are more likely to desiring more economics and vice versa. Mearman, Papa and Webber (2014) further investigate the perception issue applying a mixed-methods approach among UK economics students. They find that students' perceptions of studying economics are, on average, somewhat negative, while at the same time they regard economics as a value adding subject to study. In line with the literature discussed above, the authors also find the expectation of career outlooks and financial benefits to be positively correlated with the students' perception of economics.

To sum up, most research covers questions concerning motivational factors of economic majors to study economics. There is only little research on the matter with a specific focus on non-economics majors. The relevance to fill this gap can be derived from the above mentioned vast amount of non-economics majors who attend at least some economics lectures and usually exceed economics majors by far (for the case of Germany, there are nearly 12 times as many students studying business than classical economics). Hence, this paper aims at improving the understanding of non-economics majors' choices for studying economics. Our research questions deviate from the multiple insights we can adapt from the discussed work into our own analysis. We incorporate the significant motivational factors to study economics, job perspective and income, and test whether their influence also holds for non-economic majors to desire more economic lectures (opinion channel). In addition, we ask whether the experiences with economics contents so far have an impact on non-economics majors' decisions (perception channel).

3 Estimation and results

For the empirical analyses, we used the data from a survey carried out among 252 business majors. The data were collected as a stratified sample out of a population of around 3,500 business students studying at a German university during the winter term of 2016/17. We focused solely on business majors since introductory courses in economics are mandatory for all business-related study programmes at the university. This ensured that we gathered data from a homogenous group and all respondents are eligible within context and scope of the analyses. The stratification was based on the individual bachelor's and master's study

programmes. Selection criteria were, firstly, the academic semesters[1] to make sure that students of all possible academic stages are included in the survey and, secondly, the programmes with the highest enrolled student numbers to optimise sample size. Additionally, the dataset was filtered for several observations to ensure consistency of the responses. After this procedure, the sample size reduced to n=195.[2]

In the following, we performed an estimation to assess the influence of factors concerning the perception of and opinion on economics taught to non-economic majors. Our variable of interest was whether a student wants to study more economics. Since the answer is measured on a Likert-scale, we applied ordered logistic regressions, as did Webber and Mearman (2012), Mearman, Papa and Webber (2014) or Robst and VanGilder (2014). We built two models with the distinction of examining the opinion variables in model 1 and the perception variables in model 2. Table 1 shows the results for both models. As discussed above, the number of observations dropped from 195 to 130 when focusing on perception, since we only included students having attended an economics lecture prior to the survey. For that reason, the first model was our preferred specification for all variables that do not concern perception. In addition to the displayed variables in Table 1, we used *age*, *squared age*[3], the stage of advancement in academic education measured as a respondent's current bachelor's or master's *semester* as well as *work experience not related to economics contents* as control-variables in both models. None of them showed a pattern of significant influence in the model, which is in line with the related findings by Mearman, Papa and Webber (2014). Contradictory to Webber and Mearman (2012), we do not find Master's students to be significantly less likely to want more economics.

Our results suggest that students with work experience from a dual studies programme (internship/working student) which is related to economics contents of the current studies are 2.4 (2.3) times more likely to want to study more economics than those who have no work experience. In contrast, students with prior full-time work experience are about 8 times less likely to want to study more

[1] Study programmes in Germany are predominantly divided into semesters, typically a winter and a summer semesnter. Bachelor degree studies usually range from 6 to 8, Master degree studies from 2 to 4 semesters.
[2] To control the consistency of the replies, we asked the respondents to assess the statements "I would like to have a higher amount of economics during my studies" and "I would like to have a lower amount of economics during my studies". We dropped all observations where students gave simultaneously a 4 or more on a Likert-scale from 1 (strongly disagree) to 6 (strongly agree) for both questions.
[3] We include age squared in the model since literature frequently points to a U- or inverted U-shaped function of age (Balestra, 1990).

economics. Next, we find weak support that the frequently discussed gender gap in economics, i.e. the persistent difference of male and female students studying economics (Happ, Förster, Zlatkin-Troitschanskaia, 2016; Asarta, Butters, & Thompson, 2014; Dynan & Rouse, 1997) also holds for non-economics majors. Male students are 1.7 times more likely to want to study more economics than female students. In addition, past economics teaching contents has some significant influence. Respondents with prior experience with economics contents from secondary school education are about 3 times more likely to want to study more economics than those without such experience. This is consistent with the findings from Happ, Förster, Zlatkin-Troitschanskaia, & Carstensen (2016) that prior school experience in economics has a positive impact on the success of subsequent economics studies. Unlike the stated authors, we cannot confirm the same conclusion for prior experiences arising from apprenticeships/vocational trainings. The academic background of the parents does not seem to play a decisive role either. The coefficients hint that students whose parents do not have a university degree are more likely to want to study more economics than those with one parent or both parents holding a university degree. However, both variables are statistically insignificant. Some influence is found with respect to the desired type of future employment. The students who want to be self-employed in the future are about 2.9 times less likely to want to study more economics than those who would like to work in a private-sector job. The remaining employment types and undecided students do not show any significant distinction.

Table 1: Ordered Logistic Regression Output.

Variables/Groups		Regression 1 coef	Odd	Regression 2 coef	Odd
Do you have work experience related to the economics contents of your current studies?	No		Reference		
	Yes, other side job	1.507 (1.043)	4.511	0.892 (1.483)	2.440
	Yes, internship/working student	0.843 (0.497)*	2.323	0.416 (0.623)	1.516
	Yes, dual studies	0.892 (0.428)**	2.440	0.291 (0.613)	1.337
	Yes, apprenticeship	0.559 (0.518)	1.749	0.480 (0.658)	1.616
	Yes, full-time job	-2.072 (1.022)**	0.126	-3.491 (1.564)**	0.030
Gender	female		Reference		
	male	0.531 (0.309)*	1.701	-0.231 (0.418)	0.794
Have you already had any economics teaching content?	No		Reference		
	Yes, Apprenticeship	-0.386 (0.976)	0.680	-0.138 (1.289)	0.871
	Yes, School	1.082 (0.469)**	2.951	0.042 (0.907)	1.043
	Yes, University Lecture	-0.702 (0.510)	0.496	-0.849 (0.757)	0.428
Do your parents possess a university degree?	No, none of them		Reference		
	Yes, one of them	-0.020 (0.354)	0.980	-0.259 (0.461)	0.772
	Yes, both	-0.495 (0.445)	0.609	0.360 (0.706)	1.433
Please state your preferred future type of employment	Private Job		Reference		
	Self-employment	-1.050 (0.617)*	0.350	-1.123 (0.819)	0.325
	Public Sector Job	-1.563 (1.013)	0.210	-1.430 (1.131)	0.239
	Academic job	1.793 (1.632)	6.005	-1.728 (1.709)	0.178
	Others/I don't know	-0.311 (0.354)	0.733	-0.237 (0.466)	0.789
	Non-Profit Organization	-0.557 (1.213)	0.573	1.498 (1.199)	4.474
Better interdisciplinary comprehension (1-6)		-0.140 (0.165)	0.870		
Helpful for future working life (1-6)		0.664 (0.190)***	1.944		
Helpful for general economic and political comprehension (1-6)		0.337 (0.156)**	1.400		
Earn more money later (1-6)		0.294 (0.143)**	1.342		
Positive perception index (1-6)				0.778 (0.226)***	2.177
Lectures too theoretical (1-6)				-0.337 (0.164)**	0.714
Cut 1		9.450 (5.351)		-4.075 (7.707)	
Cut 2		10.603 (5.361)		-2.909 (7.696)	
Cut 3		11.894 (5.374)		-1.832 (7.694)	
Cut 4		13.214 (5.389)		-0.736 (7.697)	
Cut 5		14.277 (5.403)		0.182 (7.697)	
Pseudo R^2		0.1507		0.1235	
Log Likelihood		-281.15167		-192.60359	
LR chi2		99.75***		54.25***	
Observations		195		130	

Notes: Ordered logistic regression. Dependent variable: "I would like to study more economics". Included, but not displayed are age, squared age, current bachelor's or master's semester and work experience not related to economics contents as control-variables in both models. None of them shows a pattern of significant influence. ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively.

Next, we analyse the influence of the overall opinion on the field of economics on the desire of non-economic majors to study more economics, hence their general appreciation of economics as a teaching subject. The four variables analysed as predictors were examined for possible multi-collinearity first. The

paired correlation coefficients show strong relationships, thus indicating possible multi-collinearity. However, due to further testing, we find that the multi-collinearity problem should not be too great here.[4]

The estimation shows that the highest level of significance (1%) is reached for the statement of economics being *helpful for future working life*. If the agreement with this statement increases by one point on the Likert-scale, the probability to strongly agree to want more economics studies is 1.9 times greater compared to all other outcomes of the dependent variable. This also applies for the statements *helpful to earn more money later* and *helpful for general economic and political comprehension*, i.e. intradisciplinary comprehension, which are both statistically significant at the 5%-level. An increase in the agreement that studying economics *is helpful for general economic and political comprehension (helps to earn more money later)* by one point leads to a 1.4 times higher (1.3 times higher) probability to strongly agree to want more economics studies compared to all other outcomes. To sum up, we find income and job perspective to play a pivotal role in the motivation to study economics even for non-economics majors, which is in line with the related findings of Haucap and Heimeshoff (2014), Willies and Pieper (1996), Robst and VanGilder (2014), Mearman, Papa and Webber (2014) and Happ, Schmit and Zlatkin-Troitschanskaia (2013). We also find the students' view on intradisciplinary but not interdisciplinary comprehension to be influential on the significance of economics as a field of study.

As the variables associated with positive perception, i.e. *satisfaction with quality*, *able to understand*, *requirements appropriate*, *learning success* and *interesting style of teaching*, are highly correlated and multi-collinearity cannot completely be ruled out, we created a positive perception index (ppi). The remaining variable, *too theoretical*, is anticipated as having a negative influence on the dependant variable and is separately included in model 2 of the regression. Both variables are significant and show coefficients as expected. If positive perception measured by the positive perception index rises by one point, it is 2.2 times more likely to strongly

[4] To test for multi-collinearity between the independent variables we also ran an OLS regression using the same variables and determined the VIF-values afterwards. A maximal VIF-value of about 3 can be observed which is clearly below the critical value of 10 (cf. Wooldridge, 2013). However, note that separately included in the model, each of the four variables has a positive coefficient significant at the 1%-level such that the probability of students to want to study more economics rises with an increase in each of those variables. If all variables are put together as in the model, the effect of each of the variables is at least a little alleviated. The statement that *economics content is helpful for interdisciplinary comprehension* even loses its significant influence.

agree to want to study more economics, while it is 1.4 times less likely, if the perception that economic lectures are too theoretical increases by one point.

4 Conclusion

While the research on factors that influence students on studying economics usually focusses on economics majors, this article concentrated on a much larger group of non-economics majors. Using data from a questionnaire among business students, the statistical estimation performed above analyses whether the frequent findings based on economics majors can be confirmed for non-economics majors, too.

Our analysis has identified several interesting findings. We find some support that the well-known gender gap among economics majors also holds for non-economics majors. In addition, students with work experience from a dual studies programme and with prior experience with economics contents from secondary school education are found to have a more positive attitude towards economics studies. Future income expectations and job perspectives, i.e. the opinion channel, are relevant motivational factors for non-economics majors to study economics. The analysis of students' perception of economics teaching also shows results as expected. An index combining the elements satisfaction with quality, comprehension, appropriateness of requirements as well as expected learning success due to and general interest in teaching style has a positive impact on the prospect of more economics studies, while the opposite is found to be true for the negative perception of economics being evaluated as too theoretical.

In conclusion, we identify our results to be in line with the related existing research. The relevant factors that influence economic majors to study economics also hold for non-economics majors. This is especially found to be true for factors of opinion on and perception of economics as a field of study. The positive and negative factors of teaching and curriculum affect both groups of students alike.

References

Asarta, C. J., Butters, R., & Thompson, E. (2014). The gender question in economic education: Is it the teacher or the test? *Perspectives on Economic Education Research*, *9*(1), 1-19.

Balestra, P. (1990). Dummy variables. In: J. Eatwell, M. Milgate & P. Newman (Eds.): *Econometrics* (pp. 70-74). Macmillan: London.

Caplan, B. (2002). Systematically biased beliefs about economics: Robust evidence of judgemental anomalies from the survey of Americans and economists on the economy. *The Economic Journal*, *112*(479), 433-458.

Denny, E. (2014): Factors influencing the performance of non-economics majors in an introductory economics course. *International Review of Economics Education*, *17*, 1-16.

Dynan, K. E., & Rouse, C. E. (1997). The Underrepresentation of women in economics: A study of undergraduate economics students. *Journal of Economic Education*, *28*(4), 350-368.

Happ, R. , Förster, M., Zlatkin-Troitschanskaia, O., & Carstensen, V. (2016). Assessing the previous economic knowledge of beginning students in Germany: Implications for teaching economics in basic courses. *Citizenship, Social and Economics Education*, *15*(1), 45-57.

Happ, R, Schmidt, S. & Zlatkin-Troitschanskaia, O. (2013). Der Stand des wirtschaftswissenschaftlichen Fachwissens von Bachelorabsolventen der Universität und der Fachhochschule. In: U. Faßhauer, B. Fürstenau, & E. Wuttke (Eds.), *Jahrbuch der berufs- und wirtschaftspädagogischen Forschung [Yearbook of Vocational and Management Training]* (pp. 73-85).Opladen: Budrich.

Haucap, J., & Heimeshoff, U. (2014): The happiness of economists: Estimating the causal effect of studying economics on subjective well-being. *International Review of Economics Education*, 17, 85–97.

Haucap, J., & Müller, A. (2014). *Why are economists so different? Nature, nurture and gender effects in a simple trust game.* (Düsseldorf Institute for Competition Economics, Discussion Paper No. 136). Düsseldorf, Germany: Düsseldorf University Press (DUP).

Jappelli, T. (2010): Economic literacy: an international comparison. *The Economic Journal*, 1*20*(548), 429-451.

Macha, K., Neubauer, M., Rehm, M., & Schuhen, M. (2011). Informelles Lernen und Ökonomische Bildung. In J. Schlösser & M. Schuhen (Eds.). *Siegener Beiträge zur Ökonomischen Bildung*, 1/2011. Siegen: Zentrum für ökonomische Bildung in Siegen (ZöBiS),Universität Siegen.

Mearman, A., Papa, A. & Webber, D. J. (2014). Why do students study economics? *Economic Issues*, *19*(1), 119-147.

Robst, J. & VanGilder, J. (2016).Salary and job satisfaction among economics and business graduates: The effect of match between degree field and job. *International Review of Economics Education*, *21*, 30-40.

Webber, D. J., & Mearman, A. (2012). Students' perceptions of economics: identifying demand for further study. *Applied Economics*, *44*(9), 1121-1132.

Weijters, B., Cabooter, E. & Schillewaert, N. (2010). The effect of rating scale format on response styles: The number of response categories and response category labels. *International Journal of Research in Marketing*, *27*(3), 236–247.

Willis, R. A. & Pieper, P. J. (1996). The economics major: a cross-sectional view. *Journal of Economic Education*, *27*(4), 337-349.

Wobker, I., Kenning, P. H., Lehmann-Waffenschmidt, M., & Gigerenzer,G. (2014). What do consumers know about the economy? A test of minimal economic knowledge in Germany. *Journal für Verbraucherschutz und Lebensmittelsicherheit. Journal of Consumer Protection and Food Safety*, *9*(3), 231-242.

Wooldridge, J. M. (2013). *Introductory econometrics. A modern approach*. Mason: South-Western Cengage Learning.

PROCEEDINGS OF THE 2ND INTERNATIONAL SCIENTIFIC CONFERENCE
»TEACHING METHODS FOR ECONOMICS AND BUSINESS SCIENCES«
7 MAY 2018, MARIBOR, SLOVENIA
N. Gajšt & A. Plos (eds.)

University of Maribor Press

Diversity and Adaptation in Mathematics Teaching – An Experience in an Accounting and Management Degree

FILOMENA SOARES, ANA PAULA LOPES &
MARIA PAULA NUNES

Abstract This paper presents an educational experience developed in a basic and general Mathematics Course in an Accounting and Management degree at the Polytechnic of Porto. The main goal of this plan was to minimize the impact of differentiated Maths' backgrounds of first-year students, in particular, to combat dropout and high failure rates in this curricular unit and, in a more general way, to level up students' Maths literacy and skills. The strategic plan was introduced in 2012, with registered results between 2013 and 2016, and had a corresponding "target audience" including all students enrolled at the Maths Curricular Unit in the Accounting and Management Degree. The methodologic steps connected to the project development, implementation, maintenance and transferability will be described, ranging from its scientific and pedagogical structural design – going through boards' submission and approval - to student's background analysis, quantification and characterisation, among others. The results achieved over the last three years of its implementation will be presented, as well as its real and tested pros and cons and transferability to other courses and/or subjects.

Keywords: • active learning • student engagement • (un)success • teaching methods • educational experiences • higher education • mathematics curricula •

CORRESPONDENCE ADDRESS: Filomena Soares, PhD, Senior Lecturer – Associate Professor, Polytechnic of Porto - School of Hospitality and Tourism, Vila do Conde, Portugal, e-mail: filomenasoares@esht.ipp.pt. Ana Paula Lopes, PhD, Senior Lecturer – Associate Professor, Polytechnic of Porto - Porto Accounting and Business School - CEOS.PP, S. Mamede de Infesta, Portugal, e-mail: aplopes@iscap.ipp.pt. Maria Paula Nunes, Mst, Senior Lecturer – Associate Professor, Polytechnic of Porto - Porto Accounting and Business School, S. Mamede de Infesta Portugal, e-mail: paulanunes@iscap.ipp.pt.

DOI https://doi.org/10.18690/978-961-286-285-5.14 ISBN 978-961-286-285-5
Dostopno na: http://press.um.si

1 Introduction - Framework and Context

To enable a global view and better comprehension of the work presented here, we will begin by describing the organizational framework of our institution within the Portuguese higher education system, a brief description of our entire educational system and the entry process into higher education in Portugal. Since this is a pedagogical experience in the teaching of Mathematics to non-mathematicians, we analyse the exams required as specific tests for the above-mentioned entry process into higher education, as well as a brief reference to the syllabus for the Curricular Unit (CU) presented and those appearing in the several alternative paths from the pre-university education (secondary education).

1.1 P. Porto and ESEIG

The Polytechnic of Porto (P.Porto) is a Higher Education Portuguese institution providing undergraduate and graduate studies, with a long history, whose origins go back to 1852 (History – P.PORTO. (n.d.)). This academic community has more than 20.000 students, faculty and researchers, assigned to one of its eight Organic Units (UO) spread across three campuses – Porto (Campus 1), Póvoa de Varzim/Vila do Conde (Campus 2) and Felgueiras (Campus 3).

The former School of Industrial and Management Studies (ESEIG) was one P. Porto's UO that was, as a consequence of a strategic reposition of the institution in 2016, transformed into P.Porto Campus 2, which currently houses two new schools: the School of Hospitality and Tourism (ESHT) and the School of Media, Arts and Design (ESMAD). It originally had two buildings, one in Póvoa de Varzim and one in Vila do Conde in 1990 and it was only in 2001 that ESEIG was housed in a new single building. With 26 years of history, ESEIG had an educational offer of 8 undergraduate degrees, seven postgraduate programmes, seven master's degrees and two technological specialization courses in areas ranging from Accounting and Administration, to Design, Hotel Management, Engineering, among others, with about 1,500 students and more than 100 faculty members.

1.2 Portuguese Educational System

Portuguese Education System encompasses three separate educational levels: basic/primary, secondary and higher (see Figure1 and Figure 2).

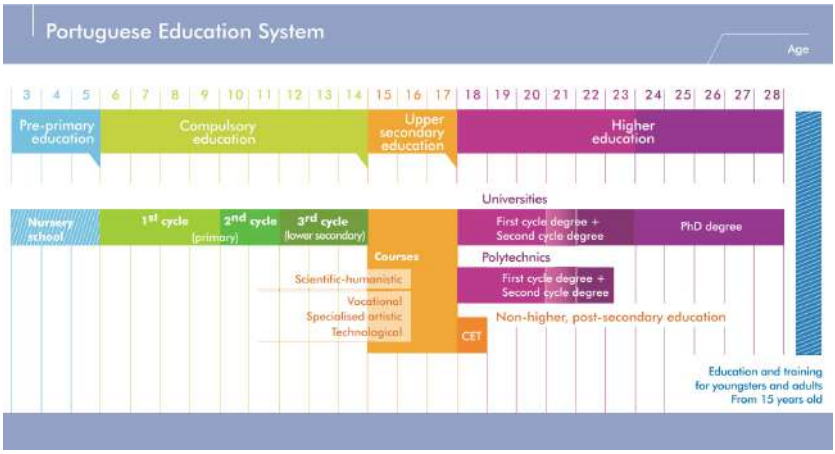


Figure 1: Portuguese Education System
Source: Ministry of Education (2007), pp. 9

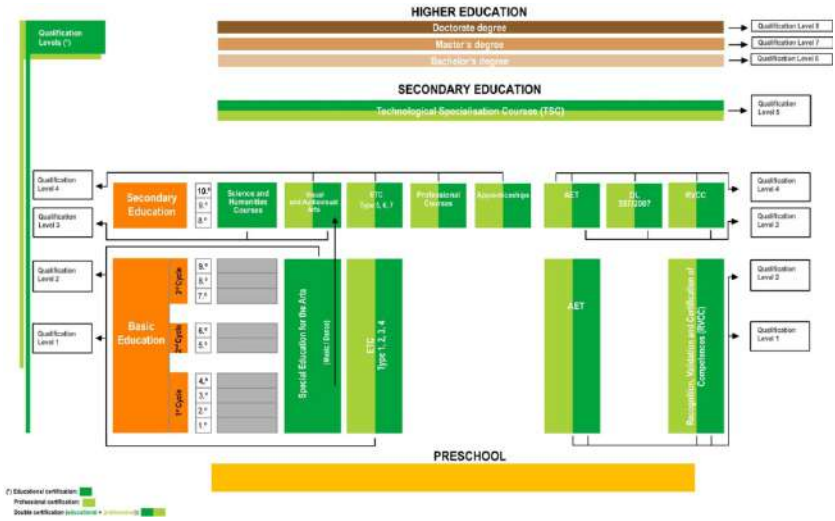
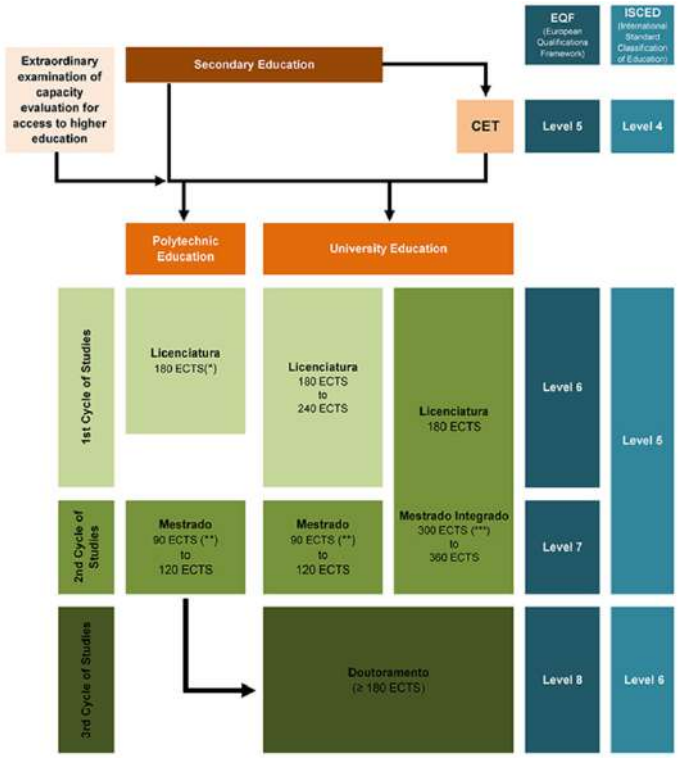


Figure 2: Portuguese Education and training system
Source: A.N.Q. (2011). pp. 25

Since 2016, the first six school years (1st and 2nd cycles – from 6 to 12 years of age) are currently the only ones which guarantee that all Portuguese students have gone through the same educational curricula within twelve years of compulsory education (starting when students are 6 years old and finishing high school when they are 18 years old). From the 7th to the 9th grade (3rd cycle or lower secondary education) and from the 11th to the 12th grade (upper secondary cycle) there are alternative paths for students to take – General/Training courses and General/Vocational courses, respectively. Since all these distinct alternative cycle curricula are interchangeable, students can proceed to the third cycle (higher education) from any previous secondary cycle path they choose (Ministry of Education, 2007). Currently, there are also post-secondary technological specialization courses (CET), which are not taught in HEI, and the Professional Technical Superior Courses (CTeSP), which are a higher education programme of two academic years, which do not grant a degree, and are not shown in the presented Figures above.

Higher Education System in Portugal is divided into two sub-systems – the University one and the Polytechnic one – (see Figure 3) with a network of public Higher Education Institutions (HEI) made up of 14 Universities, 20 Polytechnic Institutes and 6 institutions of military and police Higher Education. In the private sector, HEI comprises 36 Universities and 64 Polytechnic Institutes (Portuguese Higher Education. (n. d.)).



(*) Except when in order to exercise a certain professional activity requiring education and training rating between 210 and 240 ECTS.

(**) In exceptional circumstances, and subject to the fulfillment of every requirement relating to the definition of the objectives of the degree and the conditions for acquiring the latter, a cycle of studies leading to a *Mestre* degree in a specialized field may be amount 60 credits resulting from a stable and consolidated practice in that specific field at international level.

(***) A *Mestre* degree may also be granted following an integrated cycle of studies of which the duration, for the purposes of obtaining access to a professional activity, a) is established by European Union regulations;and b) results from a regular and consolidated practice within the European Union; in such cases, a *Licenciado* degree is granted to students having obtained 180 ECTS (3 years, 6 semesters).

Figure 3: Diagram of Portuguese Higher Education according to Bologna
Source: http://www.studyinportugal.edu.pt/index.php/study/portuguese-higher-education

1.3 Entering High Education in Portugal

Portuguese governments have established several higher educational policy priorities aiming "to extend higher education access to a wider public and stimulate the development of scientific and technical activities, promoting equity and reducing the numbers of early school-leavers" (Ministry of Education, 2007). In this sense, the creation of technology specialisation courses was encouraged

with the objective of increasing level 4 vocational training provision, of extending access to this training to a wide range of people and, consequently, of opening up new ways of entering higher education.

The general entry conditions to higher education are:

- to pass an upper-secondary education course or legally equivalent qualification;
- to take the necessary exams, known as Entrance Tests, for the course that a student wishes to attend with a minimum mark of 95 points; and
- to satisfy the necessary pre-requisites (if applicable) of the course they are applying to.

These conditions are, as it will be referred later, very wide ranged as there are, for most of high education degrees, several possibilities of Entrance Tests, opening specific degree areas to almost all secondary student's background studies. Some Entrance Tests (2 digit code) even admit the possibility that more than one exam that can be performed (3 digit code), as can be seen in Table 1.

Table 1: Portuguese HEI access - Exams to be performed as Entrance Tests

Entrance Tests		Exams to Perform		Entrance Tests		Exams to Perform	
01	German	**501**	German (initiation - Biennial)	**02**	Biology and Geology	**702**	Biology and Geology
03	Drawing	**706**	Drawing A	**04**	Economy	**712**	Economy A
05	Spanish	**547**	Spanish (initiation - Biennial)	**06**	Philosophy	**714**	Philosophy
07	Physics and Chemistry	**715**	Physics and Chemistry A	**08**	French	**517**	French (continued - Biennial)
09	Geography	**719**	Geography A	**10**	Descriptive Geometry	**708**	Descriptive Geometry A
11	History	**623**	History A	**12**	History of Culture and Arts	**724**	History of Culture and Arts
		723	History B				
13	English	**550**	English (continued - Biennial)	**14**	Latin	**732**	Latin A
15	Portuguese Literature	**734**	Portuguese Literature	**16**	Mathematics	**635**	Mathematics A
						735	Mathematics B
17	Mathematics Applied to Social Sciences	**635**	Mathematics A	**18**	Portuguese	**639** **239**	Portuguese Only for severe deaf
		735	Mathematics B				
		835	MACS				
19	Mathematics A	**635**	Mathematics				

There is also another system that makes access to higher education simpler and more flexible for people over 23 years of age and with appropriate training and experience. This is one of the several extraordinary access modalities (along with Transfer requests, holders of other Higher Education degree, among others) that

has been established to promote equal opportunities, to improve attendance and completion of courses, to attract new students and to diversify the provision of education.

The Accounting and Management Degree, the first degree dating from ESEIG's inauguration in 1990, has experienced several transformations to its general curriculum, which culminated with its adaptation to the Bologna Process, in 2006. In these changes, non-nuclear areas were the most 'penalized', essentially when it came to the number of contact hours (lectures), with a reduction from 6 to 3 weekly hours in Mathematics, not directly followed by a reduction in the syllabus content, according to Bologna philosophy and paradigm. This changed the role of the professor from 'knowledge transmitter' to 'skills developer and learning promoter', assuming a more 'personal' role as tutor, manager and supporter.

In the academic year of 2005/2006, along with the Bologna Process, another drastic change was introduced when the minimum grade for the entry test (Specific Exam) was established at 9.5 on a 0-20 scale (DGES - Legislação, (n.d.)). This decision resulted in a huge drop in the number of students that entered degrees in which Mathematics A (National Exam) was the Specific Exam required. In that sense, many institutions made remarkable changes to the Specific Exam required to enter in their degrees, and in ESEIG the Accounting and Management Degree was one of them. Until 2006, in the Accounting and Management Degree students had to take one of the following entry exams: Economy; Geography and Mathematics A (DGES-DSA, 2006, pp.6, 4, 160). Since 2007, the Specific Exams accepted were: 04 Economy, 18 Portuguese or 17 MACS (Mathematics Applied to Social Sciences) (DGES – DSAES, 2008, pp. 3, 78).

1.3 Mathematics in ESEIG's Accounting and Management Degree

Looking at the Mathematics courses connected with this specific degree, one can see the usual General Mathematics as a first-year course, divided into two CUs – Mathematics (1st semester) and Applied Mathematics (2nd semester), Probabilistic Methods, Statistical Methods and Financial Calculus in the second year, and Operational Research in the third. The first semester Mathematics syllabi are the

'usual' in any Management degree, working essentially on basic Calculus items (see Figure 4).

Course: Mathematics

Academic Year: 2015/2016

Academic year: 1
Term: Winter Semester
Attendance: Mandatory
Course Responsible Teacher: Doutora Filomena Soares

Number of Credits (ECTS): 4.0
Theoretical/Practical Work (hours): 51.0 h

Learning Outputs:

Specific outcomes
1 - To analyze a real function.
2 - To apply the differential calculus in the study of the variation of real functions.
3 - To define and calculate the primitive of a real function.
4 - To distinguish the several types of integrals and choose the adequate methods of integration
General outcomes
- To complete, organize, systemize and apply the basic knowledge in Mathematics.
- Apply the knowledge acquired in modelling and solving problems related with real situations in the field of the Accounting/Management/Economy
- Students should de able to understand the mathematical fundaments behind the applications and develop their reasoning and calculus skills

Syllabus:

1. ONE VARIABLE REAL FUNCTIONS - Basic Concepts
1.1. Pre-calculus review
1.2. The logarithmic and the exponential functions
1.3. Some Economical Functions
1.4. Graphing a function, its Tangent and Normal Lines
2 DIFFERENTIATION
2.1 The meaning and interpretation of a derivative
2.2 The basic rules
2.3 The chain rule
2.4 The inverse function¿s derivative
2.5 Implicit Functions and Implicit differentiation
2.6 Equations of tangents and normals to curves
2.7 Differentials
2.8 Applications in Economics: Marginal Functions and Elasticity
2.9. Second and higher derivatives
2.10. Taylor's Formula and Applications
2.11. Absolute and local Extremes. Inflection Points
2.12. Limits. Asymptotes
3. MULTIVARIABLE FUNCTIONS
3.1. Definition and Domain
3.2. Limits and Continuity
3.3. Partial Differentiation
4. INTEGRAL CALCULUS
4.1. Antiderivatives and The Indefinite Integral
4.2. Direct Integration: The Rules of Integration
4.3. Integration Methods

Figure 4: Mathematics Course Syllabus (excerpt)

It is not possible to determine which of the performed Exams students used as Entrance Test, since their 'classification' is a pondered average of their secondary studies (three years) and the Specific Exam they chose: 04 Economy, 18 Portuguese or 17 MACS (see Table 1). It is not even possible to determine or exclude any area of studies from Secondary School since the Exam performed is not directly related to the Area (for example, a student may enter with Portuguese from any area of studies).

As it turns out, the students who enrolled this first semester course had the most varied basic educational background and this has an extremely notorious impact on Mathematics since the curricula of the basic CU (Mat A, Mat B and MACS, not to mention students who have not had Math since the 3rd cycle) are very different from each other. This was the challenge that made us try something in the first semester of the first year, where these students feel even more strongly the impact of entering into higher education: self-questioning is often in terms of choices really wants in terms of 'capacity' for the pursuit of studies, because as professors of this CU cannot wait until they have acquired skills and knowledge in topics that have never analysed, studied or even known.

2 Teaching Practice Description

The work project proposal presented here was introduced yearly at the Department of Mathematics of ESEIG and submitted after to the Technologic-Scientific Council, to be approved for implementation since 2012. From that year and until 2016, it was functioning despite all strict financial constraints. The person in charge of the Mathematics CUs in this Degree proposed the maintenance of this measure, which we will briefly describe in this section, reducing one class in the first semester of the second year of this degree in the course of Probabilistic Methods (working with more than 70 students), allowing to annually perform the 'workload duplication' in the first year, described later in this article, without increasing the number of Math Department FTE (Full Time Equivalent).

2.1 Fundamental Objective - Levelling Up

We can state that the primary objective of this measure goes beyond the increase in the 'success' rates at Math CU in the 1st semester of the 1st year of the Accounting and Management Degree, as much as this is almost the only objectively 'measurable'. The 'ultimate' and first objective of this plan is the accomplishment of CU syllabus which is to fulfil the CU program unit (realizing that many students may not understand the topics because they have never gone through such subjects); to deal with extremely different Math skills in a smooth, unifying and motivating way; and to fight discouragement and desertion. In this sense, the goal was the students' knowledge and skills 'leverage' in Mathematics, promoting its connection, where and when possible, with the nuclear areas of

the degree course, and trying to increase the level of satisfaction with the chosen degree.

First, it is necessary to realize which Maths themes were part of the academic career of our students during the last three years of upper secondary education. To this end, it is essential to analyse some of the most common but different possible curricular paths, with distinct Maths programmes:

- Scientific-humanistic courses – essentially directed at further study at higher education level:
  - Sciences and Technologies – 3 years of Math A (Dgemecpt, 2013) – compulsory
  - Socioeconomic Sciences – 3 years of Math A (Dgemecpt, 2013) – compulsory
  - Languages and Humanities – 2 years of Applied Mathematics to Social Sciences (Dgemecpt, 2001) – optional
- Technological courses, designed for students that wish to join the job market, also allowing the continuation of studies on technological specialized or higher education – 3 years of Math B (Dgemecpt, 2002a, 2002b, 2004);
- Specialised artistic courses, organised to ensure artistic training in the areas of visual and audio-visual arts, dance and music – Math – 2-year syllabus – optional;
- Vocational courses are designed for students that wish to join the job market, providing also further education courses in post- secondary non-tertiary or higher education. Modules are organized by different areas of training – Applied Maths – Mathematics Modules developed during the 3 years – optional.

2.2 Target Audience Analysis

We may say that our 'target audience' were all students enrolled at Maths CU, however this 'target audience' should be properly characterized and 'categorized' regarding courses and Maths level attended in the SS (see Figure 5). In general (DGES – Estudos e Estatísticas, n.d.), there are few differences between the overall candidates' area and the area of those who managed to be enrolled in this

Degree. But the challenge to be faced, despite being related to the field of study, just goes a little beyond this issue, since the Specific Test used for entering this Degree was not, frequently, Math A.

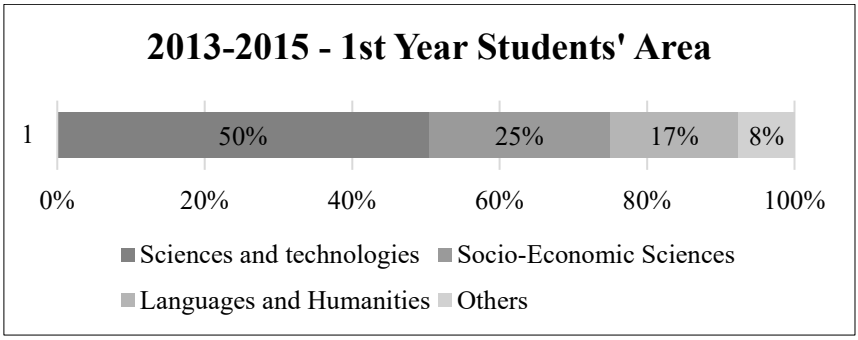


Figure 5: Students enrolled in Accounting and Management in ESEIG – Secondary Study Area

Making use of the information retrieved from an annual enquiry (developed by Maths teachers) that all students entering Accounting and Management Degree at ESEIG have been answering via the school *Moodle* platform since 2013 (which is, as far as we know, the only way to access this type of information, not available in any public data base), we can see that only 26% used Mathematics A National Exam (see Figure 6) as Entrance Examination despite the 75% of them studying Science and Technology and Socio-Economic Sciences.

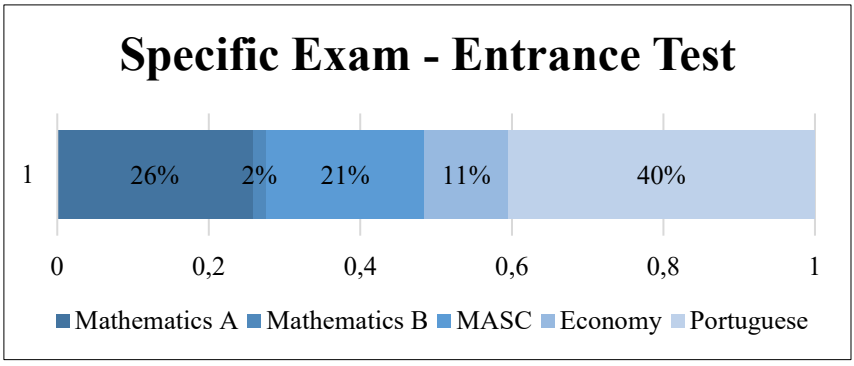


Figure 6: Accounting and Management ESEIG - National Exam performed – 2013 to 2015

More than 1/3 of students registered in the first-year course of Mathematics in the Accounting and Management Degree joined this Bachelor without attending Mathematics (A or B) during their secondary education. That is, besides the 9th grade, these students only (eventually) have, in their academic curriculum the CU of Quantitative Methods or Mathematics Applied to Social Sciences (MACS) taught in the 10th year. It should also be noted that this 9th grade was, at least, completed three years before entering high education system (and 'fleeing Mathematics' in secondary education, there will certainly be an underlying obvious reason – struggling with difficulties in this subject).

For several years we felt that the general lack of motivation of students in a CU where the use of basic concepts is constant resulted fundamentally from the fact that they were not able to keep up with all the new or even 'revision' themes, and from them feeling unable to work on these concepts in an autonomous way. So, in a sense, the proposed measures were attempting to provide a 'more targeted' teaching practice to fill the general and specific gaps of those students who enter without having taken (or succeeded) Mathematics in secondary education.

2.3 Methodology

ESEIG academic services cooperation was crucial as they were the first contact students had with our institution during the registration procedure. At that time, students were formally informed about the date and time they would have to take a mandatory Diagnostic Assessment Test (DAT); the ESEIG academic services gave students a brief description of the purpose of that test and noted down (by signing each student for the test) which students had been informed. The date for the completion of this test was the first morning on the first day of school, prior to students' schedule choice.

Given the results obtained in this test (visible for students as part of the feedback presented after submission), students were advised to choose Maths classes with different number of weekly contact hours. However, these options were just mere 'advice' and no student was ever forced or compelled to enrol in any class against their will. When school activities began, all students who had chosen a class load of 6 contact hours agreed, before teachers, on class frequency from September to January since it was not 'recommendable' to change classes at least not by the first assessment date due to the apparent differences in schedules of

different classes. The development of differentiated pedagogical practices was a constant concern by offering students a wide range of online materials in digital format, promoting their sequential utilization according to the needs of each group/class, trying to work and promote a kind of flipped teaching and learning environment.

In this CU, the continuous assessment was carried out with two tests done in class, with different weights (70%T1+30%T2) and several small tests online (implemented via ESEIG Moodle Platform) distributed throughout the semester in order to promote a 'true' continuous evaluation and to monitor continuous learning results. It must be mentioned that the first moment of classroom assessment was performed when about 2/3 of the Term weeks had passed (not the middle of the semester) to enable the realization of the same test for all students enrolled at CU, regardless of the number of class contact hours that they had attended. The learning objectives for the first test were items 1 to 3 (see Figure 4), leaving for the second only item 4 – Integration. As the degree central areas were Accounting, Management and Economy, the core of all the problems was the application to these ones, whenever possible, and when reviewing secondary school subjects. We practically 'ignored' Trigonometry, Trigonometrical Functions and Complex Numbers, in order to accomplish in two months the 'levelling up schedule'.

2.4 Impact Analysis and Students' Perceptions

Although the test results are 'mute' in the sense that the diagnostic test detailed analysis goes beyond the scope of this article, we present in Figure 7, the percentage results in the three years under analysis – 2013 to 2015. The correspondent automatic feedback for students was:

- advised to attend class with 6 weekly contact hours;
- advised to attend class with 3 weekly contact hours;
- left to the student's discretion.

As the test was the same in the 3 years under analysis, we noticed a drop tendency in global results – an average of 60.5% in 2013 (SD (standard deviation) = 20.5), 50.2% in 2104 (SD = 23.2) and 52.7% in 2015 (SD = 19.7).

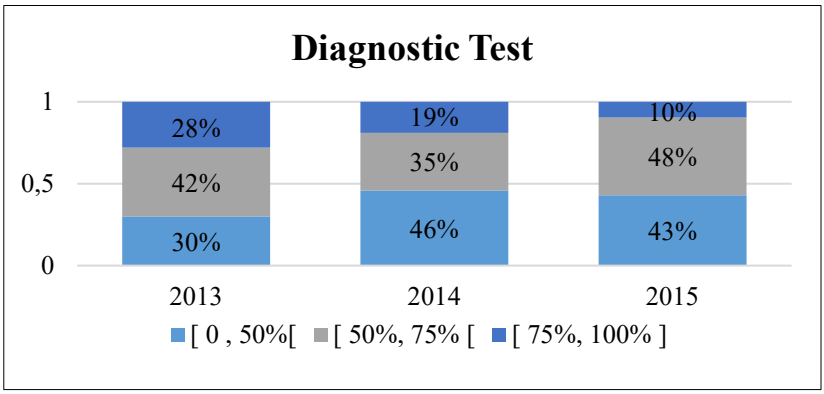


Figure 7: Results of the Diagnostic Test per year (2013-2015)

In Figure 8, we present students' schedule choice where 'repeating' students and 1st year students' enrollment options in these different classes are presented separately in order to distinguish reactions to the Diagnostic test and students' future perceptions.

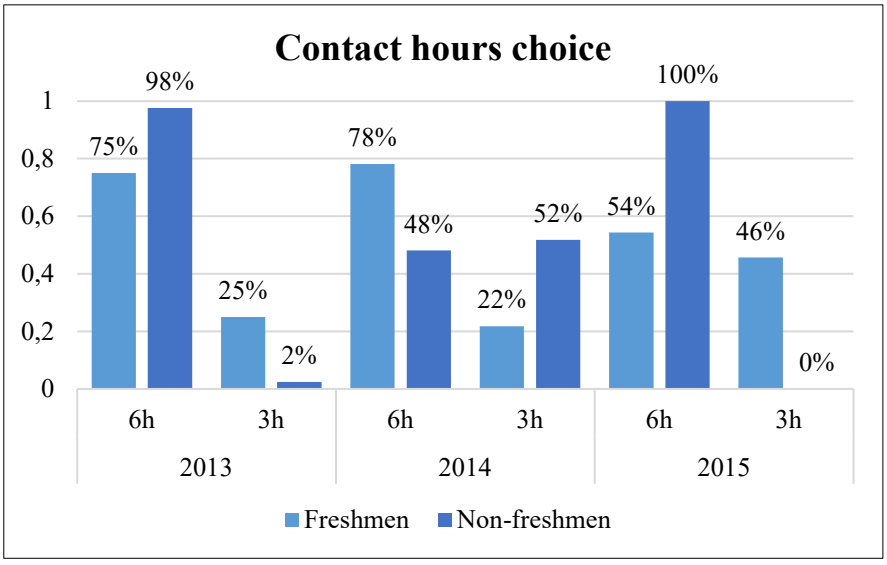


Figure 8: Weekly contact hours choice.

It should be noted that non-freshmen students are, generally, very conscious of their competences and seek to overcome their difficulties, principally if they feel someone cares. The options are quite different but there are several factors to take notice of – usually even when registered in a 3-hour contact class; if they can, the non-freshmen will attend the 6-hour classes. However, sometimes schedules are not completely compatible with other years' courses and they are not able to attend classes as often as they wish to.

In Figure 9, we present two annual assessment indicators for Mathematics CU: Relation between Successful students (S) and Assessed ones (A), in the percentage S/A and Global relation between Successful students (S) and Enrolled ones (E), in the percentage S/E.

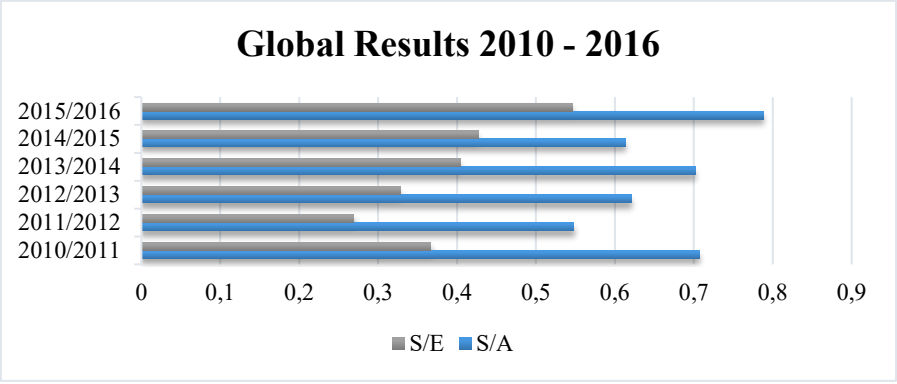


Figure 9: Assessment Indicators – Mathematics

If we separate, for the last three years, our analysis in terms of number of hours of each class, we can see the results shown in Figure 10. From a different point of view, this question also justifies, at least partly, the difference between the rates of Successful/Enrolled and Successful/Assessed, which is also one of our concerns.

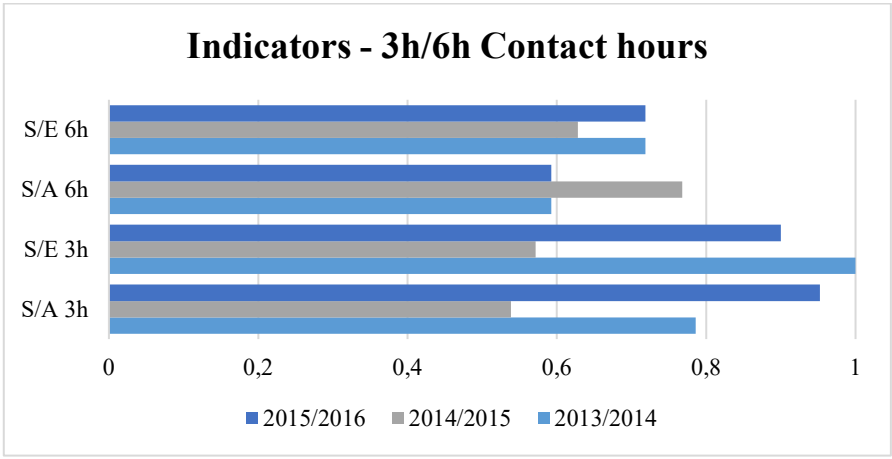


Figure 10: Assessment rates per number of class contact hours

It is interesting to compare the results shown in this last image with the ones in Figure 7: when the number of repeating students in a 3-hour class is high, this is directly reflected in the rate drop (2014/15).

Even though we have conducted a satisfaction survey every academic year since 2012, which has led us to maintain and increment this teaching practice, at its end, in May 2016, we developed a global assessment survey which 130 students from all the academic years responded to. Figure 11 presents the flow chart which shows all direct answers given by students, since no one better than them will be able to 'speak their minds'. This survey was anonymous and was answered electronically.

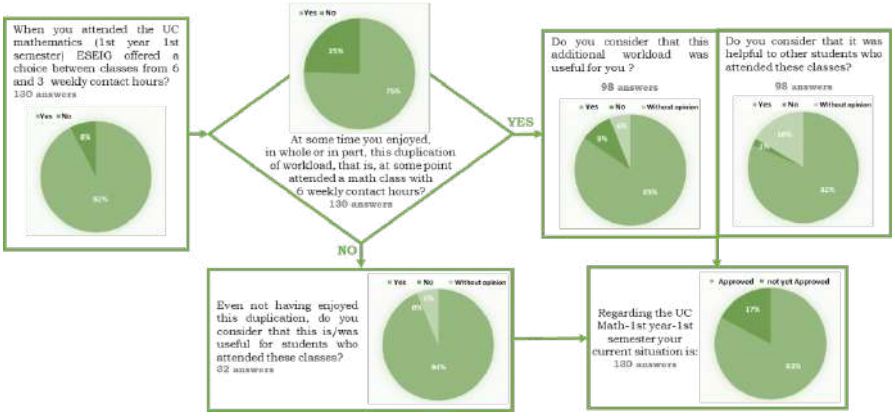


Figure 11: Inquiry – Accounting and Management students – May 2016
Source: own

It seems to us that, as images speak for themselves, this feedback is truly encouraging and rewarding for teachers who gave themselves to this little project.

3 Final Remarks

The development of an alternative teaching practice was described here. Being aware of students' distinct abilities and backgrounds, it allowed us to work differently with different audiences, and its transferability is undoubtedly an open and possible path. This approach does not seem to us difficult to implement in other undergraduate courses and/or other institutions which face the same problem in the admission of students with different 'background history'. In this sense, we leave here some important points that should be taken into consideration while embracing a similar methodology:

- Identify previous skills and knowledge that supposedly pre-date the CU program in which the measure will be applied;
- Develop a well-designed Assessment Diagnostic Test and carry it out before the real start of school activities;
- Ask for the collaboration of academic services to ensure that all students enrolled in the first year/first time are informed of its implementation and objective;
- Guarantee that the classes with more contact hours have schedules as 'nice' as the others;

- Ensure that all students are evaluated the same way, performing the same tasks and the same evaluation moments (as mentioned);
- Make sure that the students in the usual classes are not penalized by the existence of 'special' classes fulfilling the UC program.

This practice required a very strict daily scheduling and it was labor-intensive but, in the end, the overall results were positive and worth the effort. There are, obviously, several difficulties to keep in mind such as, for example, financial restrictions, frequent high absenteeism rates, low motivation to learn, among others; eventually some legal questions will need to be considered, too. Students recognize teachers' engagement and dedication for their academic development and that they are the reason for teachers/lecturers/professors existence; we think that this is one possible path, despite it being a 'hard' one.

References

A.N.Q. (2011). *Report on the Referencing of the National Qualifications Framework to the European Qualifications Framework*. Agência Nacional para a Qualificação. DGES. Retrieved from: https://ec.europa.eu/ploteus/sites/eac-eqf/files/PT%20EQF%20Referencing%20Report.pdf

Dgemecpt. (2001). *Dgemecpt. Programa de Matemática Aplicada às Ciências Sociais*. Retrieved from http://www.dge.mec.pt/sites/default/files/Secundario/Documentos/Programas/mat_aplicada_cien_soc.pdf

Dgemecpt. (2002a). *Dgemecpt. Programa de Matemática B - 10.º ano*. Retrieved from http://www.dge.mec.pt/sites/default/files/Secundario/Documentos/Documentos_Disciplinas_novo/Curso_de_Artes_Visuais/matematica_b_10_novo.pdf

Dgemecpt. (2002b). *Dgemecpt. Programa de Matemática B - 11.º ano*. Retrieved from from http://www.dge.mec.pt/sites/default/files/Secundario/Documentos/Documentos_Disciplinas_novo/Curso_de_Artes_Visuais/matematica_b_11_novo.pdf

Dgemecpt. (2004). *Dgemecpt. Ofício-Circular n.º 19 de 23/06/2004*. Retrieved from http://www.dge.mec.pt/sites/default/files/Secundario/Documentos/Legislacao/oficio_circular_19_23-06-2004.pdf

Dgemecpt. (2013). *Dgemecpt. Programa e Metas Curriculares Matemática A*. Retrieved from http://www.dge.mec.pt/sites/default/files/ficheiros/programa_metas_curriculares_matematica_a_secundario.pdf

DGES - DSA. (2006). *Candidatura ao Ensino Superior Público - 2006. Guias do Ensino Superior, n.º 61*. Editorial do Ministério da Educação. Edição: 1.ª, Julho de 2006.

DGES - DSAES. (2008). *Acesso ao Ensino Superior 2008 - Provas de Ingresso – Público. Guias do Ensino Superior, n.º 67*. Editorial do Ministério da Educação. Edição: 1.ª, Fevereiro de 2008.

DGES - Estudos e Estatísticas. (n.d.). Retrieved from http://www.dges.mctes.pt/DGES/pt/Estudantes/Acesso/Estatisticas/EstudosEstatisticas/

DGES - Legislação. (n.d.). *Decreto-Lei n.º 26/2003, de 7 de fevereiro*. Retrieved from http://www.dges.mctes.pt/DGES/pt/Estudantes/Acesso/ConcursoNacionalPublico/Legislacao/ see

Lusa. (2005, April 22). *Ministro Mariano Gago responde aos protestos dos estudantes. Governo mantém 9,5 como nota mínima de acesso ao ensino superior*. Retrieved from https://www.publico.pt/2005/04/22/portugal/noticia/governo-mantem-95-como-nota-minima-de-acesso-ao-ensino-superior-1221405

History — P.PORTO | Ensino Superior Público. (n.d.). Retrieved from https://www.ipp.pt/apresentacao-en-en/history

Ministry of Education (2007). *Education and Training in Portugal*. Lisboa: Ministry of Education Editorial, 2007. [E-Reader Version]. Accessed: November 10, 2017. Retrieved from http://www.dgeec.mec.pt/np4/97/%7B$clientServletPath%7D/?newsId=147&fileName=education_training_portugal.pdf

Portuguese Higher Education. (n.d.). Retrieved from http://www.studyinportugal.edu.pt/index.php/study/portuguese-higher-education

PROCEEDINGS OF THE 2ND INTERNATIONAL SCIENTIFIC CONFERENCE
»TEACHING METHODS FOR ECONOMICS AND BUSINESS SCIENCES«
7 MAY 2018, MARIBOR, SLOVENIA
N. Gajšt & A. Plos (eds.)

University of Maribor Press

Blended Learning for Entrepreneurs: SIMbyCID Methodology

BISTRA VASSILEVA

Abstract This paper begins by outlining the importance of business-oriented education through experience- and result-based learning implemented in a combination of formal, non-formal and informal settings. The author's primary goal is to develop a methodology providing students the opportunity to experience different professional skills as data collectors, researchers, communicators, and decision-makers. The overall intention is to offer a coherent blended framework that is student-oriented and makes use of active-based learning to support academics in encouraging student active participation and stimulating their entrepreneurial skills. To meet these goals, SIMbyCID methodology is developed and experimented in different academic programmes and degrees. It could be implemented through an interactive online platform designed as a simulator (SIM) for developing innovative entrepreneurial thinking combined with responsible mind-set. SIMbyCID platform is planned as a fully interactive online simulator of the process of innovative (starting from an idea to the final project completion) entrepreneurship process which enables HEIs to apply a step-by-step approach (mission-based learning) in user-friendly environment.

Keywords: • blended education • entrepreneurship • competences • experience-based learning • online platform •

CORRESPONDENCE ADDRESS: Bistra Vassileva, PhD, Associate Professor, University of Economics-Varna, Varna, Bulgaria, e-mail: bistravas@ue-varna.bg.

DOI https://doi.org/10.18690/978-961-286-285-5.15 ISBN 978-961-286-285-5
Dostopno na: http://press.um.si

1 Introduction

In terms of education, there is increasing consensus (Berge, de Verneil, Berge, Davis, & Smith, 2002; OECD, 2014; Biggs & Tang, 2007) that beyond knowledge and skills training, a learning process should emphasise the following: (1) developing a mindset which is global; (2) working through a model of cross-cultural reconcilement; and (3) emphasising 'relational' skills. In the field of entrepreneurship education this involves: (1) providing knowledge about market landscape; (2) developing understanding about the context of business models and business ecosystems; (3) at the individual level, assessing the capabilities to recognise and to exploit market opportunities. Under these conditions, teaching is not merely a way of 'covering the curriculum' or transferring the knowledge directly from the 'expert' to the learner but a way of encouraging innovative thinking, creativity and responsibility for the decisions which are taken.

Research results suggest that students must do more than just listen: they must read, write, discuss or be engaged in solving problems (Chickering & Gamson, 1987). Further, students must be actively involved in such higher-order thinking tasks as analysis, synthesis, and evaluation. Thus, strategies promoting activities that involve students in doing things and thinking about what they are doing may be called active learning. Performing these activities, especially in a team environment, forces students to take responsibility for their decisions.

The distinguishing feature of experience-based learning (or experiential learning) is that the experience of the learner occupies central place in all considerations of teaching and learning. This experience may comprise earlier events in the life of the learner, current life events, or those arising from the learner's participation in activities implemented by teachers and facilitators. A key element of experience-based learning is that learners analyse their experience by reflecting, evaluating and reconstructing it (sometimes individually, sometimes collectively, sometimes both) in order to draw meaning from it in the light of prior experience (Andresen, Boud, & Cohen, 2001).

2 Blended learning for educational ecosystems

Nowadays, information has become a corporate asset. As a consequence, entrepreneurs should possess capabilities to acquire, manage, and distribute information in a dynamic and knowledge rich environment. According to the research on e-learning practices in European universities (Dondi & Moretti, 2007, p. 29), 'technological' innovation is part of a broader dynamic – the re-structuring of the higher education enterprise in general, based on 'performativity' and a consumer focus. It is supplemented by a shift to 'managed learning environments' and more investment in assessment and outcomes. A recently conducted study by Benson-Armer, Gast and van Dam (2016) among 1,500 global executives and chief learning officers (CLOs) with experience at some of the largest, most successful companies around the world shows significant level of dissatisfaction with the status quo of capability building. Only 57 percent of the respondents believe that their academies are "very or fully aligned" with corporate priorities. Even fewer (52 percent) reported that these institutions enable their companies to meet strategic objectives. The findings reflect the notion that the transformation towards virtualisation will inevitably mean significant organisational re-engineering. The transformation will affect the learning tools, method, and approaches as well as the learning environments. These will take both trainers and trainees outside their comfort zones, or risk-free learning environments.

2.1 Blended and simulation-based learning

Blended learning (b-learning) systems are systems "combining face-to-face instruction with computer-mediated instruction" (Graham, 2004). E/b-learning comprises a wide range of learning formats, including self-study and instructor-led, in both an asynchronous and synchronous mode (Peres, Lima, & Lima, 2014). The e/b-learning systems may be used as an alternative to traditional teaching/learning and training or as a complementary element adding value to the educational process.

Learning outcomes in a b-learning environment should be agreed between staff and learners and written in the students' perspective. Learning outcomes should reflect both knowledge and skills to be developed. The focus, especially for entrepreneurship education, should be placed on developing the following three groups of skills. First, cognitive skills which require capability to cope with

difficulties provoked by the dynamic environment. These skills are recognized as the main human capabilities, as mental agility and tolerance for ambiguity or uncertainty are required to recognize or quickly adapt to the unknown. Second, decision-making skills, especially to understand the true areas of disagreement (conflict) which contribute to solving the right problems and manage the true needs of different stakeholders. Third, tactical abilities to perform and manage operational activities.

Relationship learning (Selnes & Sallis, 2003) should be the core of b-learning environment. It usually consists of joint activity between a supplier (teacher) and a customer (student) in which "the two parties share information which is then jointly interpreted and integrated into a shared relationship-domain-specific memory that changes the range or likelihood of potential relationship-domain-specific behaviour" (Selnes & Sallis, 2003, p. 80). Relationship learning is thus a process to improve future behaviour in a relationship which also creates more value together than the two parties (trainer and trainee) would create individually.

Thinking skills, which are defined as a wide spectrum of approaches and programmes which seek to promote higher-order cognitive abilities and which stress the importance of social interaction with adults and peers acting as mediators of experience (Baumfield & Oberski, 1998, p. 44) are especially important skills created through relationship learning.

Beyond global learning outcomes, a strong focus is placed on the soft skills that refer to transversal objectives such as:

- SS1 – Learning to learn;
- SS2 – Information processing and management;
- SS3 – Deduction and analytical skills;
- SS4 – Decision making skills;
- SS5 – Communication skills, language skills;
- SS6 – Teamwork, team based learning and teaching;
- SS7 – Creative thinking and problem solving skills;
- SS8 – Management and leadership, strategic thinking;
- SS9 – Self-management and self-development (Peres & Pimenta, 2011).

Simulation-based learning is a form of active and experience-based learning (or experiential learning). Its distinguishing feature is that the experience of the learner occupies a central place in all considerations of teaching and learning. This experience may comprise earlier events in the life of the learner, current life events, or those arising from the learner's participation in activities implemented by teachers and facilitators. A key element of simulation-based learning is that learners analyse their experience by reflecting, evaluating and reconstructing it (sometimes individually, sometimes collectively, sometimes both) in order to draw meaning from it in the light of prior experience (Bessant & Rush, 1999). Darling (1999) suggested that effective education of entrepreneurs in simulation-based learning should bypass material assets and focus on mental processes, emotions, feelings, perceptions, behaviors, decisions. Shelton (1999) proposed that the beginning of the twenty-first century could be called 'The Quantum Age' – time of changing paradigms, from Newton's mechanistic laws of classical physics to the theories of chaos and quantum mechanics. He suggests that new sciences provide the conceptual foundation for a new skill set for decision makers – a set of skills that can enable to view conflict from a new perspective, but also to respond to conflict in new ways. This paradigm shift affects the view point to conflicts and respectively to the skills required to deal with conflicts. During the last few years, several authors (Shelton & Darling, 2004) have been using quantum theory in their research work as a metaphor for the development of a new set of skills aimed at decision makers, called quantum skills. The concept of quantum skills corresponds to the goals of simulation-based learning and will be used by the authors as a cornerstone of their methodological framework to entrepreneurial education.

According to Benson-Armer, Gast and van Dam (2016), digitization offers a huge opportunity to transform learning and address some of its current deficiencies although it bears noting that digital learning tools are not new. What is disruptively new is the fact that the content of learning is moving to the cloud, becoming accessible across multiple devices and teaching environments and often being generated, shared, and continually updated by users themselves. "Unleashing the power of collective intelligence is especially critical to the digital-learning transformation. Increasingly, the learner and the learner's inner circle - colleagues who send each other articles or recommend content through a central online-learning system - act as curators" (Benson-Armer, Gast, & van Dam, 2016, p. 4). Learning should be done at the speed of business. Since there is less need to wait for scheduled training sessions, "pull" can complement "push".

2.2 Ecosystem approach to b-learning environments

Stated broadly, the ecosystem approach requires ensuring the integration of social, economic, and environmental demands and pressures. Ecosystem-based management (EBM) has been developed during the last decade using the principles of the ecosystem approach (EA). The first principle states that the humans are an integral part of the ecosystem. The second principle refers to the target of the EA, i.e. the areas which should be identified by ecological criteria. It means that ecosystem approach is place-based. The EA seeks to balance conservation and sustainable use constitutes the third principle. The fourth principle addresses the cumulative impacts, i.e. the combined and incremental effects of human activities.

Several interrelated elements have to be integrated in a common framework to implement successfully the EBM to b-learning environments (Figure 1).

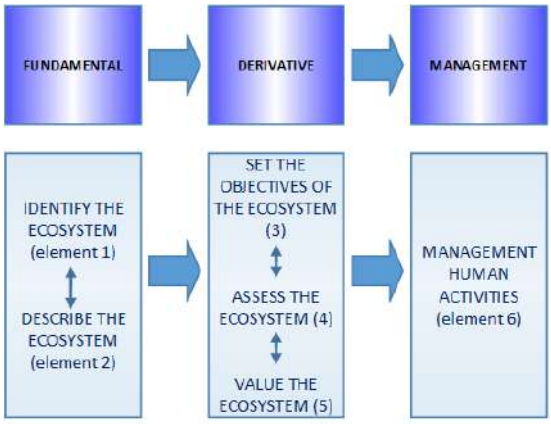


Figure 1: Ecosystem-based approach to b-learning environment
Source: Author work

The identification of the ecosystem (element 1, Fundamental stage) should be based on performance criteria instead of learning environment boundaries. The second element (Fundamental stage) requires a deep understanding of how the ecosystem is constructed (i.e. its architecture) and how it works (i.e. its dynamics). Both explicit and tacit knowledge could be used to describe the elements of b-learning ecosystem and their interrelations in details.

Definition of ecological objectives (element 3, Derivative stage) is a critical and demanding EBM component which requires a scientific and holistic view to the ecosystem dynamics. B-learning environments are vibrant places where resources of people, knowledge, and know-how are fluidly mobile. The integrated assessment of the current state of the b-learning ecosystem comprises the fourth element (Derivative stage). Monitoring activities are an inseparable part of the assessment and they should be used as a feedback loop to provide updated information on the changing states of ecosystem elements and processes followed by corrective and adaptive management reactions. Valuation of b-learning ecosystem comprises the fifth element of the EBM of the ecosystem. The final element is management decisions to regulate human activities in ways that provide benefits from the productive use of resources while maintaining the integrity of the ecosystem.

Since ecosystems exist beyond geographical places, this approach could be successfully applied especially for digital, hybrid ecosystem. The orchestrators of these hybrid ecosystems must follow some new principles and adopt a set of behaviours different from those that purely digital ecosystems require. By collaborating with new business partners, including industry incumbents and players in other sectors, companies can form new data ecosystems. These ecosystems give their participants access to valuable collective data assets as well as the capabilities and domain expertise necessary to develop the assets into new data-driven products and services (Russo & Albert, 2018). The metrics which will be used during the stages of the EBM process (see Figure 1) should reflect the following key characteristics: mobility and its scope and speed of reaction; entrepreneurial process; alignment of interests, incentives, goals; global ties and bonds - "brain circulation", etc. (Engel, 2015).

2 SIMbyCID Methodology

SIMbyCID methodology is based on the following concepts and models: learning through relationships, experience-based learning, education as a transformational system and the paradigm for educational quality as a professional-creative process. The concept of SIMbyCID was built on the assumption of education as a transformative process with its three particular outputs (knowledge, skills and values) which, when linked together, lead to sustainable competence in any professional setting (Vassileva, 2015). None is independent of the others, and it is the interaction among these that leads to

sustainability of learning within the profession and competence development. Each domain is, of course, a major field of professional enquiry and action, and its details and form vary from profession to profession.

As a whole system, the three different perspectives on the learning process (teachers and administrators, students, and audience such as policymakers, parents, communities) have their own benefits and standings and also interact with one other continuously. The inputs to the system are the students, faculty and staff, funding, facilities and the goals of the university. These could be grouped further as human, physical, and financial resources. The system itself is created and controlled entirely by the elements that compose the system, regardless of the inputs, with some measurable points within; namely, training of personnel, teaching methods, learning, advising, counselling, tutoring, evaluations, infrastructure, etc. (Figure 2).

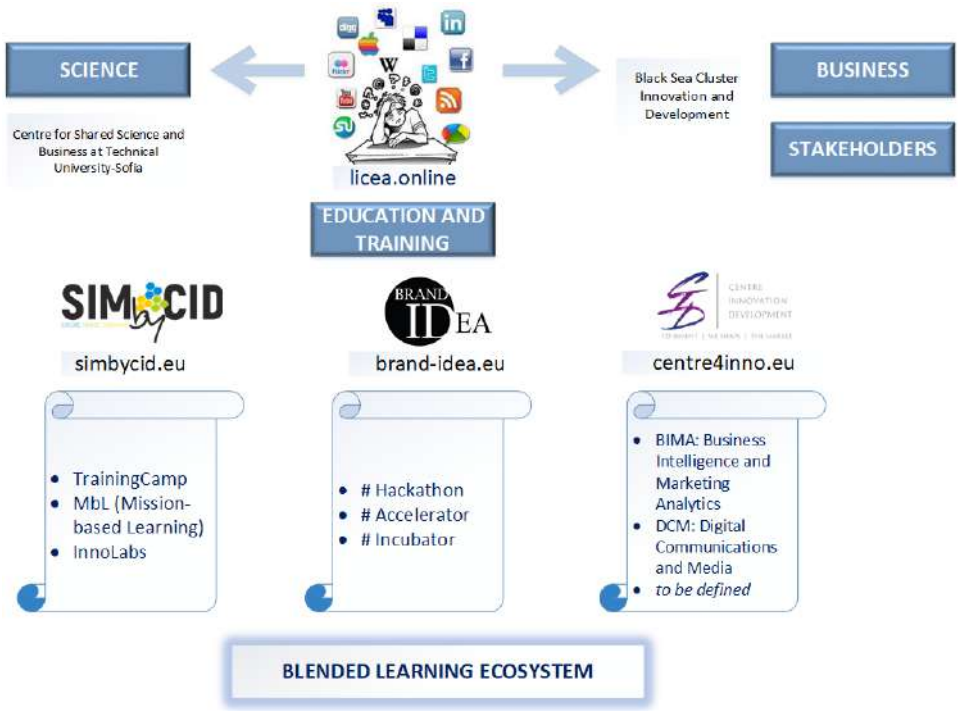


Figure 2: SIMbyCID b-learning environment
Source: Author work

When developing the anatomy of SIMbyCID, the author applied established design elements known to influence high-quality learning, such as active-based learning, cross-debate, research activities, perceptual mapping, field work (Vassileva, 2013). SIMbyCID is designed as a multi-layered process-based system. The structure of each level is similar and it is divided into several missions (from five to seven) depending on the content of the course. Mission is defined as an assignment which requires a practical completion of a task or a sequence of tasks based on a certain knowledge (Figure 3).

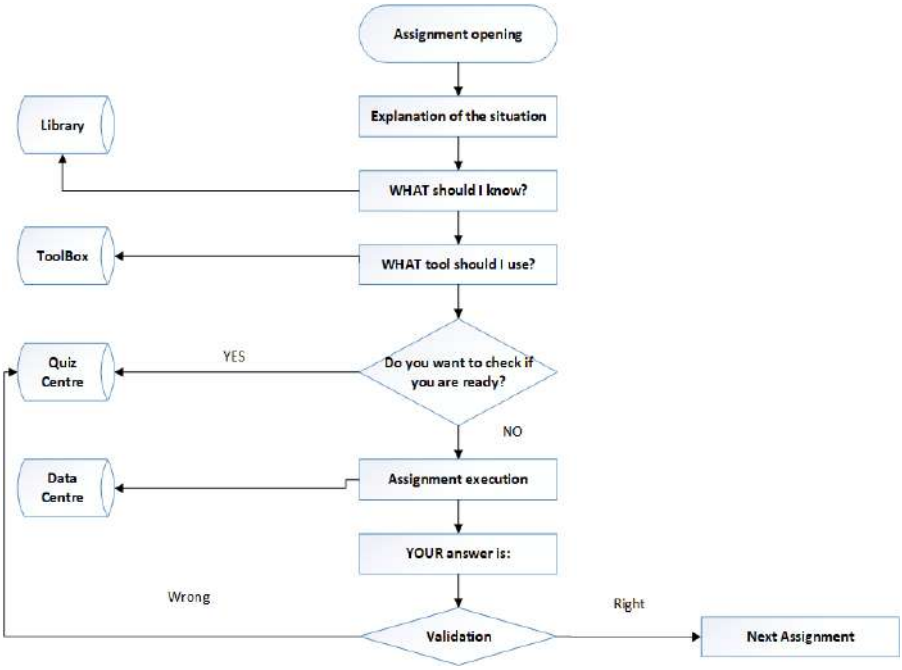


Figure 3: Mission structure
Source: Author work

Missions must be accompanied by clear instructions and a feedback form. The feedback form is used for validation and it serves as an assessment tool thus providing transparency and creating a competitive environment among students. Depending on the level of formalisation missions are divided into CAM (computer-assisted missions) and HAM (human-assisted missions). Missions are logically incorporated to fit to the course content. The proposed design is scheduled for a semester of 15 weeks. The goal is to create a coherent and consistent combination of traditional teaching methods and evidence-based

research interventions performed by students in business environment. Each mission is intertwined with the application of information to reach mastery more quickly. The assets build a web of instruction or information that supports behaviour change through whatever path is best for the learner. As many authors suggest, success in learning relates as much to the design of individual components as it does to the consistency and fit of those components within the course as a whole (Webster & Kenney, 2011; Biggs & Tang, 2007).

3 Conclusion

The proposed SIMbyCID concept provides an opportunity for the HEIs to transform the education process into experience-based learning which stimulates active participation of students and its entrepreneurial skills. Its main objectives include: (1) stimulating creative and innovative (out-of-the-box) thinking, (2) developing business-related skills at different levels (the basic level comprises business survival skills), (3) stimulating entrepreneurial attitudes and activities of students by small projects implementation, including social innovations. SIMbyCID could be used as a tool to re-engineer the process of higher education using as a background the concept of business models. When applying SIMbyCID in a constant and systematic manner in higher education process students can gain personal experience through engaging in various business and research activities related to the theoretical background of the disciplines and academic curricula. These experiences were designed to provide students with additional tools stimulating them to learn and reflect on their study. The main barriers during the process of SIMbyCID development could be summarised as follows: (1) Administrative barriers due to the restrictive internal rules of the HEI; (2) Misunderstanding of the concept both from the management body of the HEI and lecturers (teachers). Such kind of activities require different type of management and high level of engagement of the teaching staff; (3) Bureaucratic procedures embedded within the educational system which prolong the process of changes and modifications of teaching materials and the process of learning; (4) Extremely low level of administrative flexibility. The author will continue to develop the next layers of SIMbyCID in order to accomplish it as a business simulator, also to be applied for distance learning.

References

Andresen, L., Boud, D., & Cohen, R. (2001). Experience-based learning, In Foley, G. (Ed.). *Understanding adult education and training* (2nd ed.) (225-239). Sydney: Allen & Unwin.

Baumfield, V., & Oberski, I. (1998). What do teachers think about thinking skills?. *Quality Assurance in Education*, *6*(1), 44-51.

Benson-Armer, R. Arne Gast, A., & van Dam, N. (2016). Learning at the speed of business. *McKinsey Quarterly*, *2*. Retrieved from http://www.mckinsey.com/business-functions/organization/our-insights/learning-at-the-speed-of-business

Berge, Z., de Verneil, M., Berge, N., Davis, L., & Smith, D. (2002). The increasing scope of training and development competency. *Benchmarking: An International Journal*, *9*(1), 43-61.

Bessant, J., & Rush, H. (1999). *Benchmarking framework conditions*. Paper (November) for the Benchmarking Co-ordination Office, Brussels, Belgium: European Commission.

Biggs, J. B., & Tang, C. (2007). Teaching for quality learning at university. What the student does (3rd ed.). New York, NY: Open University Press/McGraw-Hill Education.

Chickering, A., & Gamson, Z. (1987). Seven principles for good practice in undergraduate education. *AAHE Bulletin*, 39, 3-7.

Darling, J. R. (1999). Organizational excellence and leadership strategies: principles followed by top multinational executives. *Leadership & Organization Development Journal*, *20*(6), 309-21.

Dondi, C., & Moretti, M. (Eds.) (2007). *E-learning quality in European universities: different approaches for different purposes*. UNIQUe Report, SOCRATES Agreement number: 2006 – 1425 / 001-001.

Graham, C. (2004). Blended learning systems: Definition, current trends, and future directions. In C. Graham & J. Bonk (Eds.), *Handbook of Blended Learning: Global Perspectives, Local Designs* (pp. 3-21). San Francisco, CA: Pfeiffer Publishing.

OECD (2014). *HEInnovate: Introduction to HEInnovate and its seven dimensions*. Retrieved from www.heinnovate.eu

Peres, P., Lima, L., & Lima, V. (2014). b-learning quality: dimensions, criteria and pedagogical approach. *European Journal of Open, Distance and e-Learning*. *17*(1), 57-75.

Peres, P., & Pimenta, P. (2011). *Teorias e práticas de b-learning*. Lisbon: Edições Sílabo.

Selnes, F., & Sallis, J. (2003). Promoting relationship learning. *Journal of Marketing*, *67*(3), 80-95.

Shelton, C. (1999). *Quantum leaps: 7 skills for workplace recreation*. Woburn, MA: Butterworth-Heinemann.

Shelton, C., & Darling, J. (2004). From chaos to order: exploring new frontiers in conflict management. *Organization Development Journal*, *22*(3), 22-41.

Vassileva, B. (2013). Applying REFRAC to advance student learning in the field of marketing, 42nd EMAC Conference "Lost in Translation": Proceedings, 4-7 June 2013, Istanbul Technical University, Turkey, 6 pp.

Vassileva, B. (2015). Cultivating applied competences through mission-based learning. Proceedings from International Conference on Management, Enterprise and Benchmarking in 21st Century II (MEB 2015), 29-30 May 2015, Obuda University, Keleti Faculty of Business and Management, Hungary, pp. 227-238.

Webster, C. and Kenney, J. (2011). Embedding research activities to enhance student learning. *International Journal of Educational Management*, *25*(4), 361-377.

PROCEEDINGS OF THE 2ND INTERNATIONAL SCIENTIFIC CONFERENCE
»TEACHING METHODS FOR ECONOMICS AND BUSINESS SCIENCES«
7 MAY 2018, MARIBOR, SLOVENIA
N. Gajšt & A. Plos (eds.)

University of Maribor Press

The Place and the Importance of Community Service Learning Course in Public Relations Bachelor's Degree Program

NURAY YILMAZ SERT & TUBA ÇEVIK ERGIN

Abstract Community service learning courses are not widespread in Turkey. At Sakarya University, the 'community service learning course' of Public Relations and Advertising Department (Communication Faculty) is a compulsory course with a total of 6 hours per week (6 ECTS). This study displays the importance of community service learning course for education and communication faculties. The place and importance of community service learning course in public relations bachelor's degree program were examined through a new media literacy project. A 2 different-focus-group study was undertaken. Team leaders of 15 study groups formed for community service learning course in new media literacy in the spring semester of 2016-2017 participated in the focus group study. All other students in the project reported their opinions on the course and the project. They stated that community service learning is an instructive course that should be included in the curriculum of public relations bachelor's degree. The results show that this course enhances students' professional knowledge and skills, provides students with the opportunity to practice what they learn in theory and allows them to recognize their deficiencies in the field. It was concluded that community service learning is important in public relations bachelor's degree programs.

Keywords: • community service learning • public relations • media literacy • higher education • Turkey •

CORRESPONDENCE ADDRESS: Nuray Yilmaz Sert, PhD, Associate Professor, Sakarya University, Faculty of Communication, Department of Public Relations and Advertising, Sakarya, Turkey, e-mail: nurayyilmazsert@sakarya.edu.tr. Tuba Çevik Ergin, PhD, Assistant Professor, Sakarya University, Faculty of Communication, Department of Public Relations and Advertising, Sakarya, Turkey, e-mail: tubacevikergin@sakarya.edu.tr.

DOI https://doi.org/10.18690/978-961-286-285-5.15 ISBN 978-961-286-285-5
Dostopno na: http://press.um.si

1 Introduction

Recently, engaging activities that will benefit to the society by people have been seen as a humanitarian value which will contribute to increasing social welfare. In order to impart these values to young people, community service learning (CSL) course was decided to enter the curriculum of education faculties in Turkey starting from the 2006-2007 academic year. The general purpose of the community service learning course is to create sensitivity for social problems among students, to help students develop solutions for social problems and make them actively participate in solving social problems. In this way, it is aimed to create both social and individual gains beside the educational game. This study examines the place and importance of community service learning course in the public relations curriculum within the framework of all these gains.

2 Literature Review On Community Service Learning (CSL)

At the present time, responsible individuals and responsible organizations are considered important in a society. In this context, social responsibilities have been one of the most highlighted topics, especially for two decades. Community service learning is related to collective responsibilities of both the students in the individual sense and the universities in the institutional sense.

Institutions of higher education have multiple purposes. As articulated in the contemporary discourse, these purposes focus on teaching (and for many, the essential correlative, learning), research, and service (Weigert, 1998, p. 4). Service is associated with active participation of citizens in social problems and also very important because one of the presumptions of a well-functioning, viable democracy is that citizens participate in the life of their communities and nation. But the role of higher education in forming actively engaged citizens has long been the focus of scholarly research (Thomson, Smith-Tolken, Naidoo, & Bringle, 2010, p. 214). According to most researchers, universities need to re-define their function in a rapidly changing world. Politicians, educators, students, and the community at large all claim that the link between university education and the society is somewhat problematic. This problem can be overcome by a cooperative and coordinated study between universities and community (Elma et.al, 2010, p. 232). Community service learning (CSL) is an educational approach that integrates service in the community with intentional learning activities.

Within effective CSL efforts, members of both educational institutions and community organizations work together toward outcomes that are mutually beneficial (Canadian Alliance for Community Service-Learning, 2006). That means community service is meant to enhance, among other objectives, reciprocal learning (Thomson, Smith-Tolken, Naidoo, & Bringle,2010, p. 214).

Community service learning course was designed not only to establish connection among community service experiences and academic learning, personal development and citizenship but also connect experiences between students' real and academic life (Küçükoğlu, 2012, p. 214). In other words, community service learning is a term that is used to describe the integration of community service into the curriculum in such a way that the community benefits and the students learn skills that are relevant to their future profession (Clinton & Thomas, 2011, p. 52). Although most research in social service learning scholarship focuses on only students, this course cultivates positive social change between three key stakeholders or constituents through mutually beneficial service partnerships.

1. Institutions (Universities and Colleges): Institutions benefit through enhanced teaching and learning opportunities, increased student engagement and retention, co-generation of new knowledge and ideas, research opportunities, and enhanced institutional reputation (Gemmel & Clayton, 2009, p. 35).
2. Students: Students benefit through enhanced learning opportunities, commitment to volunteering or trying to "make a difference," tolerance for diversity, honing skills (organizational skills, working with groups, public speaking, etc.), and understanding the application of concepts, theories and material learned in the classroom to a practical setting (Scharrer & Cooks, 2006, p. 72).
3. Communities: Communities benefit as community members and organizations share and integrate their expertise with that of faculty and students, thus generating enhanced understanding of community issues and building collective capacity to address them, resulting in either or both short-term impacts and long-term transformational change (Gemmel & Clayton, 2009, p. 35).

In the USA, the service-learning movement has become a major presence within higher education. The 1980s were marked with increased growth in the national service efforts at the grassroots level including the Campus Outreach Opportunity League (1984) and Campus Compact (1985), which help mobilize service programs in higher education (Mumford & Juelich Velotta, 2010, p. 124). Both are promoted civic engagement and learning through service in higher education (Philips, 2007, p. 3). In 1990, the National and Community Service Act created Serve America (now known as Learn and Serve America), a federal program dedicated to providing grants and other supports for service-learning activities in America's schools, higher education institutions, and community based organizations (Spring, Grimm & Dietz, 2008, p. 5).

In Turkey, there is no such structure similar to the Campus Outreach Opportunity League (1984) or Campus Compact. There are just legal regulations. Within the scope of the update work, Higher Education Council has decided to include a course called "Community Service Learning (CSL)" in the 2006-2007 academic year but only at education faculties. Therefore, this course has been a theoretical-applied and compulsory course at education faculties since the mentioned date. In other faculties, it was left to decision of department heads.

3 Research

In general, the common outcomes of research and studies related to the community service learning course are making students more sensitive to social problems, encouraging students to develop solutions for social problems and making them participate actively in the solution of social problems. This study has original value in terms of demonstrating the necessity of community service learning course, which have educational and individual gains as well as social gains, to be included not only in education faculties but also in communication faculties and public relations curriculum.

3.1 Purpose of the Research

Although the course "Community Service Learning" has been included in the education faculty curriculum since 2006-2007 academic year, it has been structured for recent years in the curriculum of the public relations departments of the communication faculties. In Sakarya University, Public Relations and

Advertising Department of the Communication Faculty's "Community Service Learning" course was defined as a compulsory course in the 2013-2014 academic year with a total of 6 hours per week including 3 hours devoted to theory and 3 hours for practical work in the total of 6 ECTS. The purpose of this study is to display the importance of community service learning course, not only for education faculties but also for communication faculties. In this study, the place and the importance of community service learning course in public relations bachelor's degree program were examined through the example of the new media literacy project which was carried out in 2017.

3.2 Population and Sample of the Research

A total of 65 students took part in the "New Media Literacy" project, which was carried out within the context of community service learning course. 65 students were divided into 15 different groups. A team leader had been identified for each group. New media literacy was set as a project theme and students were asked to visit high schools in Sakarya to make a presentation about new media literacy to high school students and inform them about new media literacy. The first stage of the project was the training of trainers. The new media literacy training was given to students for 3 weeks (9 hours in total) by the instructors. However, it should be noted that these students had already taken media literacy courses in previous periods. Therefore, training within the project is related to refreshing and updating previously given information and correcting the deficiencies. Preparing presentation materials was the second phase of the project. First, a master PowerPoint presentation was prepared by the course instructor, and then this master PowerPoint presentation was given to the team leaders along with supporting resources. Each team leader was asked to develop this presentation together with his or her group members. The aim is both to increase the knowledge of the students about the subject and to give them the practice of working as a team. In addition, emojis with a variety of face expressions like smiling, crying, happy, angry, etc., were printed for each group and they were asked to use these printed emojis when making presentations. The aim of this is to make the presentation more enjoyable and attract the attention of the audiences. As the final stage of the project, 15 schools in Sakarya were identified and each group was asked to go to these schools on the predetermined dates and make new media literacy presentations.

3.3 Research Method

As a research method, two separated focus groups were completed on May 9 and May 16, 2017, in the study. The team leaders of 15 different working groups, who visited high schools for giving training about new media literacy in the context of the new media literacy project in the spring semester 2016-2017, attended the focus group workshop as participants. In addition, other 50 students in the same project were asked to report their opinions on the course and the project. Focus group study and student reports were examined by the content analysis and the obtained data were presented under the headings of the research findings. Expression of the team leaders who performed the focus group work; in the first letters of the name and surname, (e.g. S.G., F.B., etc.) and the numbers in the student reports together with the number given to each student (e.g. Student 1, Student 2, etc.).

4 Findings of the Research

The findings of the research are explained under five headings: the findings related to the necessity of community service learning course in the public relations curriculum, the findings related to social, educational and individual achievements of the course and the findings about the appropriateness of the project subject determined within the course.

4.1 Findings Related to the Necessity of Community Service Learning Course in the Public Relations Curriculum

According to the results obtained from the research regarding public relations students, community service learning course helped them gain experience in order to establish communication to the society they live in and to apply the information they learn. Students consider the community service learning course as a course in which effective communication skills are practically gained. In addition, all students who participated in the survey shared a common opinion that this is a useful lesson that should be included in their curriculum.

> "... theoretical information is not sufficient in the field of public relations. It is missing for the experience of the learner. Experience is gained with this course (Student 2)".

"Public Relations aims to communicate better and always interact with the populace. From this point of view, it was a good experience to communicate with students and listen and share their thoughts in the school we went to in context of community service learning course (Student 27)".

"Since Public Relations based on communicating with people, in other words it deals with society, such an applied course is necessary. Because nearly all of the courses are theoretical, the students do not have enough information without going to the field. For this reason, it is necessary to have lessons for such practice (N. E.) ".

"Having this opportunity among different people in an institution other than our faculty is really giving me a good experience. Increase the number of courses like this and this course will add a lot to things to us who will graduate from our faculty. As a result, as you know the Public Relations department is more practical than theoretical (Student 13)".

"The combination of theoretical and practical work is essential. It is very important for students to gain experience so as to improve their orientation during their pre-service training, as it is an introductory lesson that teachers have important duties and responsibilities, such as social integration and social leadership. Ensuring that institutions and organizations establish positive relationships with their respective circles creates an effective and efficient environment for communication and interaction (Student 26)".

4.2 The Findings Related to the Social Contribution of Community Service Learning Course

The greatest social gain of the course is to provide students with the awareness of the responsibilities of the society in which they live as individuals. It is also important to make them realize that they have competencies to contribute to society.

> "Through our presentations within the context of this course, we have realized that we can be a collective contributor, we can be useful individuals to society, and through this lesson we have learned that we can be useful individuals to the society (Student 15)".

> "Through this course, I understood that we can serve the society in every area, but the best service is to educate the young people and children, which is my most important achievement from this course (Student 17)".

> "We gained social sensitivity, sense of responsibility and awareness by this course. It is a course that teaches us social consciousness practically (Student 41)".

> "This course showed us that giving information and teaching young people is a good feeling while we are presenting something to high school students in our presentation. They asked questions and we tried to respond as soon as possible, and we tried to create awareness in them. When they are aware of these issues at these age, they will continue this in the future, they will tell what they learn to their surroundings, one person will spread information to 10 people (E.T.)".

> "What I have learned from this course is: to be able to realize our social responsibilities within the society, to have a positive attitude in the context of sociality, and to reach younger generations through the projects in the context of the course (Student 42)".

4.2.1 Findings Related to the Educational Gains of Community Service Learning Course

As stated in the findings on whether the course of community service learning should be included in the public relations curriculum or not, the greatest contribution of the course to the education is a gained experience in terms of applying the information obtained from theory. However, the students who participated in the project and participated in the research stated that the most important contribution of this lesson in terms of education is both to be aware of their own deficiencies related to the topic of presentation and to learn new information about the topic while preparing for presentation.

> "Making presentations in a different environment for other people was a unique acquisition. We have gained a real presentation experience. I also learned new things when I worked for the presentation (Student 1)".

> "The primary acquisition of the course is the information I got about media literacy, which we offer high school students at the event. This event enabled me to explore the subject and learn more about it before presenting the subject to the students (Student 12)."

> "I can say that it made me understand media literacy better and see how necessary it is (Student 4)".

> "We are making too many presentations in our lesson. Since we have been making these presentations to our lecturers and our classmates, we feel very comfortable. However, in the presentation we made within the project, there were a lot of teachers and students that we had never met before, and we were excited and it was hard for us. It was a great experience for us. We noticed many of our deficiencies while making our presentations in the project... While we are working on the presentations, we always say that we have already known this, but we understood that we do not know very well when we felt high pressure in our presentations within the project (O. B.)".

> "Last year, we took media literacy lessons, we knew something, but with this presentation we learned more. Because it's a presentation, you work more, you look at other sources, you search for things you do not know, it was even more beneficial for us ... I also gained experience about how to present the presentation and how to get their attention so they do not get bored. The stress of giving presentations in different environments was gone (M. A.) ".

4.2.2 Findings Related to Individual Benefits of Community Service Learning Course

When the statements of the students were analyzed, it was revealed that the work carried out within the scope of community service learning course resulted in individual gains to the students: the development of presentation skills in front of the community, the increase in self-confidence and team work.

> "It increased my self-confidence and in the mean time I had an idea about which points should be considered while speaking in front of the community (Student 45)".

> "This lesson has an important effect on us about making presentations in front of community. Although we were excited, it was a significant plus for us that we finally start to get used to it. In addition to this, this course helped us to develop our ability of speech, and develop our use of body properly (Student 9)".

> "Since this course includes group work, I have learned that how individuals should work with each other in a team as a team member. I did brain gymnastics when I was thinking about the ideas which would make the applications more colorful and enjoyable (K. C.)".
> "Due to the fact that this course requires group work, it created an atmosphere of common action, cooperation, and atmosphere of sharing thoughts and ideas properly. It helped us improve our ability to communicate to the people we do not know before (Student 7)".

> "Self-confidence is the first thing that comes to my mind about what this lesson taught me. I became a person who is more confident than before (Student 26)".

> "It was a good opportunity for me to improve myself. Firstly, my self-confidence is increased and I identified my strengths and weaknesses. (Student 41)".

4.2.3 Findings Related to the Appropriateness of Community Service Learning Course to Project

In the Spring Semester of the 2016-2017 academic year, the topic of the community service learning course was designed by the instructors as "New Media Literacy" and the whole class was organized to take part in the same project. It has been observed that students support the project, their active participation and voluntary efforts were increased because the project theme was determined not only to provide social benefits but also to enable students to use their knowledge what they learned about the field in the school. Moreover, it is specified that because the students who made a presentation within the project taught others about the field and thus they have a sense of responsibility.

> "Public relations are based on public interest. Through this course, we have done an application for high school students by providing training on new media literacy. I think that New Media Literacy is the right choice for this course. Our department and the lessons we have attended are relevant to our profession. It was a very useful presentation for both us and high school students (Student 6)".

> "The media is the one of the most important tools for the public relations departments. First of all, we must read, understand, and use the media correctly as public relations experts or as members of society. We must make ourselves and everyone around us conscious consumers about media literacy. For this reason, the selection of the topic "new media literacy" has been the right choice in the community service learning course within the context of Public Relations (Student 28)".

> "Because of the topic which students did not know very well, we were afraid of teaching. That was the reason why it was hard for us. These are things that we all know a little bit, but it was also a bit of a challenge to teach them correctly so we tried to use proper words (S. G.)".

> "We also took care of what we said in our presentations. Because that age group can be influenced easily by a single word coming from our mouths, they can also take us as a role model. Since even our one word could influence them, we tried to be very careful in our presentations. (K.C.)".

5 Results

Today, new media tools are the most important application areas of public relations. Therefore, it is expected that public relations students should have theoretical knowledge about the new media literacy in academic terms and should have the ability to apply this information. Mostly, the courses' content of the department is prepared in this direction. In 2016-2017 academic year, the new media literacy project was put into practice as a subject in which students can apply their knowledge and skills within the scope of community service learning course. Within the scope of the project, the mission of the students is to make an informative presentation about the importance of new media literacy to the students in high schools.

The subject of this study is to analyze the outputs of the new media literacy project which was carried out within the scope of community service learning in the line with the purpose of the research. The aim of the research is to show that the community service learning course is a necessary and important course in terms of Public Relations curriculum. In line with this aim, two focus group studies were carried out with the participation of team leaders. In addition, other 50 students in the project were asked to report the work. When the data obtained from the focus group study and the reports were analyzed, it was concluded that the students considered the course of community service learning as a course that it should definitely take part in the curriculum in order to return their knowledge into experience. In terms of acquisitions, it has been revealed that community service learning course is beneficial for social, educational and

individual aspects. In general, common opinions of the students are: in terms of social aspects, be aware of their social responsibilities towards community and their contribution to community; in terms of educational aspects, finding the opportunity to see and overcome their own deficiencies in the subject while preparing the project; and in terms of individual aspects, developing self-confidence. Moreover, it has been determined that the relevance of the research topic to field of study provides motivation and responsibility for the students' participation in the project.

Besides this, as a result of the analysis of the students' statements, the suggestions for the public relations curriculum are as follows:

- More practice in the courses
- More space for the projects
- More focus on developing presentation skills
- More studies on enriching content with materials

The overall outcome of the research is that community service learning course is an important lesson which should be included in the public relations undergraduate curriculum. Therefore, this study shows that it is necessary that community service learning course should be in not only for curriculum of the education faculties but also in the curriculum of the communication faculty which is an applied field.

References

Butin, D. W. (2006). The limits of service-learning in higher education, *The Review of Higher Education*, *29*(4), pp. 473-498.

Campus Compact (n.d.) *Initiatives: Service-learning.* Retrieved April 23, 2018 from https://compact.org/initiatives/service-learning/

Canadian Alliance for Community Service-Learning (2006). *Community service-learning in Canada: A scan of the field.* Retrieved from http://www.communityservicelearning.ca/en/documents/ScanofCSLinCanada_000.pdf

Clinton, I., & Thomas, T. (2011). Business students' experience of community service learning. *Asia-Pacific Journal of Cooperative Education*, *12*(1), 51-66.

Elma, C. (2010). Pre-service teachers' perceptions regarding the community service practices course. *Educational Administration: Theory and Practice*, *16*(2), 231- 252.

Gemmel, L. J., & Clayton, P. H. (2009). *A comprehensive framework for community service-learning in Canada*. Ottawa: Canadian Alliance for Community Service-Learning.

Hessler, H. B. (2000). Composing an institutional identity: The terms of community service in higher education. *Language and Learning across the Disciplines*, *4*(3), 27–42.

Küçükoğlu, A. (2012). Communıty service-learning in teacher education: an experimental learning approach. *International Journal of Turkish Literature Culture Education*, *1*(4), 214-226.

Mumford, J. M., & Juelich Velotta, E. (2010). Synergy: service learning in undergraduate instructional technology courses. In J. Yamamoto, C. Penny, J. Leight, S. Winterton (Eds.), *Technology leadership in teacher education: Integrated solutions and experiences* (pp.124-143). New York: Information Science Reference.

Philips, A. (2007). Service learning and social work education: A natural but tenuous connection, In M. Nadel,V. Majewski, M. Sullivan-Cosetti (Eds.), *Social work and service learning: Partnerships for social justice* (pp. 3-20), Lanham, Maryland: Rowman & Littlefield Publishing Group, Inc.

Scharrer, E., & Cooks, L. (2006). Violence, conflict, and community service-learning: Measuring impact on students and community, *Journal of Higher Education Outreach and Engagement*, 11(1), 7-85.

Spring, K., Grimm, R., & Dietz, N. (2008). *Report on community service and service-learning in America's schools*. Washington, DC: Corporation for National and Community Service, Office of Research and Policy Development.

Thomson, A. M., Smith-Tolken, A. R., Naidoo, A. V., & Bringle, R. G. (2011). Service learning and community engagement: A comparison of three national contexts. *VOLUNTAS: International Journal of Voluntary and Nonprofit Organizations*, *22*(2), 214-237.

Weigert, K. M. (1998). Academic service learning: Its meaning and relevance. *New Directions for Teaching and Learning*, *73*, 3-10.

This book presents proceedings of the 2nd International Scientific Conference »Teaching Methods for Economics and Business Sciences« held on 7 May 2018 at the University of Maribor, Faculty of Economics and Business.

Nataša Gajšt

Alenka Plos

MARIBOR
7 MAY 2018

University of Maribor

Faculty of Economics and Business