Virtual 9th Higher Education Institutions Conference

PROCEEDINGS

Double-Blind Peer Reviewed
Edited by: Karmela Aleksić-Maslać

ZSEM Zagreb School of Economics and Management   LSB Luxembourg School of Business

Virtual 9th Higher Education Institutions Conference

11-12 November, 2021

HIGHER EDUCATION INSTITUTION AS A DRIVER OF CHANGE AND A CATALYST FOR INNOVATION

PROCEEDINGS

Double Blind Peer Reviewed

Content

Welcome Note

Dear guests and friends,

on behalf of Zagreb School of Economics and Management, Croatia's first AACSB accredited business school which is among the top 5% best business schools in the world since 2013, I'm proud to wish you all a warm welcome to our ninth consecutive Higher Education Institutions Conference – HEIC 2021. „Higher Education Institution as a Driver of Change and a Catalyst for Innovation" is our vision for this year's topic of this unique conference which inspires the academic community for nine years, has become a synonym for excellence, educational trends, and growth. Even though we hoped how we would have an opportunity for meeting in person, in our beautiful capital Zagreb, the situation made us change our plans and set the stage for one more virtual HEIC. Last year, HEIC2020 set the standards for opinion-makers in the educational industry to discuss the latest trends virtually, and we hope to do the same this year. ZSEM is used to being innovative and we successfully maintained our professional approach to higher education as well as HEIC organization during the COVID-19 crisis. Constantly proving the worth of talent combined with hard work in order to achieve brilliance is a direction we choose for HEIC2021, even in these challenging times. Zagreb School of Economics and Management as a trendsetter among Croatian higher education institutions continues to educate young people who will be leaders of tomorrow, despite all pandemic challenges. Furthermore, it is crucial to talk about changes and innovation, now more than ever, and is essential that academic society recognizes the need for inventive activities that will upgrade higher education standards while the world faces economic and health crises. We are those who should provoke true development in our countries and our task is to work together, to discuss, learn from each other, and contribute to higher education improvement with our experience and knowledge. However, we hope that the next HEIC shall take place in the traditional, offline setting of our stunning Adriatic Coast, nevertheless staying open and prepared for all demanding tests in this turbulent era which questions our capability for implementing ingenious solutions in higher education and inventing smart trends that will lead the next generations.
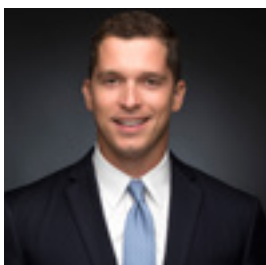
Best regards,
Mato Njavro, PhD
Dean, Zagreb School of
Economics and Management

Organizing Committee

dr. sc. Đuro Njavro
Conference chair, President of the Board of Trustees, Zagreb School of Economics and Management

mr. sc. Karmela Aleksić-Maslać
Associate Dean, Zagreb School of Economics and Management

dr. sc. Zoran Barac
Managing Director, Zagreb School of Economics and Management

dr. sc. Dino Dogan
Dean, Luxembourg School of Business

dr. sc. Maja Martinović
Associate Dean, Zagreb School of Economics and Management

dr. sc. Mirna Koričan Lajtman
Academic Director, ZSEM Business Academy

dr. sc. Goran Oblaković
Associate Dean, Zagreb School of Economics and Management

Sara Oreški, bacc. oec.
Conferences and Event Project Manager, ZSEM Business Academy

Program Committee

dr. sc. Abdelkrim Haqiq
Hassan 1st University, Settat, Morocco

dr. sc. Boris Podobnik
Boston University and Zagreb School of Economics and Management

dr. sc. Danica Kragic
Royal Institute of Technology (KTH), Stockholm, Sweden

dr. sc. Dino Dogan
Luxembourg School of Business

dr. sc. Đuro Njavro
Zagreb School of Economics and Management

dr. sc. Emmanuel Glakpe
Howard University, Washington DC, USA

dr. James Uhomoibhi
Ulster University, Northern Ireland, United Kingdom

dr. sc. Julie Felker
University of Michigan-Dearborn, USA

mr. sc. Karmela Aleksić Maslać
Zagreb School of Economics and Management

dr. sc. Kjell Knudsen
Labovitz School of Business and Economics, USA

dr. sc. Maja Martinović
Zagreb School of Economics and Management

dr. sc. Mato Njavro
St.Gallen Institute of Management in Asia, Singapore

dr. sc. Metka Tekavčić
University of Ljubljana, Slovenia

dr. Michael Hanke
University of Liechtenstein, Liechtenstein

dr. sc. Richard Tresidder
Sheffield Hallam University, UK

dr. sc. Shab Hundal
Jyväskylä University of Applied Sciences, Finland

dr. sc. Siniša Krajnović
Digital Services in Market Area North East Asia at Ericsson, Beijing, China

dr. sc. Victoria I. Pyatanova
Plekhanov University, Russia

Keynote speakers

em. prof. dr. sc. Davor Pavuna

M.Sc. in Physics in Zagreb, (Croatia, 1977); Ph.D. in Quantum Physics (UK, 1982). After few years in France, India, Australia and USA, since 1986. he is permanently at the EPFL in Lausanne (Switzerland). Main research on complexity correlations and (macroscopic) quantum phenomena. A textbook on superconductivity (1992) used in ≈4000 courses worldwide! More than >235 cc articles, 36 reviews, 25 edited professional books, co-organizer of 30 international conferences and 7 summer schools. More than hundred colloquia in leading institutions worldwide and as many invited conference talks; hundreds of public lectures. Adviser to 36 government agencies and advanced high-tech companies worldwide. Tesla World Foundation President.

Shab Hundal, PhD

Shab Hundal holds a D.Sc. in accounting from the Jyväskylä University, School of Business and Economics in Finland. He is having two master's degrees; M.Sc. Financial Management, Aberdeen Business School, Robert Gordon University, Aberdeen, U.K, and M.Sc. (Honours School) Economics, Punjab School of Economics, India. He also holds a Bachelor of Education (B.Ed.). Currently, Shab Hundal is working as a Senior Lecturer of Financial Management at JAMK University of Applied Sciences. Before it, he worked at the Ministry of Education, Singapore; Aberdeen City Council and Aberdeenshire Council (UK), Marks & Spencer (UK), and British Telecom (UK). Shab Hundal has published several scientific articles in the fields of corporate finance and corporate governance. The journals include Corporate Ownership & Control, International Journal of Business, Governance & Ethics, Eurasian Journal of Economics and Finance, Journal of Transnational Management, etc. Shab is on editorial boards of many journals. He is also a member of the Finance Finland Academy.

Larry Moneta, PhD

Larry Moneta, PhD served as Vice President for Student Affairs at Duke University from 2001 to 2019 when he retired to a life of consulting, teaching and grandparenting. At Duke he led the central planning, policy formation, and coordinating agency for the University concerning student issues. Dr. Moneta worked in student affairs on a variety of campuses before joining the Duke community in August 2001, most recently at the University of Pennsylvania as Associate Vice President for Campus Services from 1997 to 2001 and Associate Vice Provost or University Life from 1992 to 1997. He received his Ed.D. and B.S. from the University of Massachusetts and his M.Ed. from Springfield College. In addition to his administrative duties, Dr. Moneta teaches a wide variety of courses, consults for institutions across the country, and presents regularly at conferences and workshops. He has been an active member of NASPA, ACPA, and other organizations, serving NASPA most recently as a member of its National Academy for Leadership and Executive Effectiveness Board and as a member of the NASPA Foundation Board (2000). Dr. Moneta's publications include The Influence of Technology on the Management of Student Services, Future Issues in Serving Students at Metropolitan Universities (both New Directions in Student Services monographs, 1998), Future Trends in Student Affairs for NASPA's Leadership Exchange and When Expectations and Realities Collide: Environmental Influences on Student Expectations and Student Experiences (Larry Moneta and George D. Kuh) in Promoting Reasonable Expectations: Aligning Student and Institutional Views of the College Experience Thomas E. Miller, Barbara E. Bender, John H. Schuh, (Jossey bass, 2005). In 2020, Dr. Moneta became the Board Chair of ShalomLearning, a nonprofit providing curricula, teacher training and an online platform for supplementary Jewish education. He also became a member of the Jewish Grandparents Network Advisory Board and the advisory board of Jewish Changemakers, a leadership development fellowship for Jewish college students and recent graduates that is a program presented by the Jewish Federations of North America.

Panelists 2021

1. Innovating financial models

Moderator:	Zoran Barac, PhD

Zoran Barac, PhD is the Managing Director of the Zagreb School of Economics and Management (ZSEM) where he is also the Head of the Finance and Accounting Department. Dr. Barac received his Ph.D. in Management at the University of St. Gallen in Switzerland and his M.Sc. in International Economics at the University of Zagreb, Faculty of Economics and Business. Currently he teaches the course: Corporate Governance. Before joining the Zagreb School of Economics and Management, Dr. Barac held several senior executive and board positions in the corporate sector such as a finance director of the regional media company and CFO of a pharmaceutical distribution company. Before entering the corporate sector, Zoran Barac was the President of the management board of the Croatian Pension Investment Company. Dr. Barac also served as a Governing Board member of the Croatian Pension Supervisory Authority in the period from 2000 to 2005. Dr. Barac currently serves as the President of the Supervisory board of Platinum Invest, an Investment Funds Management Company. He also serves as a Supervisory board member of the ZSEM Business Academy and a member of the Supervisory board of Croatia Airlines. As an experienced coach and sports official he serves as the President of the Croatian Wushu Federation, a national sports organization that governs Croatian Wushu, which is the collective term for the martial art practices and sports which originated and developed in China. Also as a National Wushu team coach, he coached medal winning athletes in national and international competitions. Dr. Barac also served as a member of the Governing Council of the Croatian Agency for the Supervision of Pension Funds in the period between 2000 and 2005.

Panelist:	Victoria Pyatanova, PhD

Victoria Pyatanova Ph.D., Head of Financial Management Department of Plekhanov Russian University of Economics, Moscow. V. Pyatanova has a Ph.D. degree in Finance from the Plekhanov Russian University of Economics an MBA degree from Cambridge Judge Business School. Honorary Research Fellow of Brunel University London (from 2017). V. Pyatanova has vast practical experience as she has worked on managerial positions in large international and Russian financial organizations, banks, and FMCG companies. Winner of the Russian national contest "Manager of the Year-2009". Her research interests include themes of competitiveness of a company and strategic finance. Victoria is an author of numerous publications, including books: "International Trade Settlements", "Company's Strategy and Competitive Advantage", "International Financial Management" (in two parts). Disciplines taught: Corporate Finance (Advanced level, ACCA Standard), Financial Management (Advanced level, ACCA Standard), Strategy and Competitiveness of a Company.

Panelist:	Lucia Brajkovic, PhD
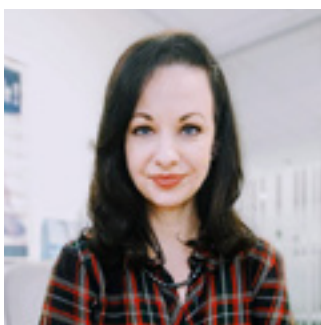
Dr. Lucia Brajkovic is an Education Specialist with the Education Global Practice at the World Bank. She is also the Executive Director of the Higher Education Initiative for Southeastern Europe and serves on boards and committees of several international education organizations. Prior to joining the World Bank she worked as a Senior Research Specialist for the American Council of Education in Washington, DC. Lucia holds a Ph.D. from the Institute of Higher Education, University of Georgia, USA, where she was a Fulbright Fellow, and an MA in philosophy and sociology from the University of Zagreb, Croatia. Her research focuses on higher education internationalization and global engagement; political economy and higher education systems in post-socialist countries of Central and Eastern Europe; higher education finance; and education and skills development in lagging regions. Her work has been published in international peer-reviewed journals and other venues, including European Journal of Higher Education, Policy Reviews in Higher Education, European Foreign Affairs Review, International Higher Education, and Encyclopedia of International Higher Education Systems and Institutions.

Panelist: **Alen Host, PhD**

Professor Alen Host, PhD is the Dean of the Faculty of Economics and Business of the University of Rijeka. He received his PhD degree in the field of Economics from his home institution and his M.Sc. degree in International Economics from the School of Economics and Business, University of Ljubljana. He is a guest lecturer at many Universities in Europe. He is the co-initiator of the online graduate program in Business Economics, and of the online postgraduate specialist program in Security Management in the EU (of which he is also the co-director). Professor Host has also been a member of the Senate of the University of Rijeka (since 2016), a member of the National Council for Digital Economy (since 2017), and a member of the Strategy Committee of the University of Rijeka (since 2018). In 2016, he was the Government Commissioner for the Municipality of Matulji and, from 2017 to 2020, a member of the Croatian President's Council for Economic Affairs. In 2017, he became a member of the Commission for Customs and Trade Facilitation of the International Chamber of Commerce in the Republic of Croatia and in 2019, the Chairman of the Supervisory Board of PIK d.d. Rijeka. He is active in the activities of the Institute for Tourism of the Republic of Croatia and was the President of its Management Board from 2018-2020. He is also a member of the Management Board of the Public Institution Regional Development Agency of Primorsko-goranska County.

2. Empowering learning through technology

Moderator:	Boris Debić, MSc

Boris Debić, MSc Google's Chief History Officer emeritus, is a technologist who spent 15 years with the company from its earliest days and in the period of the most accelerated growth ($3B to $161B revenue/yr, 3500 to 210k workforce). He holds an M.Sc. in Physics from the University of Zagreb, Croatia. At Google he has worked in several roles: Release engineering, G+Privacy, Global Infrastructure, Data center site location, AI driven decision making, Ads serving and machine learning infrastructure, Developer Relations. He has worked with Google.org on analysis and exchange of global climate modeling data sets and agricultural data to provide food security forecasts, also in providing access to education to Syrian refugees in Jordan and across the Arab world. With support from NASA Ames directs Mars Society's NorCal Rover project. He is a board member of several high tech startup companies in both the US and Croatia including http://production.pro which was featured as a top three at Launch Fest in San Francisco. He teaches AI at the Zagreb School of Economics and Management. Prior to Google he held positions in: Silicon Valley startups, most notably E.piphany; the United Nations; the Croatian Ministry of Foreign Affairs and the University of Zagreb. Boris Debić has been a lecturer, invited keynote speaker, IEEE editor and organizer of Computer Science conferences.

| Panelist: | Gorana Bikić – Carić, PhD |

Gorana Bikić-Carić (PhD in Linguistics) teaches romance linguistics subjects (contrastive romance linguistics, history of romance languages) at the Department of Romance Studies, Faculty of Humanities and Social Sciences, University of Zagreb. Occasionally she teaches at other universities (University of Bucarest in 2009, Eötvös Loránd University, Budapest in 2017 and 2020). She participates at international romance linguistics conferences, where she presents her researches in French, Spanish, Portuguese and Romanian. She got her MA degree in 1995 in the field of computer assisted learning in the university studies of French, and her PhD degree in 2008 (French and Romanian articles in comparison with their Croatian equivalents, using a parallel corpus). Her interests also include corpus linguistics – currently she leads an institutional project named Parallel Corpus in Romance Languages and Croatian (RomCro) that started in 2019 and is included in the 2021 ARCA Innovation Exhibition, Zagreb. The corpus is aimed to be used in linguistic researches (including students' graduation thesis), as well as in translation and educational studies.

Panelist:

Saša Janićijević, MSc

Saša Janićijević, MSc founder and CEO of Codemap, is an experienced tech entrepreneur with a focus on the no-code/low-code space, and a proven track record in strategy and management consulting, project management, and business development. Sasa doesn't have a typical IT resume. This 33-year-old from Zagreb graduated from the Faculty of Economics in his hometown, after which he attended SDA Bocconi School of Management in Milan, where he obtained a specialization in pharmaceutical and medical technology. This landed him a position at IMS, a pharma consulting giant, where he worked for several years in Munich and London offices as a consultant for the pharmaceutical and biotechnology industries.

After a successful career in pharma consulting, he decided to take the leap and create his own startup, a recruitment marketplace for pharma talent — Hloop. Long story short, the project ran into development issues, the team ended up spending over $100,000 in two years and was left without a final product. Looking for better development experience, he discovered the no-code community and realized its full potential. In less than two months, he was able to build a fully functional marketplace platform by himself, without writing a single line of code. A year later, Codemap, his freelance marketplace for no-code/low-code gathered over 600 vetted experts and agencies and has had over $4,000,000 in value of projects posted by more than 1,200 founders, startups, and SMEs looking to build their applications or automate their workflows. No-code/low code is the future of development that will shake the whole software industry as we know, irreversibly and quicker than anticipated. Gartner analysts predict that low-code programming platforms will be used for 65 percent of all application development in 2024, and Forrester expects the low-code market to reach a value of $ 21 billion as early as 2022.

Panelist:	Lana Balić Matijašević, MBA

Lana Balić Matijašević, MBA is Founder & CEO of Careesma for Virtual assistants, Talent Management and Organization Development Services. Careesma is an IBM business partner, and with BI predictive proprietary methodology combines analytics and augmented intelligence, enhanced and scaled human expertise and optimized virtual assistant management. Careesma solves bottlenecks in the business administration process for companies which are expanding their business model and scaling their revenue. Lana graduated from the Zagreb School of Economics and Management and currently attends MBA studies. At ZSEM she was the head of the Career Centre where she developed a process with 92% of student employment success. She gained experience in HEC in Paris and John Carroll University (JCU), in Cleveland, USA. At the age of 26 she received the opportunity to work for several years for the a significant VW retailer in Croatia where she produced software for human resource management for 800+ employees. She specialized in finding ROI (return on investment) of people performance from financial and human resource data analytics. From 2012 she has successfully introduced technological transformation and operational processes in several Croatian and international companies. She has a local experience and international experience with global companies like InfosecGlobal, working with their leading cyber security specialists.

She works as Advisor for Business Operations and Human Resources for companies which are providing tailor-made automation solutions for Kuka, Ford and Amazon. From 2017.- 2022. Lana continued to carry out her five-year transformation plan that calls for the market average of consumer movement growth of 25% yearly toward virtual assistants, talent management and automatization.

Panelist: **Ivica Siladić, PhD**

Ivica Siladić, PhD is one of the founders and the Chief Technology Officer at Mireo, a Croatian-based company specialized in embedded GPS navigation systems and GPS/GSM vehicle tracking. For the last 15 years, he's been managing and directing the development of all vital Mireo products, gathering experience in embedded systems, digital maps and GPS navigation systems, fleet tracking, and Big Data analysis.

He's a passionate programmer with deep knowledge of C++ and lots of other computer languages. He's also a passionate Human Machine Interface designer.

Ivica Siladić has a Ph.D. from the Department of Mathematics, University of Zagreb.

3. Achieving Competitiveness – Focus on Quality and Higher Academic Standards

Moderator:	Goran Oblaković, PhD

Goran Oblaković, PhD is Associate Dean of the undergraduate programs, program director of the Executive MBA graduate program at the Zagreb School of Economics and Management as well as the Academic Director for the Undergraduate Program in Economics and Management. He completed his PhD in management at the University of St. Gallen, Switzerland, defending the dissertation „Risk Management at the Strategic and Operational Levels of Swiss Banks: Current Status and the Lessons Learned from the Subprime Crisis". He completed his master's studies in strategic finance (MSSF) and business administration (MBA) at the Indiana University Southeast, USA, where he also completed his bachelor's degree in business administration (BS).

In 2013 he joined the Management, Entrepreneurship and Digital Transformation Department at the Zagreb School of Economics and Management. His areas of scientific and research interest include risk management, banking, and entrepreneurship. He has extensive experience working in logistics and consulting, and has worked for corporations such as FedEx, Target, and also for the United Nations, Indiana University, and couple of startups. From 2016 he is also the Head of the Management, Entrepreneurship and Digital Transformation Department.

| Panelist: | Inga Koryagina, PhD |

Inga Koryagina, PhD is a Head of the International Division, Vice-Dean at the Faculty of Finance at the Plekhanov Russian University of Economics and is awarded the 5th place in Associated Professor's university rating in 2019-2020. Her academic disciplines are Marketing, Services Marketing, Strategic Marketing, International Business Etiquette, Cross-Cultural Communications in Business in Russian and English for bachelors and masters. In September 2020 she participating in the project of the Komsomolskaya Pravda website KP.RU — " Healthy conversation". In March 2020 she participated in the preparation of the participant in the finals of the Olympiad on team management in the professional sphere HEAD HUNTER -2020, who took 1st place, Rusalliance "Sova". In January 2020 she received a diploma for the scientific advising of the student who won 1st place in the Open Competition of Initiative Research Projects "HIGH GOALS — 2019" with the article "The Current State of Academic Mobility of Foreign Students in Russia", Rusalliance "Sova". In July 2019 she was a Guest Lecturer at the Pompeu Fabra University International Business School and ESCI Universitat Pampeu Fabra Graduate School of International Business (Barcelona).

Panelist:

Michael Hathorn, PhD

Professor Dr. Michael Hathorn teaches in the MBA program and Diploma in Sustainable Business at BSL. He is a partner of OPTIMIS and leads the Optimis Learning business, where he focuses on sustainable executive and organizational development. Previously working for the investment management firm, Capital International, Prof. Dr. Hathorn founded and headed the firm's Learning and Organizational Development function for the European businesses. At TNT in Amsterdam, he served as Group Director of Learning and Organizational Development during a major strategic change initiative to create synergies across the three divisional businesses. He is a contributor to the World Business Council on Sustainable Development and is a member of the Society for Organizational Learning and the American Marketing Association. In addition, he is a partner in the area of Board Development at the International Center for Corporate Governance where he focuses on talent development and board diversity. Prof. Dr. Hathorn is a graduate of Louisiana State University with an MS in Marketing. He received his Ph.D. in International Business from the University of St. Gallen.

Panelist: **Josip Hrgović, PhD**

Josip Hrgović, PhD is Director's assistant for science at the Agency for Science and Higher Education. He completed his PhD in philosophy at the University of Zagreb, Croatia. From 2001 to 2013, he worked as a sociologist at Pilar Institute of Social Sciences. In 2013 he joined the Agency for Science and Higher Education , where his current responsibilities are management of the Department for Science and organization of the work of sections in the Department, cooperation with other Director's assistants in the strategic planning and further development of the Agency. He is coordinator and Assistant Coordinator in a number of procedures for re-accreditation of institutions in higher education system and research system, initial accreditation procedures in the research system as well as coordinator in the procedures of selection and medium-term evaluation of centres of excellence in research in the Republic of Croatia. Through the Agency for Science and Higher Education he is providing expert support to the National Council for Science, Higher Education and Technological Development and doing analysis, processing and interpretation of data from accreditation procedures and participation in writing reports.

4. Educating students for the future job market

Moderator:	Julie Felker, PhD

Julie Felker, Ph.D. is on the faculty of the College of Business at the University of Michigan-Dearborn. Prior to joining the faculty she served as a senior academic leader in the College, including positions as senior associate dean and interim dean. She teaches Organizational Behavior, Human Resource Management, International HRM, Change Management and Management Skills to MBA and undergraduate students. Her research interests include geographic mobility of knowledge workers, cross-border recruitment in the European Union, organizational change in emerging economies, and comparative human resource management, with special emphasis on Central and Eastern Europe. As a faculty affiliate and senior consultant of the William Davidson Institute at the University of Michigan-Ann Arbor, she develops and delivers management education programs and provides technical assistance in developing countries, most recently Algeria, Rwanda, and the former Soviet Republics of Uzbekistan and Kazakhstan. Through the Davidson Institute she works with women micro-business owners in Rwanda, a global initiative funded by Goldman Sachs. Dr. Felker is a guest lecturer and visiting scholar at the University of Padova, Stockholm School of Economics in Riga, and Zagreb School of Economics and Management. Felker, Ph.D. began her career in industry, working in the International Accounting Group-Pacific Canada Division of Unisys, Corp. She is a member of the Academy of International Business, Academy of Management, European International Business Academy, European Academy of Management, OBTS-Teaching Society for Management Educators, and the Society of Human Resource Management.

Panelist: **Amy Gillett, MBA**

Amy Gillett, MBA is the Vice President of the Education sector and specializes in designing and delivering executive education programs in emerging markets. Prior to joining WDI, Gillett served in the foreign service in Prague, Czech Republic as a Masaryk Fellow responsible for political and economic research. She also worked as a marketing executive for Hewlett-Packard and The Clorox Company. She has a Master of Business Administration degree from Cornell University where she attended as a Park Leadership Fellow, a master's degree in Russian and Eastern European studies from Stanford University, and a bachelor's degree in Slavic languages and literature from Stanford University. Additionally, Gillett holds certificates from the Pushkin Institute in Moscow and St. Petersburg State University in Russia. She is fluent in Russian and speaks some Czech, French, and Spanish.

Panelist: **Dr. Mark JG Govers, PhD**

Dr. Mark JG Govers, PhD is an out-of-the-box thinker from The Netherlands with a Ph.D. in management sciences. He works at the intersection between developing, applying, and teaching knowledge focused on socio-technical issues. Since 2006, he is an academic scholar at Maastricht University. As visiting professor, he lectures information, management, and organizational science in The Netherlands and Colombia, and Peru. Besides his academic work, he is a senior advisor at his consultancy firm called Archypel Consulting. Projects are related to re-balancing the intersection between structures, cultures, people, and IT systems. Besides projects, he enjoys helping managers and leaders with organizational and managerial issues. He is well known for giving challenging and entertaining lectures and workshops, which he calls "knowledge-tainment".

Panelist:	Dr. Mark Van Dongen, PhD

Dr. Mark van Dongen, PhD, is a highly experienced Global HR expert who combined his work as an operational HR leader with academic research and studies. This leads to a profile that merges deep insights with a very practical attitude.

A professor in Leadership, Mark has vast knowledge of business practices which he weaves in his lectures. He has a Ph.D. from the Wroclaw University of Economics and has written three books and numerous articles on leadership and the development of leaders. Mark is an international HR leader within ArcelorMittal, the world's largest steel company, and is based in Luxembourg.

New Approaches
to Knowledge
Building

SESSION CHAIR:

Karmela Aleksić-Maslać

19

Processing Complexity with Sensorial, Emotional and Spiritual Capacities

Anne Eskola[1], Vincent Goubier[2], Anneli Kakko[3], Christophe Pons[4] and Arnaud Trenvouez[5]

1JAMK University of Applied Sciences, Jyväskylä, Finland, anne.eskola@jamk.fi
2 The Catholic University of Lyon, Lyon, France, vgoubier@univ-catholyon.fr
3JAMK University of Applied Sciences, Jyväskylä, Finland, anne.eskola@jamk.fi
4The Catholic University of Lyon, Lyon, France, cpons@univ-catholyon.fr
5 PerformanSe, Nantes, France, arnaud.trenvouez@performanse.com

Abstract

Today's business environment is best described as VUCA – Volatile, Uncertain, Complex, and Ambiguous. VUCA is the expression of the fact that the rate of change is outpacing our capability to adapt. As a result, businesses, industries, and careers are being disrupted faster than ever before. Within any company, association, or entity, whether public or private, the situations to be managed have become more complex. The obligation to decide on issues characterised by uncertainty and unpredictability, for which the recycling of old schemes or the use of traditional tools based on rational analysis are not sufficiently operational, leads to the weakening of managerial staff. This has a direct impact on people: staff turnover, absenteeism, addiction, and even an increase in burnouts. This increases the frequency of reorganisations and change management practices. Having to constantly deal with ambiguity can lead to anxiety and doubts and can decrease the level of trust in organizations. We must seriously rethink how we lead ourselves, others, and our organisations. An EU-financed project called ProCESS aims at tackling these problems. ProCESS addresses the lack of training in the field of complexity management in higher education. The lack of training leads to the underperformance of many organisations. ProCESS aims at developing new ways of training future managers, the main lever being the development of so-called SES (Sensorial/Emotional/Spiritual) skills on an equal basis with hard skills to train managers to sense and to feel, as well as to understand.

Keywords: *complexity, higher education, management, VUCA*

1. Introduction

Traditional management research considers organizations as machine-like mechanisms that can be controlled [1] and that need some hierarchical management. These kinds of management models functioned well in the context of physical production [2], but in today's VUCA environment they do not work. There has been a change from traditional management theories towards the complexity theory in defining the context of organizations [3].

The complexity theory suggests that organizations tend to self-organize themselves to a state where they regulate themselves. Any complex systems have emergent properties that cannot be reduced to the mere properties of their parts. The behaviour of these systems is unpredictable and uncontrollable, and it cannot be described in any complete manner. [4] The complexity theory posits that systems begin as collections of individual actors who organize themselves and new structures and behaviours emerge as the actors act and react to each other creating value because of individual interactions. The emergent result is often more than, or qualitatively different from, the sum of individual actions [5]. In sum, a complex system is unstable and open. It is a conjunction of order and disorder where antagonistic logics exist, which evolves by bifurcations, and which is the seat of multiple and diversified interactions [6].

Many authors [6], [7] have raised the question of the management of complexity, agreeing that the apprehension of complex problems presupposes not remaining within a rational approach, but rather benefits from other approaches such as art, religion, or philosophy, and hence, assumes the mobilisation of various human capacities other than exclusively rational thought. However, few companies take these new approaches into account. The solutions that have been provided by so far can almost exclusively considered as a mere means of support in stress reduction and in helping an individual find balance, rather than as a real performance factor and a response to dealing with complexity. There is thus a need to engineer the mobilisation of all kinds of capacities, emotional, sensorial and spiritual, so that they may be implemented in organisations and in management training as vital factor affecting performance.

ProCESS (Processing Complexity with Emotional, Sensorial and Spiritual capacities) is an educational project that will invent new ways of training both students and current managers on how to address complexity, with the main lever being the development of "SES (Sensorial / Emotional / Spiritual) skills", on an equal basis with hard skills. ProCESS project aims at tackling the challenge of decision making in organizations because decision making based on facts and rational approaches is no longer sustainable in the VUCA world. Indeed, the more complex decisions become, the less executives can rely on rational approaches only [8]. In this context it is appropriate that higher education institutions' curricula continue to evolve and explore different ways to better equip students as future leaders, perhaps in radical ways.

Another challenge is the underperformance of organizations. The lack of decisiveness and the occurrence of delays have a cost. The correlation between the quality of work-life and economic performance is largely established [9]. These pitfalls have an indirect impact on companies' attractiveness, leading to difficulties in recruiting young managers since the younger generation considers well-being at work an essential criterion when making a career choice. Thus, ProCESS aims at developing a methodology to deal with complex management cases through alternating sequences of mobilisation of Sensory, Emotional, and Spiritual (SES) skills, in addition to rational capacities and to test this methodology on real business cases. In addition, ProCESS aims at training new types of trainers such as philosophers, artists, architects, etc., in SES skills and develop a new niche of activity for them.

2. Literature review

Simple problems can be solved with common analytic methods like data collection and analysis by defining the problems more precisely or by breaking them into smaller parts that can be solved in isolation by different people. Partial solutions to a bigger problem can be integrated into an overall solution, because there are no significant interconnections between the parts and all participants share the same values and targets. [10] [11].

Complex problems are the opposite of simple problems that can be laborious but are always solvable. Complex problems involve many parties that have their own needs, values, and priorities. It is very hard to find a solution for complex problems because the problem changes every time it is tried to be solved. There are no prior solutions that could be utilized when solving a new problem because problems tend to be unique. It is also very hard to estimate how the attempt to solve the problem has succeeded. [12] When it is not possible to solve problems in isolation, it becomes difficult to deal with differing assumptions and values of people. Systemic problems get in touch with misunderstandings, assumptions, and beliefs. Just improving communication or trust is not enough. [11]

Organizations encounter complex problems usually in situations where they face continuous change or unforeseen challenges. This can happen anywhere: in strategic development, in product management, in design, etc. [12] [13] In complex environment, the parties lack common world view, common values or common ethics, and people are looking at the problem from different perspective and planning strategies [14].

It is possible that the reason lying behind the problems linked with learning and innovation is eventually the fact that complex problems connected with the improvement of operations have traditionally been solved using thinking, tools, techniques, and action patterns that were based on expertise and considered adequate at some point of time in the past. [15] Though the challenges met by the companies have changed, the thinking patterns, the ways of working or the styles of management have not necessarily evolved in the same pace [16], and there is still a tendency to solve complex problems with thinking patters, tools and methods that used to work for simple problems. [10], [12], [17].

Why then organizations tend to stick to procedures that used to work in the past? This phenomenon is psychological: human mind tends to perceive things that support prevailing conceptions, which, in turn, strengthens prior conceptions. When contradictory signals are omitted, organizations lean on procedures that have become outdated. [18], [19]

Usually, organizations try to solve problems using an authoritarian strategy by letting few people solve the problem. These experts have the power to define the problem and its solution [20]. This is a way to tame the problem. Instead of facing its wickedness, it is simplified to make it more manageable. [17] However, organizations must learn how to solve or cope with challenges from different perspectives that represent different stakeholders. In practice it is about the organizational ability to handle different paradoxical situations in daily life in a productive way. [21], [22], [23], [24], [25]

The new ways of working demand self-guidance from the employees. Ability to self-organizing is expected both from individuals and from teams. However, this is not possible without an even closer interaction between the employees and management. This is called the paradox of self-guidance. Self-guidance does not mean the quantitative diminishing of managerial work but, instead, its development in terms of quality. [25], [26] The paradox of learning means that a lot of old information must be removed before new information can be adopted. The paradox of organizing means that both creativity and discipline must be present at once. The paradox of belonging means that collaboration requires both cohesion and difference. [22] The paradox of innovation and effectiveness [28], [9] refers to the fact that organizations must be able to generate new know-how while simultaneously utilize the existing know-how. Understanding paradox situations and problems helps to find many possible solutions instead of one right solution.

Redefining organizational practices means moving away from mass production efficiencies, hierarchical organisation, and central control, and introducing flexible, learning organizations that constantly change and solve problems through interconnected, self-organizing processes. [3] Organizations process information in three situations: to understand their environment, to create new information and to take decisions. A common denominator for problem solving methods based on co-operation is shared understanding and sensemaking. It is possible that people in the organization do not agree on everything, but they share a common view on issues that are meaningful for the organization. [30] Shared understanding means that stakeholders understand each other's position so that they can use collective wisdom when solving problems. It helps individuals in the network to work independently to achieve common targets. The empowerment of individuals helps them create innovations and adapt to turbulent conditions. [13]

It is impossible to find an optimal solution for a complex problem, but it is possible for organizations to learn to handle them. Simple techniques are the best. Involving stakeholders, documenting opinions, and communicating helps organizations to handle complex problems by using social planning processes instead of systematic ones. Emphasizing action and experiment and adopting proactive orientation is important even though results are uncertain. [12]

As the complexity of context increases, organizations must increase their own complexity to correspond the complexity level of their environment, because it takes complexity to defeat complexity [2]. Organizations in complex environments have consciously given up pursuing order and control and this is reflected in the ways of working and managing. They are operating at the "edge of chaos", which is the balance necessary for adaptation and self-organization to occur. There are a many positive features, such as flexibility, autonomy and robustness, that traditional mechanistic organizations lack. The positive qualities are aspects of the process of self-organization, where order is created out of disorder. These kinds of systems organize themselves to the state where they want to be and where they regulate themselves as to better cope with internal and external conflicts and this allows them to adapt to a constantly changing environment. [4]

In a complex environment, the employees must try to collaborate. Thus, flatter hierarchies, decentralization of decision-making, self-organization, emergence, the empowerment of employees and the creation of new order are key characteristics of complex systems [3], [31] In complex environment there is a need for other kinds of ways of working and ways of managing. The probe, sense and respond model becomes useful for the management [32].

3. Data and method

There are four higher education institution partners and four company partners in the project. One partner in the project is a soft-skills evaluation company whose task is to develop new assessment tools for SES Skills. The higher education partners' goals are to ensure the employability of graduates and make the graduates more efficient in a complex working environment by helping them to become creative and innovative individuals.

Thus, ProCESS intends to enhance individual potential and equip graduates with the knowledge and core competences they need to succeed in high-skill occupations.

ProCESS will involve 192 students from France, Romania, Finland, and Latvia, who will be coached by academic and company coaches from four universities and four companies, and by a varying number of SES skills trainers. Exploitability and replicability of ProCESS will be verified in private and public sectors such as health, public service, media, and consulting. The development of ProCESS' training modules is planned in cooperation with companies and thus, the project outcomes will improve the quality and efficiency of education by matching learned skills with the requirements of working life.

The companies in the project are Sanofi, which has explored the fields of emotional intelligence, positive psychology and mindfulness (400 employees took part in Sanofi's "Positive Leadership Program"), DE Klausen, the owner of which believes that new skills, particularly emotional and spiritual, are required for managers to succeed in the current constantly changing business environment, Keskisuomalainen, which is a media company in a very disruptive organizational environment where digitalization is challenging its traditional business model, and Latvia's National Post that is seeking levers to expand its modern high standard customer service through new management practices and innovative experiences.

ProCESS will deliver a methodology (Figure 1) to respond to changing needs in the wider economy and shape the careers of tomorrow; prepare individuals for today's varied and unpredictable career paths, training them in skills such as the ability to think critically, take initiative, solve problems, and work collaboratively. It is necessary to improve the correspondence between the training of managers and the reality of managing within complexity.

FIGURE 1. Global architecture of the project

ProCESS has four operational objectives: 1) Develop an original and innovative method of dealing with complex problems by mobilising the SES skills, and four training modules targeting the development of SES Skills. 2) Test the method in real situations with students under the supervision of both academics and practicing managers to ensure its operability and to assess its efficiency. 3) Deploy the four developed training modules both in higher education institutions and in professional education programmes. 4) Set up a pool of trainers in SES skills, "SESS trainers", and integrate them into a global network of change makers.

Higher education institutions will lead ProCESS's innovative HEI-company model, involving students, current managers, and SESS trainers (Figure 2). In practice HEIs will contribute to the organisation and co-coaching of 12 transnational groups of students including: 1) The provision of an adequate academic framework mobilizing 1 academic coach per HEI. 2) The organisation of 3 winter schools. 3) The setting up of a new model for management training that will be tested, evaluated, improved, and disseminated. 4) The modelling of ProCESS methodology by the release of articles and publications. 5) The setting up of quality assurance criteria and evaluation criteria that are common to all partners. 6) The harmonisation of a grading system providing 5 ECTS credits to each participating student. 7) Common arrangements for mobilities.

Enterprises are the centrepiece of ProCESS. They will provide complex situations in which ProCESS methodology can be experimented and ProCESS training modules can be tested. Each enterprise will contribute to the: 1) Definition of 3 complex management cases (1 per year) and their presentation to students. 2) Co-coaching of 12 transnational groups of students mobilising 1 coach per enterprise. 3) Leading of the winter school jury which will evaluate the quality of the action plans proposed by the students. 4) Testing of the four SESS training modules to provide valuable feedback for their improvement. 5) Reviewing of all tools and materials developed by the HEIs.

Figure 2 Details of testing ProCESS

To evaluate ProCESS results and impacts one of the challenges is to develop a new tool to assess SES skills. The objectives related to the development of assessment method are 1) The fostering of a personal transformation of the students related to SES skills and the enhancement of these skills in complex problem resolution 2) The Impact of ProCESS's methodology on the case resolution and 3) The ability to be a SES trainer. This means that the assessment must measure soft skills to improve self-awareness of students and to develop a questionnaire to assess the potential transformation of students' SES skills.

4. Expected findings

The expected results and achievements following the implementation of the project are: 1) A validated methodology for the treatment of complex management cases. 2) Training modules included in the curricula of HEIs and offered as HR development tools in companies. 3) Trainers who are trained to develop SES Skills. 4) Current and future managers capable of further mobilizing their SES Skills.

By bringing together various disciplines and by verifying the applicability of ProCESS method, ProCESS intends to increase the global performance of current and future managers while improving their well-being, as well as that of their collaborators. It is this deficit which ProCESS aims to treat by granting "sensing" and "feeling" the importance they deserve, developing a method of training these skills in different contexts and in relation to different business issues, and equipping the managers of today and tomorrow to understand and deal with complexity.

The innovative nature of ProCESS reveals itself through systematically combining non rational and rational skills, fostering a holistic approach, giving a real place to SES skills in management training and in businesses, convening standardized workshops which summon, in turn, the sensory, the emotional and the spiritual, to address real complex cases and filling a void in management training which entails a lack of trainers (SESS trainers).

The aim of ProCESS is to teach current and future managers to break out of traditional thought patterns, complement traditional methods of analysis, upset their established intellectual order, broaden their perspectives, and aid them in the ability to de-centre themselves. ProCESS offers an openness that national or regional approaches would not allow in such a complex area. Indeed, ProCESS has multicultural inputs, approaches and heterogeneity that lead to the analysis of situations from different points of view and sensitivities, and therefore a proliferation of ideas and the restitution of a broad range of solutions which will infuse companies from various sectors.

5. Conclusions

The project challenges sixteen international student teams every year to solve complex management cases. This will spur innovation and the discovery of novel solutions and tests the ProCESS methodology on a European scale. ProCESS' new training approach will improve agility in decision making of current and future managers for more performance, give rise to new teaching profiles and fields, and lead to sustainable changes in management habits and improved well-being at work.

Benefits for higher education institutions in short term are the development of the SES Skills of the students, the readiness to use SESS training modules to be exploited in bachelor and master programmes, the ability to gather a SESS trainer workforce, the readiness to offer expertise in dealing with complex cases, and the ability to provide standard cases that are re-usable in academic contexts. Long term benefits include the attraction of new students, the reinforcement of links with companies, the mobility of SESS trainers between partner higher education institutions, and the provision of general and/or tailored training for companies.

Benefits for enterprises in the short term are action plans for 12 cases (4 companies x 3 cases), testing the ProCESS methodology and assessing whether they want to import it to their HR development, challenging their managers with new training methods, gaining new management skills, identifying potential new employees (future leaders) among participating students, valuable new contacts and impulses for further cooperation, and getting exposure through the re-utilisation of their cases by the academic world. Long term benefits include contribution to the social responsibility of enterprises, well-being at work and better relations between managers and staff, less staff turnover, attractiveness for millennials, and visibility through ProCESS outputs.

Acknowledgements

28

References

[1] Morgan, G. (1996) Images of Organization. Thousand Oaks, California: SAGE Publications.

[2] Uhl-Bien, M., Marion, R. & McKelvey, B. (2007) Complexity Leadership Theory: Shifting leadership from the industrial age to the knowledge era. The Leadership Quarterly 18(4), 298-318.

[3] Daft, R. L. & Lewin, A. Y. (1993) Where are the theories for the "new" organizational forms? An editorial essay. Organization Science 4(4).

[4] Heylighen, F. (2009) Complexity and Self-Organization. In Bates, M. J. & Maack, M. N. (Eds.) Encyclopedia of Library and Information Sciences. Taylor & Francis.

[5] Haffeld, J. (2012) Facilitative governance: Transforming global health through complexity theory. Global Public Health: An International Journal for Research, Policy and Practice 7(5), (pp. 452-464).

[6] Edgar. Morin (2014) Complex Thinking for a Complex World – About Reductionism, Disjunction and Systemism. Systema Volume 2 Issue 1 | 14—22. Retrieved 31 August 2021 from ComplexThinkingforaComplexWorldAboutReductionismDisjunctionandSystemismEdgarMorin257-1036-1-PB (3).pdf.

[7] Boulton, Jean G., Allen, Peter M. & Bowman Cliff. (2015) Embracing Complexity – Strategic Perspectives for an Age of Turbulence. by Jean Boulton Peter Allen Cliff Bowman. Oxford University Press, United Kingdom.

[8] Becker, Christoph (2021). Only Human: The Emotional Logic of Business Decisions. Gyro. Retrieved 31 of August 2021 from https://www.gyro.com/gyro-thinking/only-human-the-emotional-logic-of-business-decisions/.

[9] Krekel, Christian Ward, George Ward & De Neve Jan-Emmanuel (2019) Happy employees and their impact on firm performance. Retrieved 31 August 2021 from https://blogs.lse.ac.uk/businessreview/2019/07/15/happy-employees-and-their-impact-on-firm-performance/.

[10] Rittel, H. W. J. & Webber, M. M. (1973) Dilemmas in a General Theory of Planning. Policy Sciences 4, 155- 169. Scotland: Elsevier.

[11] Roth, G. L., & Senge, P. M. (1996) From theory to practice: research territory, processes and structure at an organizational learning centre. Journal of Organizational Change Management 9(1), 92-106.

[12] Camillus, J. C. (2008) Strategy as a Wicked Problem. Harvard Business Review 86(5), 98-106.

[13] Christensen, K. (2009) Building Shared Understanding of Wicked Problems - Interview of Jeff Conklin. Rotman Magazine, Winter, 17-20.

[14] Geertz, C. (1973) The Interpretation of Cultures: Selected Essays. New York: Basic Books.

[15] Raisio, H. 2010. Embracing the Wickedness of Health Care. Essays on Reforms, Wicked Problems and Public Deliberation. Acta Wasaensia No 228. Social and Health Management 5.

[16] Jantunen, S. (2012) Making Sense of Software Product Requirements. Acta Universitatis Lappeenrataensis 470. Lappeenranta: Lappeenranta University of Technology.

[17] Conklin, J. (2005) Wicked Problems & Social Complexity. In Dialogue Mapping: Building Shared Understanding of Wicked Problems. New York: John Wiley & Sons.

[18] Couger, J. D. (1996). Creativity & Innovation. Contemporary Issues in Information Systems. Danvers, Massachusetts: Boyd & Fraser Publishing Company.

[19] Harrison, J. C. (1994). Do you suffer from paradigm paralysis?

[20] Roberts, N. (2000). Wicked Problems and Network Approaches to Resolution. The International Public Management Review 1 (1).

[21] Cameron, K. S. & Quinn, R. E. (1988) Organizational Paradox and Transformation. In R. E. Quinn & K. S. Cameron (eds.) Paradox and Transformation. Toward a Theory of Change in Organization and Management. Cambridge, Mass: Ballinger, 1-18.

[22] Lewis, M. W. (2000) Exploring paradox: Toward a more comprehensive guide. Academy of Management Review 25(4), 760-776.

[23] Lewis, M. W. & Dehler, G. E. (2000) Learning through paradox: A pedagogical strategy for exploring contradictions and complexity. Journal of Management Education 24(6), 708-725.

[24] Andriopoulos, C. & Lewis, M. W. (2009) Exploitation-Exploration Tensions and Organizational Ambidexterity: Managing Paradoxes of Innovation. Organization Science 20(4), 696-717.

[25] Czarniawska, B. (2005) On Gorgon Sisters: Organizational Action in the Face of Paradox. In D. Seidl & K. H. Becker (eds.) Niklas Luhmann and Organization Studies. Kristianstand: Liber & Copenhagen Business School Press, 127-142.

[26] Zemke, R., Raines, C. & Filipczak, B. (2000) Generations at work: managing the clash of veterans, boomers, xers and nexters in your workplace. New York: Amacom.

[27] Gennamo, L. & Gardner, D. (2008) Generational differences in work values, outcomes and person-organisation values fit. Journal of Managerial Psychology 23(8), 891-906.

[28] March, J. G. (1991) Exploration and Exploitation in Organizational Learning. Organization Science 2(1), 71-87.

[29] Andriopoulos, C. & Lewis, M. W. (2009) Exploitation-Exploration Tensions and Organizational Ambidexterity: Managing Paradoxes of Innovation. Organization Science 20(4), 696-717.

[30] Choo, C. W. (2002) Sensemaking, Knowledge Creation, and Decision Making. In C. W. Choo and N. Bontis (eds.) The Strategic Management of Intellectual Capital and Organizational Knowledge. Oxford: Oxford University Press, 79-88.

[31] Mitleton-Kelly, E., (ed.) (2003) Complex Systems and Evolutionary Perspectives on Organisations: The Application of Complexity Theory to Organisations. Oxford: Pergamon.

[32] Kurtz, C. & Snowden, D. (2003) The new dynamics of strategy: Sense-making in a complex and complicated world. IBM Systems Journal 42(3), 462-483).

30

Children's Career Aspirations and Labor Market – Implications for Education

Ivona Skreblin Kirbis[1], Mirna Korican Lajtman[2], Sanja Franc[3]

1 Zagreb School of Economics and Management, Zagreb, Croatia,
ivona.skreblin@zsem.hr
2 Luxembourg School of Business / Zagreb School of Economics and Management,
Luxembourg / Zagreb, Luxembourg Croatia, mirna.korican@zsem.hr
3 Faculty of Economics and Business, University of Zagreb, Croatia, sfranc@efzg.hr

Abstract

Career aspirations are a good predictor of the jobs that young people will hold one day. They also provide insight into labor market signaling and the needs for action in education system. The aim of this study is to explore primary school children's career aspirations on a representative sample of 998 children in the City of Zagreb and compare them with labor market demand. Data reveals alignment between aspirations, demand and prospect for top three children's aspired occupation groups (Professionals, Technicians and associate professionals, Service and sales workers). There is misalignment for occupation groups Managers and Elementary occupations. Girls tend to concentrate in slightly greater number around top ten occupation groups when compared to boys. In children's career aspiration choices some specific gender stereotypes were confirmed. Data also reveals low familiarity of homeroom professors with their pupils' career aspirations, as perceived by the children. Results are discussed with their implications for education.

Keywords: *career aspirations, education, ESCO classification, labor market, Croatia, EU27*

1. Introduction

We spend most of our lives working and educating ourselves for our future which is why career choice represents one of the most important life decision. This does not mean that it is a single-time decision since people change and adapt the course of their career to reflect the changes around them. However, already in primary school children will be making their first career choices by choosing secondary school and extracurricular activities that would bring them closer to their aspired career. It is therefore necessary to provide support through lifelong guidance while taking into consideration individual's physical and psychological characteristics, their knowledge and skills, as well as characteristics of different jobs and labor market. In the process of lifelong guidance, a combination of approaches is being used based on structural theories and developmental theories with focus on continual

exploration of self and one's own surrounding, as well as finding creative ways of response to different challenges. Therefore, the education system from primary to secondary and tertiary education should provide support throughout different career development stages to all students. In primary school, particularly strong role is the one carried by the homeroom teacher/professor who has the greatest contact with children [1]. The ultimate goal is to have a successful and satisfied individual and a society with balanced labor demand and supply.

In order to help this process of support for career development by the schools, it is helpful to explore children's career aspirations. Understanding how their aspirations are distributed and aligned with labor market demand may offer valuable insight into labor market signaling and the effect of present lifelong guidance provided in schools. Detecting patterns and key issues, and analyzing best practices can help create suggestions for improvement in the process and for involvement of secondary and tertiary education into the process of support right early on.

2. Review of the Literature

2.1. Career aspirations and school support

Research demonstrates that career aspirations of young people are a good predictor of the jobs they will actually hold as adults [2]. According to OECD's PISA research results for 2018 and 2020 conducted on 15 year old boys and girls, there is a discrepancy between labor market signals and the imagination of teenagers related to their future career, so that instead of choosing accessible, well-paying jobs with a future they tend to wish for jobs that are at high risk of being automated. Another important finding is related to diversity in career aspirations measured through the percentage of teenagers who name one of the ten most common career expectations in their country. In their overall sample, career aspirations have become even more concentrated than in 2000, so that 47% of 15-year-old boys and 53% of 15-year-old girls from 41 countries and economies said they expect to work in one of just 10 jobs by the age of 30. The percentage of teenagers aspiring to work in just top 10 jobs is highest in developing countries such as Brazil, Indonesia and Thailand, where about 75% young people expect to work in one of just ten jobs. On the other hand, in countries with strong and established systems of vocational education and training for teenagers, such as Germany and Switzerland, less than 40% of young people express an interest in just ten jobs. Generally, low diversity in career aspirations is an indication of weakness of labor market signaling at an important time in the education and training of young people. These findings suggest that expectations of young people may be out of date and unrealistic with many young people wanting to pursue jobs that they have little chance of securing.

There is evidence that career aspirations tend to be stereotypical so that in a research conducted on elementary school children aged seven to eleven on over 20,000 participants from UK and internationally, the most popular jobs for boys was often police, armed forces and sportsmen, while teaching was one of the most popular professions for girls. Also, in alignment with popular theories about masculine and feminine roles, boys have preference for working with things (Engineer or Scientist) while girls prefer jobs that involve working with people and caring professions (teacher, nurse, doctor or vet). [3] There is evidence of

gender differences in diversity of career aspirations as well, so that in most cases girls tend to be more concentrated around top 10 jobs when compared to boys (Mann et al., 2020).

Children's career aspirations are mostly influenced by their parents and friends of parents as well as the TV and media. However, less than 1% of children have heard about the jobs through people from the world of work coming to their school [3]. This is even more worrisome if we consider the benefits of early career talks. For example, taking part in career talks during school is associated with significantly better earnings at age 26 [2].

Babarovic and Sverko (2017) researched career counseling practices in primary and secondary schools from the perspective of pupils in Croatia [4]. They report that pupils perceived the role of their homeroom professors and school psychologists as more active than the role of other professional non-psychologist associates, and they were also more satisfied with their activities. The role of homeroom professors and school psychologists consisted to greatest extent in informing pupils about education programs and labor market as well as about internet websites for career counseling, with homeroom professors being more active than school psychologists since they were in closer contact with children. Homeroom professors and school psychologists have also administered career interests questionnaires, organized workshops and individual counseling meetings. External associates, such as secondary school representatives and state Croatian employment service (Hrvatski zavod za zaposljavanje, HZZ) provided less active support through visits to schools. Most of the reported activities took part in 8th, final grade, some in 7th grade and rarely in 5th and 6th grade.

2.2. Labor market and education

For analyzing labor market and education, there is a standardized framework of European multilingual classification of Skills, Competences and Occupations provided by ESCO (European Skills, Competences, Qualifications and Occupations). ESCO provides descriptions of 2942 occupations on most granular level. Based on relationships between them, these occupations are grouped into 426 different occupation groups (level 4), then further into 125 occupation groups (level 3), then into 42 occupation groups (level 2), and into 10 primary occupation groups on level 1. The 10 primary (level 1) ESCO occupation groups are: Armed forces occupations, Managers, Professionals, Technicians and associate professionals, Clerical support workers, Service and sales workers, Skilled agricultural, forestry and fishery workers, Craft and related trades workers, Plant and machine operators and assemblers, and Elementary occupations. [5]

When considering labor demand and perspective of different occupations, it is useful to consider Skills Panorama by the European Commission, Directorate-General for Employment, Social Affairs and Inclusion and powered by Cedefop, the European Centre for the Development of Vocational Training [6]. Its data can be browsed by sector, occupation, country and policy themes, and it offers detailed information such as total employment, share of women in employment, share of unemployed, relative income, job prospects, range of monthly gross income, employment by economy sectors, by field of study and by level of education. When looking at each of the ten primary level ESCO occupation groups, the future job prospect indicator which compares future number of job openings in a particular occupation to total employment in that occupation in EU27 over the period 2020-2030

is highest for Managers (100), followed by Professionals (93), Technicians and associate professionals (83), and Elementary occupations (77). For these occupation groups, the number of future job opportunities is high compared to total employment since their score is leaning towards 100 which is a maximum score. Moderate to modest job prospects are reported for Service and sales workers (61), Plant and machine operators and assemblers (48), Clerical support workers (40), as well as for Craft and related trades workers (30). For Skilled agricultural, forestry and fishery workers, the future job prospect indicator is 0, and there is no data for Armed forces occupations.

In a discussion paper by the McKinsey Global Institute, The future of work in Europe [7] which also takes a view of the situation into 2030 through a detailed analysis of 1,095 local labor markets across Europe, including 285 metropolitan areas. Reported trends may be accelerated by the pandemic and refer to the growth of automation adoption, the increasing geographic concentration of employment, the shrinkage of labor supply, and the shifting mix of sectors and occupations. Europe is expected to have a shortage of skilled workers, despite a growing wave of automation due to the declining supply of labor. Automation will require all workers to acquire new skills, so more than half of Europe's workforce will face significant transitions. The analysis shows that Europeans frequently switch jobs, but they typically move from one growing occupation to another growing occupation, with little crossover. The fastest-growing occupations in Europe are Professionals (including occupations such as analysts, architects, engineers, and doctors) and Technician and associate occupations (including agriculture technicians, construction supervisors, information and communication technicians, pharmaceutical technicians and assistants, photographers, and secretaries), which are geographically concentrated in dynamic growth hubs and certain stable economies. Same is true for fastest-declining occupations, for Craft and related trade workers (including bakers, electronics mechanics, motor vehicle repairers, roofers, printers, and toolmakers) and Agricultural workers, which are geographically concentrated mostly around shrinking regions.

Based on Croatian Government's Regulation for monitoring, analyses and prediction of labor market needs for certain occupations, as well as creating recommendations for educational enrolment policy, state Croatian Employment Service (HZZ) has conducted an analyses for year 2019 [8]. Based on their analyses, for the metropolitan area of city of Zagreb, HZZ lists different occupations for which greater educational enrolment quotas are suggested. Most of the listed occupations (N=47) refer to 2-year and 3-year high school programs (such as programs for carpenters, bakers, cooks, waiters, hairdressers and so forth). For 4-year program secondary schools and undergraduate professional study programs Nursing professionals are being listed. Finally, listed university undergraduate programs in need are: Medicine, Mathematics (teaching orientation), Computer Science, Electrical engineering and information technology, Rehabilitation, Speech therapy, Mechanical engineering, German studies, Pharmacy, Physics (teaching), Physics and chemistry (teaching), Physics and informatics (teaching), Physics and technology (teaching), Biology and chemistry (teaching), Music pedagogy, Information and communication technology.

In order to provide valuable insight into labor market signaling and the effect of present lifelong guidance provided in schools in this paper we explore primary school children's career aspirations with the goals to:

1. Compare children's career aspirations and labor demand across ten primary ESCO occupation groups

2. Explore gender differences for children's top ten aspired careers

3. Determine homeroom teachers'/professors' familiarity with children's career aspirations as perceived by the children, and explore differences between lower elementary grades homeroom teachers and higher elementary grade homeroom professors

3. Methods

3.1. Participants

The study was conducted on a representative sample of 998 primary school children in the city of Zagreb. The sample was stratified based on city district and grade. There are 51% of boys and 49% of girls in the sample. About half of the participants (52%) were from lower primary school grades (3rd and 4th grade, in the age of about 9 and 10 years old), and the other half of the participants (48%) were from higher elementary school grades (7th and 8th grade, in the age of about 13 and 14 years old). All 17 city districts were represented in the sample so that the percentage of participants reflects the actual percentage of elementary school children in the city of Zagreb.

3.2. Procedure

Data was collected between March and May 2021. The questionnaire was distributed to children in classroom during regular classes with the permission of the schools' headmasters and involved teachers and professors. It was distributed in a pen and paper version. The person who visited all the schools and administered the questionnaires had written instructions on how to answer any of the children's questions while filling out the questionnaire. The participation was voluntary and anonymous.

3.3. Questionnaire

The questionnaire was designed to measure aspired career and children's perception of parents' and teachers' familiarity with their career aspirations.

Aspired career was measured using OECD's Programme for International Student Assessment (PISA) methodology with a single open question: "What kind of job do you expect to have when you are about 30 years old? (Please type in the job title.)" Once collected, these open answers were typed into the excel database and then coded using ESCO classification. When coding, each job title was inserted into the occupation search engine at the official European Commission website [9]. Once the occupation was found, the codes for level 1, 2 and 3 of ESCO classification were inserted in the database for each occupation.

Parents' and teachers' familiarity with children's career aspirations was measured with two items asking the children "Do your parents know what kind of job you would like to do when you grow up?" and "Does your homeroom teacher / professor know what kind of job you would like to do when you grow up?" to be answered with YES or NO.

4. Results

4.1. Aspired career

Career aspirations classified according to ESCO classification at level 1 which groups all possible occupations into the total of 10 distinct groups is presented in Table 1 for overall sample, as well as for females and males separately. In the same table, there is registered demand in 2020 in Croatia according to public Croatian Employment Service (HZZ) [10]. Finally, the last three columns in the table are a comparison of ranks for each ESCO occupation group for career aspirations, for labor demand in Croatia for 2020 and for job prospect index for EU27 for the period 2020-2030.

Children's most aspired careers are in occupation group Professionals, including scientists, engineers, architects, medical doctors, veterinarians, dentists, teachers, ICT professionals, lawyers, and artists as most common choices. This occupation group is also highest in labor demand in Croatia according to 2020 data, and 2nd best for job prospect in EU, thus reflecting alignment between aspirations and demand, even though the percentage of children aspiring for this occupation group (56,5%) is much higher than the percentage of all registered demand (25%). Ranked as 2nd most aspired occupation group by children is Technicians and associate professionals, with greatest number of choices for sportsmen in this group. Again, the overall percentage of children aspiring for this career is greater than registered demand which ranks on 5th place. Still, when considering job prospect index for EU, there is close alignment in ranks. Third most aspired career is in group Service and sales workers, including cooks, hairdressers, policemen and firemen as most common choices. This occupation group also ranks 3rd in Croatian labor demand and 5th in job prospect in EU suggesting no major misalignment.

Table 1. Aspired career compared with job demand and job prospect using ESCO classification (level 1)

ESCO Occupation groups (level 1)	Aspired career TOTAL (%)	Aspired career FEMALES (%)	Aspired career MALES (%)	Registered demand in 2020 according to state Croatian Employment Service[1] (%)	Rank Aspirations (total sample)	Rank demand CRO[1]	Rank job prospect index EU[2]
ARMED FORCES OCCUPATIONS	1,0	0,6	1,4	0,0	6	10	/
MANAGERS	4,4	2,7	6,1	0,1	4	9	1
PROFESSIONALS	56,6	69,6	43,7	25,0	1	1	2
TECHNICIANS AND ASSOCIATE PROFESSIONALS	19,8	11,4	28,0	7,2	2	5	3
CLERICAL SUPPORT WORKERS	0,5	0,6	0,4	6,1	9	6	7
SERVICE AND SALES WORKERS	12,2	12,5	12,0	19,0	3	3	5
SKILLED AGRICULTURAL, FORESTRY AND FISHERY WORKERS	0,4	0,4	0,4	0,4	10	8	9
CRAFT AND RELATED TRADES WORKERS	3,4	1,7	5,1	16,6	5	4	8
PLANT AND MACHINE OPERATORS AND ASSEMBLERS	0,9	0,2	1,6	5,0	7	7	6
ELEMENTARY OCCUPATIONS	0,7	0,2	1,2	20,7	8	2	4
TOTAL	100,0	100,0	100,0	100,0			

1 Data is available from Croatian Employment Service yearbook for 2020 (ISSN 1849-4854) at https://www.hzz.hr/content/stats/HZZ_Godisnjak_2020_lipanj-2021.pdf [10]

2 Data is available from Skills Panorama by the European Commission at https://skillspanorama.cedefop.europa.eu/en/dashboard/browse-occupation?occupation=3.32&country=#1

There is however misalignment for occupation group Managers which is the 4th ranked aspired career choice with only about 4% of children aspiring for such a career. This same occupation group is ranked 9th in demand in Croatia with only 0.1% registered demand, and at the same time it is ranked the most prosperous job in EU with the maximum job prospect index of 100. It is clear that more attention should be attributed to presenting this occupation group and its prospect on the labor market to the children, as well as to understanding the mismatch between Croatian labor demand and European job prospect. It is possible that many open positions for this occupation group did not go through Croatian Employment Service (HZZ). Another misalignment is for occupation group Elementary occupations ranked only 8th for aspirations, 2nd for labor demand and 4th for job prospect. Children do not aspire for jobs in this occupation group even though there are possibilities on the labor market.

A possible indicator of diversity in career aspirations is the total percentage of children choosing the top 10 occupations. If many children consider only a few different occupations, there are stronger chances of misalignment between their aspirations and labor demand. In Table 2, top 10 most aspired careers for the overall sample, and separately for females and males are presented (based on ESCO classification – level 3). This means that out of possible 125 different occupation groups at ESCO level 3, more than half of the children in the overall sample (58,2%) would like to work only in 10 occupation groups, which is very unlikely. Percentages of the children choosing the top 10 most aspired careers are even larger when looking at each gender separately, suggesting slightly less diversity among girls (67,5%) than boys (64,6%), which confirms gender differences found on PISA results for 15year olds [2].

Table 2. Top 10 most aspired careers using ESCO classification (level 3)

RANK	TOP 10 ASPIRED CAREERS FOR **TOTAL SAMPLE**	%	TOP 10 ASPIRED CAREERS FOR **FEMALES**	%	TOP 10 ASPIRED CAREERS FOR **MALES**	%
1	Sports and fitness workers	12,0	Creative and performing artists	12,9	Sports and fitness workers	17,8
2	Medical doctors	8,0	Medical doctors	10,2	Software and applications developers and analysts	9,7
3	Creative and performing artists	7,4	Architects, planners, surveyors and designers	9,2	Protective services workers	6,6
4	Architects, planners, surveyors and designers	7,3	Primary school and early childhood teachers	6,5	Medical doctors	5,8
5	Software and applications developers and analysts	5,3	Sports and fitness workers	6,3	Architects, planners, surveyors and designers	5,2
6	Protective services workers	4,7	Veterinarians	6,0	Business services and administration managers	4,3

7	Veterinarians	3,6	Hairdressers, beauticians and related workers	5,0	Engineering professionals (excluding electrotechnology)	4,1
8	Business services and administration managers	3,4	Other health professionals	4,8	Database and network professionals	4,1
9	Primary school and early childhood teachers	3,4	Legal professionals	4,0	Cooks	3,9
10	Other health professionals	3,1	Protective services workers	2,7	Physical and engineering science technicians	2,9
TOTAL		58,2		67,5		64,6

4.2. Parents' and teachers' familiarity with children's career aspirations

When asking children whether their parents know what they would like to do when they grow up, results show that majority of the parents are familiar with their kids' career aspirations (76,1%), with no significant differences based on gender or age. Familiarity of teachers/professors on the other hand is much lower with only 29% of lower grade homeroom teachers being familiar with their pupils' career aspirations and even smaller percentage of higher grade homeroom professors (12,1%) being familiar with their pupils' career aspirations, the difference based on age being statistically significant.

Table 3. Parents' and teachers' familiarity with children's career aspirations

	PARENTS' FAMILIARITY		CHI-SQUARE	TEACHERS / PROFESSORS' FAMILIARITY		CHI-SQUARE
	YES (%)	NO (%)		YES (%)	NO (%)	
TOTAL SAMPLE	76,1	23,9		21,1	78,9	
FEMALES	77,7	22,3	n.s.	23,2	76,8	n.s.
MALES	74,5	25,5		19,0	81,0	
LOWER GRADES	78,6	21,4	n.s.	29,4	70,6	Chi-Square= 44,06 p< 0,001
HIGHER GRADES	73,4	26,6		12,1	87,9	

5. Conclusion

There is no major misalignment between top three children's aspired occupation groups (Professionals, Technicians and associate professionals, Service and sales workers) and labor demand in Croatia or job prospect for EU. There is however misalignment for occupation group Managers, ranked as 4th most aspired career but very low in labor demand in Croatia and at the same time most prosperous job in EU. Another misalignment refers to children do not aspiring for jobs in occupation group Elementary occupations even though there are possibilities on the labor market. In terms of gender differences results confirm greater career aspiration diversity for boys when compared to girls which is in line with previous research [2]. Gender stereotypes in career aspirations refer to girls aspiring more often than boys to become Medical doctors, Primary school and early childhood teachers, and boys aspiring more often than girls to become Sports and fitness workers, Protective services workers and Engineering professionals confirm past research [3].

More than 70% of children believe their parents are familiar with their career aspirations with no significant differences based on gender or age. However, only about 20% of children believe that their homeroom teacher/professor is familiar with their aspired career with statistically significant difference based on age. According to children's perception, homeroom professors are less familiar with their aspired career (only 12,1%), this being particularly worrisome since these children are about to make their important career decision when choosing their secondary school. The question is whether the homeroom professor can offer proper required lifelong guidance if not being familiar with his/her pupils' career aspirations.

One implication for education system refers to improving diversity in career aspirations. This can be done through providing more career exploration possibilities for the pupils through career talks with persons from outside school who can come directly from the world of work as well as from secondary school and universities, especially those that offer programs high in labor demand and in job prospect. Closer cooperation between different levels of education system as well as involvement of outside experts in different occupation groups and their presence in elementary school career workshops and programs could also help in opening horizons and breaking away from gender stereotypes in career aspirations. Also, professors should not just offer generalized career development guidance and they should be encouraged to get familiar with their pupils' career aspirations in order to personalize their approach to the class as well as to each individual. This should be realistic considering that they are a home professor to the same class of about 25 pupils for 4 consecutive years.

In future research, familiarity with pupils' career aspirations from the perspective of teachers/professors should also be explored, as well as their suggestions on improving their own role in supporting pupils' career development. It should also be explored what strategies of collaboration between different levels of education for career development exist and how they can be improved in order to improve labor market signaling.

40

References

[1] Vizek Vidović V., Maslić Seršić D., Žanetić Lj. & Savić A. (2016). Profesionalni razvoj u osnovnoj školi. Priručnik za učitelje i stručne suradnike. Požega: Hrvatski zavod za zapošljavanje.

[2] Mann, A., Denis, V, Schleicher, A., Ekhtiari, T., Liu, E., & Chambers, N. (2020). Dream jobs? Teenagers' career aspirations and the future of work. Paris: OECD

[3] Chambers, N., Kashefpakdel, E.T., Rehill, J. & Percy, C., (2018). Drawing the Future: Exploring the career aspirations of primary school children from around the world, London: Education and Employers

[4] Babarović, T. & Šverko, I. (2017). Profesionalno usmjeravanje u osnovnim i srednjim školama iz perspektive učenika. https://www.mobilnost.hr/cms_files/2018/02/1519740980_izvjestaj-eg-fin-web.pdf

[5] European Commission. (2021, April). ESCO Skill-Occupation Matrix Tables: linking occupation and skill groups. Technical Report. https://ec.europa.eu/esco/portal/occupation?resetLanguage=true&newLanguage=en

[6] Skills Panorama (n.d.). Retreived September 1, 2021, from https://skillspanorama.cedefop.europa.eu/en/dashboard/browse-occupation?occupation=3.32&country=#1

[7] Smit, S., Tacke, T., Lund, S., Manyika, J. & Thiel, L. (2020). The future of work in Europe - Automation, workforce transitions, and the shifting geography of employment. McKinsey Global Institute. https://www.mckinsey.com/~/media/mckinsey/featured%20insights/future%20of%20organizations/the%20future%20of%20work%20in%20europe/mgi-the-future-of-work-in-europe-discussion-paper.pdf

[8] Hrvatski zavod za zapošljavanje. (2019, December). Preporuke za obrazovnu upisnu politiku i politiku stipendiranja. https://www.srednja.hr/app/uploads/2020/01/hzz_preporuke_obrazovna_i_upisna_politika_stipendiranja_2020.pdf

[9] ESCO – Europske vještine, kompetencije, kvalifikacije i zanimanja (n.d.). Retreived September 1, 2021, from https://ec.europa.eu/esco/portal/occupation?resetLanguage=true&newLanguage=hr

[10] Hrvatski zavod za zapošljavanje (2020). Godišnjak 2020. https://www.hzz.hr/content/stats/HZZ_Godisnjak_2020_lipanj-2021.pdf

Designing a Graduate Course on Developing and Managing Start-Ups

Claude Cellich[1]

[1]*International University in Geneva, Switzerland, ccellich@iun.ch*

Extended abstract

Course Overview

Following mixed reviews from student evaluations over several terms, the author has designed a new course based on researching the field of entrepreneurship education and on personal experience as the cofounder of a start-up. Moreover, the course syllabus takes into consideration the realities of operating a new business in today's competitive environment and digitalization of the global economy. In view of the high rate of new business failures, up to 65% (Dinnar & Susskind 2019) in the early phase of development, it is essential that students realize the difficulties of being an entrepreneur and how to overcome the initial shortcomings and blunders. Having a good idea, an innovative process or product does not justify setting up a business unless there is a substantial market for it. Most difficulties faced by entrepreneurs consist of having limited financial resources, weak managerial and communicating skills, insufficient knowledge of the demand for their product or services as well as having to face constant pressure from competition to innovate in a complex, ambiguous and chaotic context (Fillis and Telford eds 2020). Competition is not only external but internal as employees seeing the benefits of the start-up, either leave to set up their own enterprise or join a competitive firm for better career opportunities.

Learning by doing can result in expensive errors (Eisenman 2021). These situations happen when entrepreneurs are anxious to start operations without adequate preparation. Entrepreneurs are like sprinters who jump the gun (Eisenmann 2021). Furthermore, it is vital for new entrepreneurs to integrate digital applications in their business models to increase efficiency and reduce operation costs. To ensure that the start-up becomes successful, entrepreneurs need to surround themselves with teams representing different experience/ expertise as research shows that such teams do better than solo entrepreneurs. For example, if an entrepreneur with an engineering background is joined by other engineers, there is the risk that they will concentrate on technical issues at the expense of marketing, budgeting or customer relations resulting in weak management and possibly insolvency. In other words, it is essential that the team is experienced in all the key functions of management to start the business on a sound basis.

The course content will consist of all aspects of the entrepreneurship process, with specific emphasis on its key elements including management, seeking sources of funding, handling risk, networking, estimating market demand and how each element fits into a business plan. The business plan will be the major component of the learning outcome. Several sessions will be devoted to how to develop a business plan and how to pitch the plan to potential sponsors, investment bankers, venture capital investors and business angels. A separate session will describe the various types of crowdfunding and how to select the most appropriate one.

Case studies and examples will be provided throughout the course to reinforce the acquisition of the essential skills needed for entrepreneurs to succeed in their venture. Students will receive continuous feedback and guidance on the development of the business plan to ensure it is doable, profitable and sustainable.

Aims of the Course

- To analyse the critical elements of entrepreneurship
- To develop the critical skills needed for entrepreneurs to succeed
- To turn opportunities into setting up innovative ventures
- To become aware of the typical mistakes made in the initial phases and how to overcome them
- To design a realistic business model and business plan.

Learning Outcomes

- To know how to apply the entrepreneurial process
- To apply the VUCA concept to assess competition and identify opportunities and challenges
- To explore the various sources of funding
- To know how to turn a market opportunity into a business model
- To develop a feasible business plan

New Teaching and Assessment Methods in HE

SESSION CHAIR:

Karmela Aleksić-Maslać

44

The impact of project assignments on the teaching quality and students' satisfaction in mathematical and statistical courses at ZSEM

Ivana Geček Tuđen[1], Andrija Raguž[2]

[1]*The Zagreb School of Economy and Management, Zagreb, Croatia, igtuden@zsem.hr*
[2]*The Zagreb School of Economy and Management, Zagreb, Croatia, araguz@zsem.hr*

Abstract

We consider the effect of partial replacement of traditional examination and teaching methods by project assignments in mathematical and statistical courses at ZSEM. We analyze the results of student's polls and the examination results of freshmen and sophomore groups in study programs Economics and Management and Business Mathematics and Economics in academic year 2020-2021 and a few previous academic years. We compare the points in the overall score before and after the introduction of grade elements based on project tasks involving programming skills. The results are obtained on the level of descriptive statistics, and the outline for the inferential statistics is given.

Keywords: *project assignments, mathematical and statistical courses, teaching process, examination methods.*

1. Introduction

Following current trends in higher education, we considered the problem of replacing part of the traditional theoretical approach in teaching with the practical one using appropriate software and replacing the traditional grade elements (such as oral exams and written tests) by more flexible ones (online quizzes, project assignments, etc.). We focused on STEM courses, in particular, courses in mathematics and statistics at undergraduate level, so we considered the courses: Statistics (1 and 2) and Mathematical Principles for Economic Analysis (MPEA) at The Zagreb School of Economy and Management.

 Namely, in today's world statistical and mathematical knowledge represents the basis for data analysis - collecting, summarizing, interpreting, and gaining information. And, we know that statistics and mathematics are most effectively passed to the students when they are based on some real and applicable data. Students learn the material more easily and have more interests in the material if they experience the statistical research process for themselves (*see*

[1]) and when they actively participate in the learning process. Also, eexploration with real data sets are more meaningful and instructive when the data are collected by the students themselves (*see [2]*).

We often tend to accuse students of being lazy or uninterested or unprepared (common situation in mathematical courses), but we need to reconsider our (teacher's) role in this vicious circle. We, as the teachers, should position ourselves not only as a transmitter of information, but primarily as a guide through the experience that students create by themselves (*see [3]*).We need to take into account that in this circle, many students already have a negative experience with the mathematical courses in the previous stages of their education, so we need to make an effort to encourage them and to rebuild the already formed image of mathematical and statistical courses as the difficult and incomprehensible. And there is no better way than to bring the material to students through every day and usable examples that are close to them and whose later use and meaning they can see.

This is the reason why we composed and reorganized the courses mentioned above so that they would offer a new approach to the students, which would benefit both teachers and students. We have systematically measured the results and satisfaction of students in order to obtain information that can help us in further improving the learning process of these courses.

The success of going beyond theoretical questions and computational exercises was measured in terms of descriptive statistical analysis of students' success in completion of new grade elements and students' satisfaction obtained by student polls. We investigated both teachers and student's viewpoint. The expectations and premises are given in the second, and the results in the third section. The fourth section contains a conclusion and guidelines and ideas for further research and improvement.

2. Setting and premises

The changes we observed were made during one-year period, in the academic year 2020/2021.

In the Statistics 1 and 2 course we didn't make changes in the course topics, but we added and/or replaced fully theoretical tasks and assignments with the practical ones (using Excel), containing the real and accurate data. We made changes in the way students learn, present and test their knowledge. We assigned 20 % of the total points in Statistics 2 course and 10% in Statistics 1 course to project assignment together with the oral exam. The rest was assigned to the written part of the exam, containing both theoretical and computational tasks.

When solving the project assignments, students were divided in groups (formed by the students themselves) of two and had several weeks to set up their project, collect data for it and, using Excel, conduct the necessary analysis and draw their own conclusions. The project assignments were then presented to the teacher and the other students at the end of the course.

Here are some examples of the project assignments students could pick from the list.

Example 1.

We study the effect of foreign direct investment (FDI) in EU member states on economic growth. Compare more precisely how foreign investment and inflation (measured through the CPI) affect GDP, in the European Union and its members. Note: for your data you can choose three or more different countries of choice for the time period of 8 years.

- *Calculate the basic statistical characteristics of these variables - minimum value, maximum value, mean value, median and standard deviation. Graph each of the listed variables. Which countries have the best and which the worst economic indicators (GDP, FDI, CPI)?*

- *Show multiple linear regression model with all variables. Show results: regression line with data, residual graph. Comment on the coefficient of determination. At the significance level of 5%, can we say that some of the coefficients are insignificant? What are the reliable intervals for the obtained linear regression coefficients?*

- *Is there a correlation between inflation (CPI) and foreign direct investment? Explain the obtained results in the context of the regression model.*

- *Do ANOVA analysis and make a conclusion.*

Example 2.

"Everyone" is crazy about Instagram and carefully gathers followers. We wonder who is the best at it! Find statistics on the 100 Instagram stars with the most followers. Sort them into categories by the industry they come from (actors, singers, TV personalities, athletes ...).

- *Form a sample with the number of followers of the first 100 personalities on Instagram who have the largest number of followers.*

- *Determine a five-digit summary for the obtained sample and graphically represent the data.*

- *Are all the categories you have identified equally represented among the Instagram stars? Test uniform distribution by category, choosing a random sample of Instagram stars.*

- *Does the number of Instagram star posts affect their number of followers? Set up a simple linear regression model and perform a statistical analysis.*

Example 3.

It's Christmas present time and are there sweeter than sweet presents?! Study the price of 20 similarly sweet Christmas packages in 2 different retail chains in the part of the city where you live (Ferrero packed in the Christmas tree, gift package Kandit products, Milka balls, …) - in both stores see the same items you chose.

- *Determine and graphically display the five-digit summary in both stores. Compare the obtained results.*

- *Using your sample, test whether one store is more affordable in the average price of sweet Christmas products than another.*

- *Check whether the deviations in the price of these products are different in these two stores.*

- *Give your friends 10 similar products to try. Let them give them a score of 1-10. See if there is a link between the average rating of the products received and their prices.*

Example 4.

This is a task for those who like to prepare healthy food and like to buy it on the market! Choose 2 Zagreb markets of your choice and compare prices on them.

- *Choose one winter fruit or vegetable and list the prices of it at as many stalls as possible in both locations. Determine the five-digit summary and graph the data.*

- *Test the normality of the prices of that grocery at both locations.*

- *Test whether price discrepancies for this grocery are different in these two locations.*

- *Surely you have the assumption that one market location is cheaper than another. Use the samples you gained to test your claim.*

To this we must add that, in addition to the tasks offered by the teachers, students were encouraged to formulate their own projects. The topic and the stages of the research would then be discussed with the teacher, so that the project would be meaningful and contain all the necessary components of the statistical analysis. As expected, not many students chose this more challenging path, but there were at least individual ideas within the already formulated projects and tasks. And this is something that we certainly want to emphasize even more in the future.

In solving the project assignments process, we (teachers) offered constant help to students in the form of consultations, exchange of ideas and advice on data collection and analysis. Older and more experienced students working as tutors on the course also took part in it.

In the Mathematical Principles for Economic Analysis (MPEA) course we replaced completely the computational tasks part of the course with the application of the material in the appropriate software (we used R) and we changed the grading structure, as follows. Old grade elements: first written test (37,5%), second written test (37,5%), activity (5%), oral presentation (10%), homework (10%); and new grade elements: written test (40%), online quiz (20%), project assignment (35%), activity (5%).

Example of the MPEA project assignment.

Portfolio theory deals with the question of how to allocate resources among several competing alternative (stocks, bonds), many of which have an unknown outcome. Portfolio selection problems arise in many areas of decision-making such as companies making insurance decisions, allocating research funds, governments budgeting tax revenues, an individual's life might be thought of as a gathering asset in order to maximize utility, and, of course, investors deciding on stock or bond portfolios. Portfolio refers to any combination of financial assets such as stocks, bonds, and cash, see (Christon 2008). We have collected two real stocks data of the Reliance Industries Ltd. and the Indian Oil Corporation Ltd from database http://finance.yahoo.com. This website provides both the closing and the adjusted prices. We use the closing prices. Using the appropriate R code:

- *Find the returns of the stocks*
- *Find the mean of the returns of the stocks*
- *Determine the variance mesasures*
- *Find the covariance between these two assets*
- *Minimize the risk using the formulated problem.*

(source: S.K.Mishra, B.Ram: Introduction to Unconstrained Optimization with R, Springer, 2019.)

In the Mathematical Principles for Economic Analysis course, students solved the optimization problems and tasks in class, modelling various optimization methods, formulating algorithms, and applying them to specific problems and data. Their task in the project assignments was to apply the learned methods and programming skills to solve a real-world problem, in a group consisted of two students. They had help in the form of tutoring and exchange of ideas with their professors.

By introducing the described changes in courses, we expected that both students and teachers will benefit in the teaching process, results, and, most importantly – improvement in students' knowledge and the experience which they will take further with them.

Those expected benefits of described changes in the studied courses from the teacher's perspective can be summarized in a following list (*compare [4] and [5]*):

- students will be able to connect different parts of the material and link theory and practice
- students will develop crtitical and analytcial thinking and improve their ability to discuss
- students will improve their presentation skills
- students will learn how to solve problems in new and unexpected situation
- by working with real life problems and real data, students will notice problems and shortcomings that occur when working with real data
- students will learn in active, not passive way

- the exchange of statistical experiences and ideas between students will be developed

- students will develop their ability to ask questions, formulate them properly, search for answers, think critically about the results, constuct their arguments and formulate their decisions

- students will experience each step of statistical analysis − from collecting data, planning the research, modelling, data analysis to presenting the results − forming a completely different experience of studying mathematical and statistical material

- students will develop their programming skills and algorithmic problem solving ability

3. Results

In order to analyze and test our premises, we continuously monitored the results of the students of the studied courses and analyzed their satisfaction with the teaching process through a survey. The analysis of the obtained survey results follows.

For the Statistics 1 and 2 courses:

Question 1. What type of test of your knowledge in Statistics do you prefer?

A) Group project tasks

B) Classical test

C) Something else (individual project task)

We surveyed 2 types of students: those who during their studies took both the classical test and the project assignments (3rd year students) and those who only took the project assignments (2nd year students).
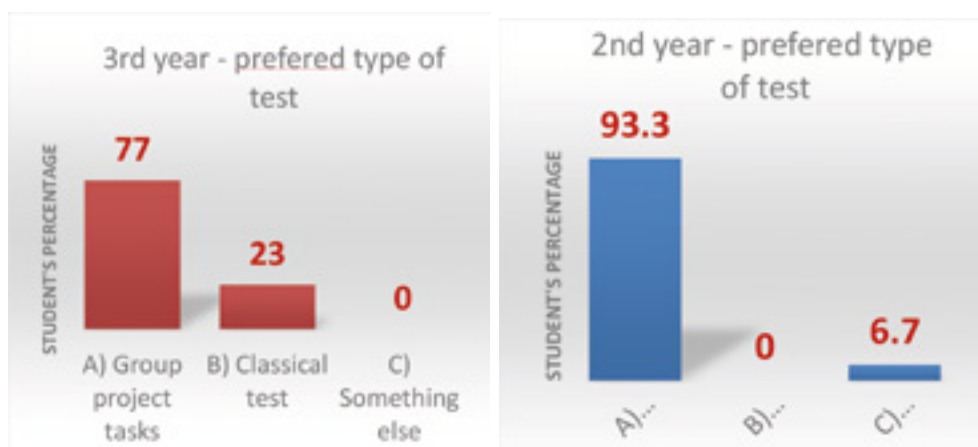
Question 2. Do you prefer the project task method just because it seems like the easier way to solve practical part of Statistics course?
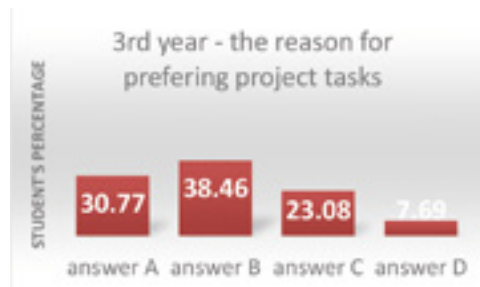
A) Yes, it is easier that way and that is the only important thing

B) Solving that part of the course is indeed easier by project tasks, but I'm interested in it because some other benefits it brings

C) Project tasks are harder way to solve that part of the course, but I prefer it anyway

D) No, the classical Excel exam is an easier way to solve that part of the course

Question 3. The BENEFITS of project tasks (in student's opinion):

A) developing teamwork abilities

B) working with real data

C) more interesting topics

D) learning new additional topics not covered by standard material

E) deeper understanding of the software used for statistical analysis

F) developing presentational skills

G) there is no stress as with the classical tests

Question 4. The NEGATIVE SIDES of project tasks

A) insufficient time for quality preparation of the project task

B) lack of interest in further research in statistical topics

C) problems in group communication

D) too much work to do

E) problem when working with real data

F) I didn't master Excel that way

G) there are no negative sides
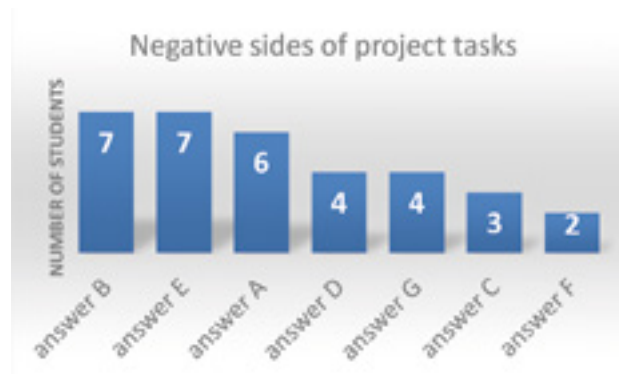
Question 5. Was working on a project assignment was a positive experience for you?

Question 6. Satisfaction with the knowledge of solving practical statistical problems in Excel after the finished Statistics course (students' opinion).

Students' satisfaction with the gained knowledge
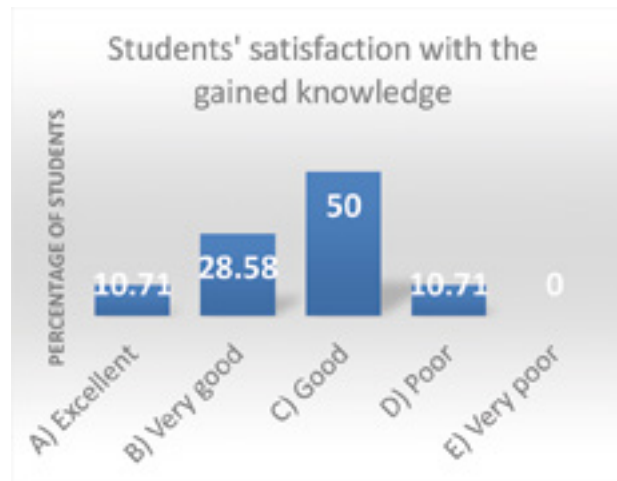
From the obtained results we concluded that the new learning and examination process that we implemented, was very well received by the students, that the students were satisfied with the level of knowledge they had acquired and that the whole process was a pleasant experience for them. We also received feedback on which aspects and components are best accepted and which should be upgraded and improved. From the students' suggestions that emerged from the survey, it can also be singled out that they would prefer more real-life problems and real data in the class examples.

For the Mathematical Principles in Economic Analysis we obtained the following results.

Question 1. Did solving tasks in the appropriate software (R) help you to understand the material better?

Did solving tasks in the appropriate sotware help you to understand the material better?
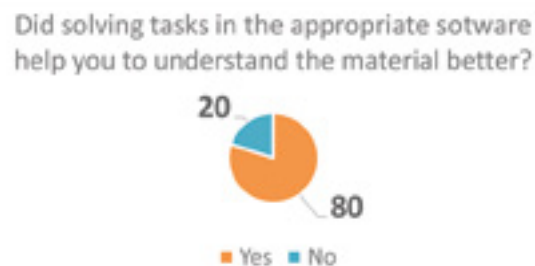
Question 2. What type of class in MPEA course do you prefer?

    A) Theoretical - solving tasks only on the board/paper

    B) Combined - solving tasks on the board as well as in the appropriate software

    C) Practical - solving tasks only in the appropriate software

What type of class in MPEA course do you prefer?
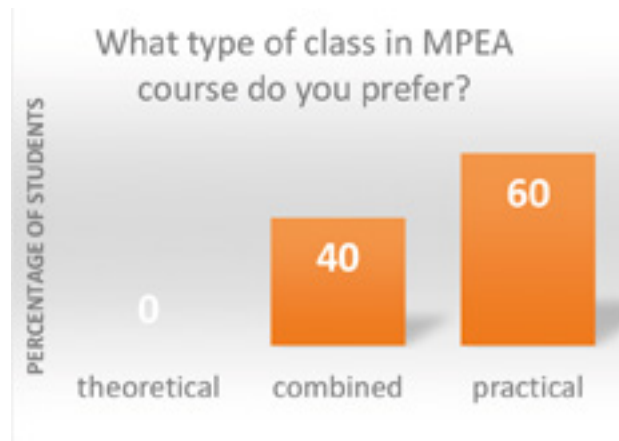
Question 3. The BENEFITS of project assignments

Question 4. NEGATIVE sides of project assignments

Question 5. Was working on the assignment a satisfying experience for you?

Was working on the assignment a satisfying experience for you?

From these results we can conclude that students do not prefer a purely theoretical form of learning materials in the observed course and that the use of software during classes helped them to master and understand the material. Once again, this way of learning and examination has been shown to be a positive experience for students, and feedback on the pros and cons of this experience can help us to further improve the teaching process.

In our further research we will create a more comprehensive base of results data that will allow us to systematically analyze how the newly introduced way of learning affects students' results and knowledge. For now, based on this one-year experience, we obtained the results that show that the students achieved better total score when examination process is improved via project assignments. The attached result is just one example, namely the analysis of a comparison of the Statistics 2, 2018/2019 vs. 2020/2021 results, where the significant difference in the mean results is observed.

t-Test: Two-Sample Assuming Unequal Variances		
	Stat 2 2018/2019	Stat2 2020/2021
Mean	9,75	16,75
Variance	31,5872093	14,30882353
Observations	44	52
Hypothesized Mean Difference	0	
df	73	
t Stat	-7,024414322	
P(T<=t) one-tail	4,69324E-10	
t Critical one-tail	1,665996224	
P(T<=t) two-tail	9,38649E-10	
t Critical two-tail	1,992997126	

We are aware that a complete analysis and comparison of results can occur when the new method of teaching and examination is compared with the old method of teaching and examination in completely identical circumstances, which includes the same generation of students, the same professor, and the same uniform test. However, this requires the division of student groups into experimental groups, which requires great technical preparation. Therefore, we give these results only as a guideline in our conclusions, and we will try to achieve more precise results of inferential statistics in completely controlled conditions in the future, so that our process and analysis would be complete as possible. We would also like to conduct for example the linear regression on how different stages of project assignment impact the student's satisfaction with the overall process or the linear regression on how the fact that group invented (designed) the task by themselves impacts their final result and satisfaction with the process.

Therefore, we set this to ourselves as the goal for future research.

4. Conclusion

Using the feedback we got from the students and the results we obtained, we conclude that using the new method for teaching and examination:

- students managed to associate theoretical statistical and mathematical knowlege and practical applications

- students were satisfied with the gained knowledge of the material and mathematical/ statistical software used in solving project assignments

- students describe the teaching and examination process as a positive experience and in their major opinion, it should be the way the material should be taught and examined

- we (teachers) describe this as the positive experience, and we see a lot of room for improvement

To conclude, the new way of teaching and examination applied in the courses Statistics 1 and 2 and Mathematical Principles for Economic Analysis at The Zagreb School of Economy and Management resulted in a process that brought benefit to both students and teachers. The feedback obtained from the students was useful to the teachers who will follow the analyzed suggestions in order to improve their teaching methods for the benefit of students' knowledge and satisfaction when learning mathematical / statistical subjects. This has certainly proved to be a path that should be followed and upgraded in the future, with many still open issues and opportunities for progress. However, based on what was obtained and analyzed - embedding even more real-world tasks, data, and problems using appropriate software is something that definitely enriches the teaching process and that could perhaps be incorporated to a greater extent (percentage) into the teaching of mathematical/statistical courses, which we will try to implement in the future.

References

[1] Bryce, G. R.: "Developing tomorrow's statistician", *Journal of Statistics Education*, 13(1), 2005., http://www.amstat.org/publications/jse/v13n1/bryce.html

[2] Hogg, R. V.: "Statistical education: Improvements are badly needed", *The American Statistician*, 45, 342-343, 1991.

[3] Moreira da Silva, M.P., Pinto, S.S.: "Teaching statistics through learning projects", *Statistics Education Research Journal*, 13(2), 177-186, 2014., http://iase-web.org/Publications.php?p=SERJ

[4] Spence, D.J., Bailey, B., Sharp, J.L.: "The impact of student-directed projects in introductory statistics", *Statistics Education Research Journal*, 16(1), 240-261, 2017., http://iase-web.org/Publications.php?p=SERJ

[5] Bailey, B. Spence, D.J., Sinn, R.: "Implementation of discovery projects in statistics", *Journal of Statistics Education* Volume 21, Number 3, 2013., www.amstat.org/publications/jse/v21n3/bailey.pdf

56

Distance Learning And Transfer Of Classical Teaching Into A Virtual Environment In The Croatian Higher Education System

Dora Šimunović[1]

Zagreb School of Economics and Management, Zagreb, Croatia,
dora.simunovic@zsem.hr

Abstract

Higher education in Croatia has not witnessed significant legislative changes for many years and, unlike some other disciplines, has had a clear and stable regulatory framework and standards of conduct. However, the COVID-19 disease pandemic in 2020 has also affected the higher education system and faced higher education institutions with great challenges and the need to urgently adjust the way study programs are conducted. Most higher education institutions before the so-called lockdown did not have developed online courses, let alone accredited online study programs. They found themselves in an unenviable situation of ad hoc adaptation to new conditions in society and epidemiological measures while preserving and ensuring the quality of the studies they perform. In this paper, the requirements for online teaching are to be examined based on the analysis of the Croatian regulatory framework for online study programs, which is essentially reduced to the Criteria and Procedures for Evaluation of Online Studies adopted by the National Council for Science, Higher Education and Technological Development.

Keywords: *Online study programs, Virtual environment, Emergency remote teaching, Criteria, COVID-19*

1. Introduction

The pandemic of COVID-19 disease in 2020 affected the entire world, including academics. The higher education sector, in which the study experience is greatly based on the possibility of live interaction between faculty and students, has almost overnight moved into a virtual environment. There was no time for preparation or transition. Student halls suddenly became virtual classrooms, lectures became recordings posted on learning systems, entire study programs became online. Most higher education institutions did not have developed policies and guidelines on online teaching and therefore faced challenges on how to teach, what tools to use, how to educate faculty and introduce students to new ways of teaching and

evaluation, how to preserve teacher-student interaction etc. [1]. Prior to these circumstances, the share of online teaching in Croatia was insignificant. Therefore, an additional challenge was how to overcome the lack of teaching experience in a virtual environment. With more or less success in dealing with the described challenges, higher education institutions survived the academic year 2020/2021. The experience of online teaching leads to an idea and opens the discussion on the migration of classical study programs into online study programs. It is necessary to examine the preconditions needed for a more efficient virtual environment and a better online study experience, and to design policies, procedures and systems that will ensure preparedness for future challenges and improve the quality of education [2]. This paper presents an overview of the key conditions required for the accreditation of online study programs in Croatia. Additionally, it presents a review of the impressions and experience of online studying in the academic year 2020/2021 from a student's perspective.

2. Legislative Framework Of The Distance Learning System

In the Croatian system of higher education it is technically more correct to speak of online study programs as systems of distance learning. According to the Act on Scientific Activity and Higher Education (hereinafter: ASAHE), the fundamental regulation governing higher education in the Republic of Croatia, study program can be organized as a distance learning system, but only with the prior approval of the National Council for Science, higher education and technological development [3]. It follows from the stated legal formulation that this is an exception rather than a regular way of conducting study programs. The Agency for Science and Higher Education (hereinafter: ASHE) informed that by December 2020 there have been only thirteen accredited online study programs at only six higher education institutions which represents a share of only 0.82% of all accredited study programs [4].

On the other hand, since the beginning of the pandemic and the so-called lockdown online teaching in Croatia was not the exception, but the rule. In fact, Croatian Institute of Public Health has on several occasions issued official statements with recommendations on the manner of teaching in the higher education system. Higher education institutions were instructed to ensure distance learning, as far as possible [5]. In December 2020 ASHE organized a webinar on accreditation and conducting online studies in Croatia, where it was set out: „Effective online teaching is the result of careful reflection and preparation, and it takes an average of 6 to 9 months for the quality preparation of an online course." [6]. It is clear that if higher education institutions did not invest in the development of distance learning systems prior to the pandemic, they did not have as much time at their disposal. In some cases, this initially even resulted in a lack of distance teaching or at least a lack of synchronous teaching. Overall, there has been a great increase in the use of LMS (learning management system) for asynchronous teaching and an increase in other available online learning tools.

In any case, such teaching solutions in the context of a pandemic, no matter to what extent implemented online and with the use of modern technologies, cannot be *lege artis* considered distance learning systems. It is necessary to distinguish online study programs from emergency remote teaching in the way it is delivered in the COVID-19 pandemic. Emergency remote teaching represents fully online teaching and learning or blended teaching and learning in situations where they would normally be delivered face-to-face. [7]. The same

was confirmed after more than a year of dealing with the challenges of the pandemic, when for ac. yr. 2021/2022 new instructions and recommendations have been published. In August 2021 the Ministry of Science and Education issued a Notice on Execution of Study Programs. All higher education institutions were instructed to deliver contact classes in accordance with their permits, but in compliance with epidemiological measures and instructions of the authorities. The reasoning was that despite all efforts of higher education institutions to protect the quality of the teaching process, it was not in accordance with accredited study programs. Distance learning systems must be accredited by the competent ministry in accordance with regulations.

However, the ASAHE does not contain any provision on distance learning other than the one mentioned above. The main regulation therefore does not offer a legal definition of a distance learning system, i.e. an online study program. Likewise, the Act on Quality Assurance in Science and Higher Education (hereinafter: AQASHE), which regulates the system of quality assurance and improvement of study programs, does not contain any provision that would specifically refer to distance learning. More detailed guidelines for ensuring the quality of distance learning systems can only be found in the Criteria and Procedures for the Evaluation of Online Studies adopted by the National Council for Science, Higher Education and Technological Development (hereinafter: the Criteria). The Criteria follow the content of Standards and Guidelines for Quality Assurance in the European Higher Education Area (hereinafter: ESG).

3. Online Study Programs

In Croatian legal framework online study programs are those in which at least 50% of courses are taught online, while online courses are those in which at least 50% of teaching hours are taught online [8]. In general, distance learning can be provided through synchronous learning that allows teachers and students to interact in real time and receive feedback immediately, or an asynchronous learning environment where this is not possible and teaching content is not offered in the form of live teaching [9]. Higher education institutions need to provide professional development for instructors, training for learners, and technical support for the content development and delivery of online courses [10]. Under the Criteria, higher education institutions have to meet some additional conditions in order to be issued distance learning permit. Certain infrastructural and technical conditions are prescribed, for example, provided 24/7 Internet access, computer equipment and software support, virtual environment, computer services, etc. In relation to personnel requirements, the Criteria introduce special preconditions for staff at management level and staff at performance level. At the management level, there must be at least one person in charge of implementing the online learning strategy, developing infrastructure procurement and faculty training plans and evaluation, and at least one person in charge of arranging exchanges with other higher education institutions. The latter refers to the so-called virtual student mobility which the Criteria describe as inclusion in the online programs of other institutions. At the performance level, it is necessary to provide at least one person trained and in charge of online communication with students, then a service for troubleshooting within 24 hours and teaching staff trained for online teaching. Furthermore, there must be at least one teacher in each online course for each teaching group whose time, expressed in norm hours, cannot be

less than the number of ECTS credits the course brings or greater than the number of ECTS credits the course brings multiplied by 1.5. Assuming that online courses will be designed without exercises (although the Criteria do not preclude this), the teaching workload should be distributed between lectures and seminars. For an online course of 3 ECTS credits, this would mean that the teacher must not have less than 3 or more than 4.5 norm hours per week. As an example, Table 1 considers the possibility of lectures lasting 1 to 4 hours per week without a seminar or with a seminar lasting 1 to 3 hours per week. Thus observed, an online course of 3 ECTS credits could be designed either with 1 hour of lectures and 1 hour of seminars per week (a total of 3.5 norm hours per week), or with 2 hours of lectures per week, without seminars (a total of 4 norm hours per week). All other options go beyond the allowable range of number of hours per week (3 to 4.5).

Table 1 Example of allowable range of norm hours

Number of ECTS credits per course	Lectures weekly		Seminars weekly		Total norm hours
	Hours	Norm hours	Hours	Norm hours	
3	1	2	0	0	2
	1	2	1	1.5	3.5
	1	2	2	3	5
	2	4	0	0	4
	2	4	1	1.5	5.5
	2	4	2	3	7
Number of ECTS credits per course x 1.5	2	4	3	4.5	8.5
4.5	3	6	0	0	6
	3	6	1	1.5	7.5
	3	6	2	3	9
	3	6	3	4.5	10.5
	4	8	0	0	8
	4	8	1	1.5	9.5
	4	8	2	3	11

Table 2 shows other possibilities for distribution of number of hours between lectures and seminars for courses from 2 to 6 ECTS credits.

Table 2 Distribution of number of hours between lectures and seminars

Number of ECTS credits					Lectures weekly		Seminars weekly		Total Norm hours
					Hours	Norm hours	Hours	Norm hours	
2	3	4	5	6	1	2	0	0	2
					1	2	1	1.5	3.5
					1	2	2	3	5
					2	4	0	0	4
Number of ECTS credits x 1.5					2	4	1	1.5	5.5
					2	4	2	3	7
3	4.5	6	7.5	9	2	4	3	4.5	8.5
					3	6	0	0	6
					3	6	1	1.5	7.5
					3	6	2	3	9

Described personnel requirement is important from the aspect of planning and preparation of online study programs. Especially since the Criteria stipulate no more than 90 students enrolled in a teaching group for an online course, and that students in online programs may only have the status of part-time students. The purpose is to equally distribute all activities in which the faculty engage: time for preparation, updating of materials, monitoring student work in an online environment, assessment of student knowledge etc.

It was mentioned earlier that in terms of content the Criteria rely on ESG. Of all the prescribed conditions for online study programs, perhaps the greatest emphasis is placed on the student-centric orientation. The Criteria impose higher education institutions to provide comprehensive support to students, especially at the undergraduate level. In the enrolment procedure, they should provide information about the program and courses, student rights and obligations, conditions required for inclusion in the online program (computer skills, speed of Internet access etc.) and through instructions or workshops provide an introduction with tips on attending online programs. All processes related to students during the studies must be enabled in online form (the enrolment process, the availability of grades, communication with stakeholders of the teaching process, practical work in virtual laboratories, library services).

Compared to classical programs and courses, online study programs and online teaching represent a difference in the manner, not the content of the performance. In the case of a higher education institution delivering a study program both as a distance learning system and in the classical way, it is important to point out that the completion of online studies gives the same academic title as the completion of classical studies. Consequently, higher education institutions must ensure the same learning outcomes of all students, regardless of the manner of conducting the study program. Thereby, it is crucial to create assessment methods for learning outcomes that are feasible in a virtual environment.

4. Transfer Of Classical Teaching Into A Virtual Environment

Generally, it can be concluded that higher education institutions were faced with most of the above-described conditions for online study programs due to the pandemic. Therefore, the experience of emergency remote teaching is extremely useful for higher education institutions that plan to start online studies. The acquired practice and overcome challenges should be used to improve the quality of online teaching, primely from the aspect of providing support to students who are the central point of the teaching process. Some of the advantages of online study programs are the availability of education, for example to students from rural areas, affordability due to lower costs of transportation, accommodation and other costs, and flexibility so that the students can plan their schedule and learn anytime and anywhere [11]. However, on the other hand, it should be considered that such a way of teaching might be a challenge for some students due to incompetence in the online environment or inability to learn independently, etc. In October 2021 ASHE published the results of a survey conducted in Croatia on a sample of 4273 students about the study experience during a pandemic. Students declared on the ratio of teaching methods in ac. yr. 2020/21: 40% entirely online, 40% combined ⅔ online and ⅓ face-to-face, 11% combined ½ online and ½ face-to-face, 8% combined ⅔ live and ⅓ online and 1% fully face-to-face. In relation to the experience of online studying, students were most satisfied with access to teaching materials from home and interaction with faculty in a virtual environment, followed by satisfaction with the objectivity of student assessment in a virtual environment and criteria and methods of student assessment. On the other hand, students stated that it would be necessary to educate faculty for online teaching, provide them with better equipment and, for example, shorten the length of online lectures. Perhaps the most significant result of the survey is that 47% students fully or mostly agree that online study provides more room for unethical behaviour when testing knowledge. Higher education institutions should use these indicators for planning and improving their performance in the future. [12].

5. Conclusions and Suggestions

The distance learning system is subject to the accreditation procedure as well as the classic study programs. In the following cycles of reaccreditation procedures, ASHE as the competent body will examine the quality of the teaching processes that have taken place (and will take place?) in the COVID-19 pandemic conditions. Given the described regulatory framework in Croatia, this could be a challenge. Higher education institutions were forced to deliver most of the teaching, and in some cases entire programs online, without them or the competent authorities having the opportunity to previously check compliance with such teaching manner. Higher education institutions that could not have foreseen such a sequence of events are formally not bound by the conditions prescribed by the Criteria. At the same time, there is no other regulatory framework that would be a guideline for assessing the quality of specific elements of the teaching process in a virtual environment. The question remains as to how this will be approached in practice. The assumption is that the emphasis could be on the ESG standard on student orientation and that more than ever it will be examined whether a particular higher education institution, and if so at what level, ensured quality teaching (quality of online teaching in the conditions of the COVID-19 pandemic from the perspective

of students as key stakeholders in the higher education system). The focus of assessment and evaluation in this regard could be on how the higher education institution has provided support to students in coping in a virtual environment, developing independence in learning, availability of teaching materials and teacher support etc.

It would certainly be useful for higher education institutions to have the described Criteria as a basis in internal evaluations, given that currently there is no other regulation in the Republic of Croatia that would regulate such situations at a higher legal level. Higher education institutions should already carry out evaluations of students', teachers' and other stakeholders' satisfaction with online teaching. Based on the analysis of quality cycle results, they should develop action plans for improvements in the coming period. The obtained indicators, in addition to helping higher education institutions to improve quality, will enable easier migration of classical study programs into distance learning systems.

From a regulatory point of view, a revision of the Criteria should be considered. A lot has changed since they were released in 2016. Technology has advanced, numerous tools for online teaching have been developed, higher education institutions have experienced emergency remote teaching. Emergency remote teaching has resulted in development of know-how, good practices, investments in infrastructure and faculty education. Although the Criteria mention the possibility of migration of classical studies into a virtual environment, there are no guidelines on how to implement it. The Criteria (or other regulation) should offer a formal procedure for migration of classical studies into distance learning systems.

References

[1] Guangul, F. M., Suhail, A. H., Khalit, M. I. and Khidhir, B. A. (2020), "Challenges of remote assessment in higher education in the context of COVID-19: A case study of Middle East College", Educational Assessment, Evaluation and Accountability. https://doi.org/10.1007/s11092-020-09340-w.

[2] Koričan Lajtman, M., Oblaković, G. & Nakić, M. (2020). Impact of professors' personal factors and digital literacy on students' satisfaction in COVID-19 pandemic. 8th Higher Education Institution Conference, Zagreb

[3] Act on Scientific Activity and Higher Education (OG 123/03, 198/03, 105/04, 174/04, 02/07, 46/07, 45/09, 63/11, 94/13, 139/13, 101/14, 60/15, 131/17)

[4] Bišćan Ivan, Pregled online studijskih programa u Republici Hrvatskoj, AZVO, prosinac 2020., available at: https://www.azvo.hr/images/stories/novosti/Pregled_online_studijskih_programa_u_Republici_Hrvatskoj_Ivan_Bi%C5%A1%C4%87an_18.12.pdf

[5] Preporuke za održavanje nastave na visokim učilištima u razdoblju pandemije bolesti covid-19 uz primjenu protuepidemijskih mjera, HZJZ, kolovoz 2020., available at: https://www.hzjz.hr/wp-content/uploads/2020/09/PREPORUKE_visoka_ucilista_31_08_2020.pdf.; Preporuke za održavanje nastave na visokim učilištima u razdoblju pandemije bolesti covid-19 uz primjenu protuepidemijskih mjera - nadopuna preporuka od 31. kolovoza 2020., HZJZ, studeni 2020., available at: https://www.hzjz.hr/wp-content/uploads/2020/03/nadopuna_uputa_visoka_ucilista_27_11_2020.pdf.; Preporuke za održavanje nastave na visokim učilištima u razdoblju pandemije bolesti covid-19 uz primjenu protuepidemijskih

mjera - nadopuna preporuka od 31. kolovoza 2020., HZJZ, svibanj 2021., available at: https://www.hzjz.hr/wp-content/uploads/2020/03/Preporuke-za-odr%C5%BEavanje-nastave-na-visokim-u%C4%8Dili%C5%A1tima-u-razdoblju-pandemije-bolesti-COVID-19-uz-primjenu-protuepidemijskih-mjera.pdf

[6] Kučina Softić Sandra, O čemu govorimo kada govorimo o e-učenju i online nastavi?, AZVO, prosinac 2020.

[7] Erlam, G. D., Garrett, N., Gasteiger, N., Lau, K., Hoare, K., Agarwal, S., Haxell, A. (2021). What Really Matters: Experiences of Emergency Remote Teaching in University Teaching and Learning During the COVID-19 Pandemic. Frontiers in Education

[8] Kriteriji i postupci za vrednovanje online studija, Nacionalno vijeće za znanost, visoko obrazovanje i tehnološki razvoj, klasa 003-08/16-05/0003, ur. br. 355-08-16-0003, Zagreb, travanj 2016

[8] Kriteriji i postupci za vrednovanje online studija, Nacionalno vijeće za znanost, visoko obrazovanje i tehnološki razvoj, klasa 003-08/16-05/0003, ur. br. 355-08-16-0003, Zagreb, travanj 2016

[9] Littlefield J. (2018). The difference between synchronous and asynchronous distance learning. https://www.thoughtco.com/synchronous-distance-learning-asynchronous-distance-learning-1097959

[10] Kebritchi, M., Lipschuetz, A., & Santiague, L. (2017). Issues and challenges for teaching successful online courses in higher education. Journal of Educational Technology Systems, 46(1), 4−29.

[11] Dhawan, S. (2020), "Online Learning: A Panacea in the Time of COVID-19 Crisis", Journal of Educational Technology Systems, Vol. 49 No. 1, pp. 5-22.

[12] Đorđević M., Plužarić, Ž, Bišćan, I. Studenti i pandemija: Kako smo (pre)živjeli?, AZVO, Zagreb, listopad 2021

64

Engagement during studies – Exploring the influence of student engagement on pro-environmental behaviour

Jasmina Dlačić[1]

[1]*Faculty of economics and business, University of Rijeka, Rijeka, Croatia,*
jasmina.dlacic@efri.hr

Abstract

Higher education institutions (HEIs) are today, more than ever before, realising the importance of collaboration with different stakeholders. Students are counted as one of most important stakeholders of HEIs. Therefore, focusing on developing close relationships with them during studies is considered as a prerequisite of collaboration with them in the long run. This can be done through engaging students in different activities that help HEIs develop relationship with other stakeholders and consequently be more present in the local community. Thus, the purpose of this paper is to explore students' engagement during studies in volunteering activities and ecological activities, as indicator of their engagement in the community. To accomplish purpose, research was conducted on 550 students from a public higher educational institution in Croatia. Research results indicate that respondents involved in volunteering and ecological activities at their households show higher levels of green consumption values, pro-environmental behaviour (some aspects) and general pro-environmental purchasing behaviour (for ecological activities), than respondents that are not involved in these activities. Paper also offers managerial implications for HEI management practices.

Keywords: *Student engagement, Volunteering, Pro-environmental behaviour, Higher educational institutions, Croatia.*

1. Introduction

Competition in higher education (HE) is omnipresent, especially among business schools. Consequently, to establish sustainable competitive advantage, higher education institutions (HEIs) are focusing on differentiation with emphasis on quality or market position [1]. If focusing on quality, both in teaching process and research, competitive advantage among HEIs is found in adherence and implementation of standards of quality in HE. Standards of quality in HE focus on delivering quality with emphasis on program level with support of the quality processes in institution (like EFMD accredited Bachelor/Master former EPAS

accreditation) [2] or the emphasis is on the entire institution (like AACSB or EQUIS) [3] [4]. Implementation and adherence to these guidelines and standards of quality in HE is a process. Belonging to the top 5 % of business schools is certainly a great motivation [5], but this is a process for the institution not a programme or an individual. And only a few are ready to commit themselves to achieving that goal throughout the institution, and to constantly improve.

One of the directions in the AACSB quality process is related to the Engagement and Societal impact (AACSB, cf. Standard 9). So, if HEIs are focusing on implementing international accreditation standards they should consider engaging with the community, as one of the pillars in their quality implementation process. Engagement can be approached from different perspectives [6] that include a behavioural manifestation, psychological state, disposition, and process. Or according to [7] it includes experience, feeling, participation, interaction and sharing. Focus of this research is on behavioural/emotional approach where customer engagement is conceptualized as "the intensity of an individual's participation in and connection with an organisation's offerings or organisational activities, which either the customer or the organisation initiates" [8, p.133]. Therefore, individuals that are volunteering in some activity like animal protection, assisting the elderly and the people in need in the community or cultural activities, are engaged individuals. This can be extended on household level to individuals that are responsible for activities within their households like waste sorting or recycling, as they are intensively participating in these activities. They are also considered to be engaged individuals. Student engagement during studies in different activities such as volunteering and ecological activities at their households is an important indicator of their engagement in the community. Therefore, the purpose of this paper is to explore students' engagement during studies in volunteering activities and ecological activities, as indicator of their engagement in the community.

Environmental protection and sustainable development goals [9] are now more than ever important. Due to that, HEIs are including courses in their curriculum related to sustainable development, focusing their research on sustainable topics as well as including it in their mission and vision. On individual level ones that are pro-environmentally oriented will express higher levels of green consumption values and show preference for environmentally friendly products [10], behave in a way to minimize its negative impact on the environment [11] and choose environmentally friendly alternative when buying products [12].

Through engagement in volunteering, individuals are learning to understand others' perspectives [13]. Volunteering activity can serve as indicator of individual's engagement as when volunteering individuals are intensively participating in such activity. Also, young individuals are ecologically oriented [14] and express pro-environmental behaviour. Based on previous, a research question is proposed: can student volunteering and ecological activities distinguish individuals in level of their pro-environmental behaviour and serve as an indicator of their future engagement in the HEIs community?

2. Empirical research

2.1. Research methodology

With aim to explore posited research question, an analysis was conducted on a purposive sample of students from Faculty of Economics and Business, University of Rijeka during October 2018. A structured questionnaire, and paper and pencil method were used to collect the data. A total of 550 answered questionnaires were collected consisting of respondents from each study group. Hence, including respondents from all three undergraduate and two graduate study groups. Questionnaire consisted of questions related to previously established scales like green consumption values [10], pro-environmental behaviour [11] and general pro-environmental purchasing behaviour [12]. Scale green consumption values used a 7-point Likert-type scale, anchored with "strongly disagree" (1) and "strongly agree" (7). While scales pro-environmental behaviour and general pro-environmental purchasing behaviour are focused on respondents' behaviour described with "how described activity [...] is likely to happen" and used a 7-point Likert-type scale, anchored with "completely not likely" (1) and "completely likely" (7).

Respondents were also asked about their volunteering activity during the last year, and were offered to choose the frequency of volunteering (once a year, 2-4 times a year, few times a year, once in a month, few times a month, once a week and almost every day) and activity they participated in (sports events, religious events, animal protection and help, assisting the elderly and people in need in the community, cultural activities, assistance to sick children in hospitals or homes and other to add). A question was added to describe if respondents were in charge for ecological activities (like recycling, waste sorting) in their households. Questionnaire also consisted of questions related to socio-demographic profile of the respondents. Descriptive statistics and bivariate statistics were used to describe and analyse the data using SPSS ver 26.

2.2. Research sample

Demographic characteristics of the research sample are presented in the Table 1. Research sample consists of 550 respondents.

Table 1. Sample demographic characteristics

Characteristic	Description	Frequency	Percentage (%)
Gender	Female	414	75.3
	Male	134	24.4
	Prefer not to say	2	0.3
Study status	Full-time	539	98.0
	Part-time	11	2.0
Education	General grammar school	250	45.5
	Secondary economics school	199	36.2
	Secondary professional school	101	18.3
Year of the study	1st undergraduate	135	24.5
	2nd undergraduate	125	22.7
	3rd undergraduate	139	25.3
	1st graduate	99	18.0
	2nd graduate	52	9.5

Respondent's profile is following; average age 21.83 years, female (75.3%), studying full-time (98.0%), finished general grammar school (45.5%), attending undergraduate studies (25.3% 3rd undergraduate study year) and have family financial situation on scale from bad (1) to excellent (7) graded as 4.9, hence, slightly above average.

Respondents were participating in different volunteering activities during the year before the study. In that period 40.9% of the respondents (223 respondents) participated in some volunteering activity. In the following Table 2 respondents profile related to different volunteering activities is presented.

Table 2. Respondents volunteering activities

Volunteering activity	Frequency of activity	Percentage (%)	Volunteering activity	Frequency of activity	Percentage (%)
Sports events (N=176)	once a year	42.6	Cultural activities (N=149)	once a year	36.2
	2-4 times a year	13.6		2-4 times a year	11.4
	few times a year	14.2		few times a year	14.8
	once in a month	8.5		once in a month	19.5
	few times a month	9.7		few times a month	9.4
	once a week	6.3		once a week	4.7
	almost every day	5.1		almost every day	4.0
Religious events and Caritas (N=147)	once a year	51.7	Assistance to sick children in hospitals or homes (N=135)	once a year	51.1
	2-4 times a year	12.2		2-4 times a year	11.9
	few times a year	12.2		few times a year	17.0
	once in a month	12.2		once in a month	6.7
	few times a month	6.1		few times a month	7.4
	once a week	3.4		once a week	4.4
	almost every day	2.0		almost every day	1.5
Animal protection (N=147)	once a year	49.0	Other activities (N=67)	once a year	29.9
	2-4 times a year	9.5		2-4 times a year	7.5
	few times a year	15.0		few times a year	14.9
	once in a month	11.6		once in a month	16.4
	few times a month	8.2		few times a month	10.4
	once a week	2.7		once a week	3.0
	almost every day	4.1		almost every day	17.9
Assisting the elderly and people in need in the community (N=163)	once a year	43.6			
	2-4 times a year	9.8			
	few times a year	15.3			
	once in a month	14.7			
	few times a month	8.0			
	once a week	4.3			
	almost every day	4.3			

Majority of the respondents have been volunteering in activities related to *Assisting the elderly and people in need in the community* like Red Cross, food delivery, food collection, social supermarkets, Rose of St. Francis, homes for homeless and similar, with frequency of once in a year (43.6%) or few times a year (15.3%). Followed with participation in *Sport events* like participating in sports games, youth training without fees, sports competitions with frequency of once in a year (42.6%) or few times a year (14.2%). Majority of the activities take place once in a year (average from 36.2%, for *Cultural activities*, to 51.7%, *Religious events and Caritas*).

2.3. Analysis of the research results

Research results are presented to explore research question and to reach paper aim. Firstly, research results are presented with descriptive statistics considering a whole research sample. Secondly, the research sample was divided into two groups. First group consists of the respondents who in the last year have participated in the volunteering activity (223 respondents) and second group consists of the respondents who have not participated in any form of volunteering activity in the last year (322 respondents). Five respondents missed to indicate whether they have participated in any volunteering activity in the last year or not. Third, the research sample was divided into two groups related to personal responsibility of the respondent if he/she is in charge of ecological activities in your household (like, recycling, waste sorting). First group consists of the respondents in charge of the ecological activity in their household (217 respondents), and second group consists of the respondents who are not responsible for ecological activities in the household (322 respondents). 11 respondents missed to indicate whether they are responsible for the ecological activities in their household or not.

Results of the descriptive analysis for the whole sample and groups related to participation in volunteering activity are presented related to Green consumption values (Table 3), Pro-environmental behaviour (Table 5) and General pro-environmental purchasing behaviour (Table 7). While results of the descriptive analysis for the whole sample and groups related to responsibility for ecological activity in the households are presented related to Pro-environmental behaviour (Table 9) and General pro-environmental purchasing behaviour (Table 11).

Table 3. Green consumption values (average values)

Items	N	Mean	SD	Volunteering activity (Yes)			Volunteering activity (No)		
				N	Mean	SD	N	Mean	SD
It's important to me that the products I use do not harm the environment.	549	4.63	1.447	222	4.88	1.413	322	4.45	1.447
When deciding, I consider the possible impact of my decisions on the environment.	550	4.09	1.512	223	4.39	1.419	322	3.87	1.535
My concern for the environment affects my buying habits.	549	4.02	1.522	223	4.29	1.489	321	3.84	1.503
I'm worried we're spending too much resources on planet Earth.	549	5.25	1.587	222	5.50	1.436	322	5.08	1.655

I would describe myself as an ecologically responsible person.	548	4.51	1.443	222	4.76	1.349	321	4.35	1.465
It is OK for me to make the effort if it contributes to ecologically responsible activity.	547	4.75	1.369	221	5.01	1.219	321	4.57	1.437
My decision to recycle is affected whether the people in my household recycle.	549	4.61	1.771	222	4.69	1.784	322	4.56	1.772

After dividing the respondents related to their participation in the volunteering activities analysis of variance (ANOVA) was used to test whether there exists the difference between two groups. The Levene test of homogeneity of variances was performed. Where it was significant, Welch's test was done. Results are presented in Table 4.

Table 4. Results of Analysis of variance for Green consumption values (volunteering activity)

Items	F-value/Welch value
It's important to me that the products I use do not harm the environment.	$F_{(1,542)}=11.805$***
When deciding, I consider the possible impact of my decisions on the environment.	$F_{(1,543)}=16.108$***
My concern for the environment affects my buying habits.	$F_{(1,542)}=11.906$***
I'm worried we're spending too much resource on planet Earth.	$F_{(1,542)}=9.318$**
I would describe myself as an ecologically responsible person.	$F_{(1,541)}=11.083$***
It is OK for me to make the effort if it contributes to ecologically responsible activity.	$W_{(1,516.94)}=14.741$***
My decision to recycle is affected whether the people in my household recycle.	$F_{(1,542)}=0.755$

Note: *** $p < 0.001$, ** $p < 0.05$

Based on the research results we can conclude that for the items related to Green consumption values, except for item "My decision to recycle is affected whether the people in my household recycle" there is present a statistically significant difference whether individuals participate in a volunteering activity or not. With respondents that participated in a volunteering activity exhibiting higher values on all items related to green consumption values. Hence, respondents that have been engaged in the community through volunteering show higher levels of green consumption values.

Table 5. Pro-environmental behaviour – total sample and volunteering activity subsamples (average values)

Items	N	Mean	SD	Volunteering activity (Yes)			Volunteering activity (No)		
				N	Mean	SD	N	Mean	SD
As I wash my teeth, I do not let the tap water running.	549	5.93	1.804	223	5.87	1.821	322	5.97	1.781
I always turn the light off when leaving the room.	549	6.21	1.358	222	6.16	1.454	322	6.25	1.295
I think ahead what I will eat, before I open the fridge.	547	4.36	1.855	221	4.46	1.787	321	4.30	1.892
I sort the waste at home whenever it's possible.	548	4.46	1.742	221	4.62	1.740	322	4.34	1.730
When printing and writing I use paper on both sides.	548	5.22	1.824	221	5.42	1.711	322	5.07	1.892
At faculty / work, I sort waste in provided recycling bins.	549	5.13	1.736	222	5.28	1.573	322	5.02	1.826
I shower less than 20 minutes.	548	5.14	1.912	221	5.07	1.894	322	5.18	1.919
When I'm feeling cold, I prefer to dress in warm clothes rather than to rise the heating temperature.	548	4.91	1.808	222	5.01	1.782	321	4.86	1.806
I read literature about ecological awareness.	550	2.40	1.561	223	2.57	1.572	322	2.40	1.556
I consume products of biological origin.	550	3.96	1.651	223	4.02	1.647	322	3.93	1.652

Also, for pro-environmental behaviour the respondents were divided related to their participation in the volunteering activities and the analysis of variance (ANOVA) was used to test whether there exists the difference between two groups. The Levene test of homogeneity of variances was performed. Results are presented in Table 6.

Table 6. Results of Analysis of variance for Pro-environmental behaviour (volunteering activity)

Items	F-value
As I wash my teeth, I do not let the tap water running.	F(1,543)=0.388
I always turn the light off when leaving the room.	F(1,542)=0.584
I think ahead what I will eat, before I open the fridge.	F(1,540)=0.954
I sort the waste at home whenever it's possible.	F(1,541)=3.410*
When printing and writing I use paper on both sides.	F(1,541)=4.915**
At faculty / work, I sort waste in provided recycling bins.	F(1,542)=2.920*
I shower less than 20 minutes.	F(1,541)=0.418
When I'm feeling cold, I prefer to dress in warm clothes rather than to rise the heating temperature.	F(1,541)=0.944
I read literature about ecological awareness.	F(1,543)=4.753**
I consume products of biological origin.	F(1,543)=0.360

Note: *** $p < 0.001$, ** $p < 0.05$, * $p < 0.10$

Based on the research results we can conclude that for the items related to Pro-environmental behaviour "When printing and writing I use paper on both sides" and "I read literature about ecological awareness" there is present a statistically significant difference on $p < 0.05$ level, and for items "I sort the waste at home whenever it's possible", and item "At faculty / work, I sort waste in provided recycling bins" there is present a statistically significant difference on $p < 0.10$ level. For all other items there has not been noted a statistically significant difference whether individuals participate in a volunteering activity or not. Results indicate that respondents that participated in a volunteering activity exhibiting higher values on indicated items of pro-environmental behaviour. Hence, respondents that have been engaged in the community through volunteering show higher levels in some dimensions of pro-environmental behaviour.

Table 7. General pro-environmental purchasing behaviour – total sample and volunteering activity subsamples (average values)

				Volunteering activity (Yes)			Volunteering activity (No)		
Items	N	Mean	SD	N	Mean	SD	N	Mean	SD
Choose an environmentally friendly alternative in case the product that is not environmentally friendly is available at a cheaper price.	549	4.56	1.574	223	4.60	1.616	321	4.52	1.537
Choose an environmentally friendly alternative regardless of the price.	550	3.95	1.455	223	4.05	1.379	322	3.88	1.488
Try to realize the ecological effects of the product before buying it.	548	4.02	1.510	221	4.10	1.494	322	3.98	1.515

Also, for General pro-environmental purchasing behaviour the respondents were divided related to their participation in the volunteering activities, and the analysis of variance (ANOVA) was used to test whether there exists a difference between two groups. The Levene test of homogeneity of variances was performed. Results are presented in Table 8.

Table 8. Results of Analysis of variance for General pro-environmental purchasing behaviour (volunteering activity)

Items	F-value
Choose an environmentally friendly alternative in case the product that is not environmentally friendly is available at a cheaper price.	$F(1,542)=0.321$
Choose an environmentally friendly alternative regardless of the price.	$F(1,543)=1.901$
Try to realize the ecological effects of the product before buying it.	$F(1,541)=0.787$

Note: *** $p < 0.001$, ** $p < 0.05$, * $p < 0.10$

Research results indicate that there is no statistically significant difference related to general pro-environmental purchasing behaviour whether the respondents participate in the volunteering activities or not.

Further, research sample was divided into two groups, as indicated before. In the following tables we tested whether student personal engagement at households related to ecological activities (recycling, waste sorting) has difference in their behaviour related to Green consumption values (Table 9 and Table 10), Pro-environmental behaviour (Table 11 and Table 12) and General pro-environmental purchasing behaviour (Table 13 and Table 14).

Table 9. Green consumption values and ecological activity (average values)

Items	Ecological activity (Yes)			Ecological activity (No)		
	N	Mean	SD	N	Mean	SD
It's important to me that the products I use do not harm the environment.	216	4.87	1.400	322	4.50	1.454
When deciding, I consider the possible impact of my decisions on the environment.	217	4.36	1.543	322	3.92	1.450
My concern for the environment affects my buying habits.	216	4.29	1.559	322	3.85	1.459
I'm worried we're spending too much resources on planet Earth.	216	5.43	1.557	322	5.16	1.579
I would describe myself as an ecologically responsible person.	217	4.93	1.345	320	4.23	1.444
It is OK for me to make the effort if it contributes to ecologically responsible activity.	216	5.00	1.336	320	4.62	1.362
My decision to recycle is affected whether the people in my household recycle.	217	4.53	1.893	321	4.68	1.693

Also, for Green consumption values the analysis of variance (ANOVA) was used to test whether there is a difference between the group who is responsible for ecological activities in their households and the group who is not. The Levene test of homogeneity of variances was performed. Results are presented in Table 10.

Table 10. Results of Analysis of variance for Green consumption values (ecological activity)

Items	F-value
It's important to me that the products I use do not harm the environment.	$F_{(1,536)}=8.573^{**}$
When deciding, I consider the possible impact of my decisions on the environment.	$F_{(1,537)}=11.420^{***}$
My concern for the environment affects my buying habits.	$F_{(1,536)}=11.166^{***}$
I'm worried we're spending too much resources on planet Earth.	$F_{(1,536)}=3.974^{**}$
I would describe myself as an ecologically responsible person.	$F_{(1,535)}=31.920^{***}$
It is OK for me to make the effort if it contributes to ecologically responsible activity.	$F_{(1,534)}=10.427^{***}$
My decision to recycle is affected whether the people in my household recycle.	$F_{(1,536)}=0.951$

Note: *** $p < 0.001$, ** $p < 0.05$, * $p < 0.10$

Research results indicate that in all items, except one related to "My decision to recycle is affected whether the people in my household recycle", there is statistically significant difference in answers related to green consumption values between groups of respondents who are in charge for ecological activities in their household and the group who is not. The group who oversees ecological activities in their households shows higher values than the group who is not in charge of ecological activities in households, in all green consumption values.

Table 11. Pro-environmental behaviour and ecological activity (average values)

Items	Ecological activity (Yes)			Ecological activity (No)		
	N	Mean	SD	N	Mean	SD
As I wash my teeth, I do not let the tap water running.	217	5.98	1.686	321	5.90	1.861
I always turn the light off when leaving the room.	217	6.29	1.249	322	6.17	1.431
I think ahead what I will eat, before I open the fridge.	217	4.45	1.830	319	4.33	1.873
I sort the waste at home whenever it's possible.	216	5.47	1.459	321	3.80	1.598
When printing and writing I use paper on both sides.	216	5.31	1.702	321	5.19	1.880
At faculty / work, I sort waste in provided recycling bins.	217	5.44	1.592	321	4.92	1.792
I shower less than 20 minutes.	216	5.16	1.859	321	5.11	1.917
When I'm feeling cold, I prefer to dress in warm clothes rather than to rise the heating temperature.	215	4.97	1.751	322	4.88	1.854
I read literature about ecological awareness.	217	2.72	1.732	322	2.19	1.389
I consume products of biological origin.	217	4.23	1.630	322	3.79	1.664

Also, for Pro-environmental behaviour the analysis of variance (ANOVA) was used to test whether there is a difference between group who is responsible for ecological activities in their households and the group who is not. The Levene test of homogeneity of variances was performed. Where it was significant, Welch's test was done. Results are presented in Table 12.

Table 12. Results of Analysis of variance for Pro-environmental behaviour (ecological activity)

Items	F-value
As I wash my teeth, I do not let the tap water running.	$F_{(1,536)}=0.246$
I always turn the light off when leaving the room.	$F_{(1,537)}=1.053$
I think ahead what I will eat, before I open the fridge.	$F_{(1,534)}=0.591$
I sort the waste at home whenever it's possible.	$F_{(1,535)}=150.786***$
When printing and writing I use paper on both sides.	$F_{(1,535)}=0.613$
At faculty / work, I sort waste in provided recycling bins.	$F_{(1,536)}=11.857***$
I shower less than 20 minutes.	$F_{(1,535)}=0.099$
When I'm feeling cold, I prefer to dress in warm clothes rather than to rise the heating temperature.	$F_{(1,535)}=0.318$
I read literature about ecological awareness.	$W_{(1,394,067)}=14.147***$
I consume products of biological origin.	$F_{(1,537)}=8.958**$

Note: *** $p < 0.001$, ** $p < 0.05$, * $p < 0.10$

Based on the research results we can conclude that there is present statistically significant difference between items "I sort the waste at home whenever it's possible", "At faculty / work, I sort waste in provided recycling bin", "I read literature about ecological awareness" and "I consume products of biological origin" related to groups who are responsible of ecological activities in their households. Where, respondents responsible for ecological activities at their households are exhibiting higher values in pro-environmental behaviour. Results indicate that greater engagement at households implies also greater their pro-environmental activity.

Table 13. General pro-environmental purchasing behaviour and ecological activity (average values)

	Ecological activity (Yes)			Ecological activity (No)		
Items	N	Mean	SD	N	Mean	SD
Choose an environmentally friendly alternative in case the product that is not environmentally friendly is available at a cheaper price.	216	4.68	1.509	322	4.49	1.632
Choose an environmentally friendly alternative regardless of the price.	217	4.18	1.444	322	3.80	1.448
Try to realize the ecological effects of the product before buying it.	216	4.38	1.514	321	4.04	1.508

Also, for General pro-environmental purchasing behaviour the respondents were divided related to their responsibility for ecological activities at their households and the analysis of variance (ANOVA) was used to test whether there exists the difference between two groups. The Levene test of homogeneity of variances was performed. Results are presented in Table 14.

Table 14. Results of Analysis of variance for General pro-environmental purchasing behaviour (ecological activity)

Items	F-value
Choose an environmentally friendly alternative in case the product that is not environmentally friendly is available at a cheaper price.	$F_{(1,536)}=1.829$
Choose an environmentally friendly alternative regardless of the price.	$F_{(1,537)}=9.090^{**}$
Try to realize the ecological effects of the product before buying it.	$F_{(1,535)}=18.950^{***}$

Note: *** $p < 0.001$, ** $p < 0.05$, * $p < 0.10$

Based on the research results we can conclude that there is present statistically significant difference between respondents who are responsible for ecological activities at their households and the ones who are not responsible in items "Choose an environmentally friendly alternative regardless of the price" and "Try to realize the ecological effects of the product before buying it". Hence, indicating that engagement at the household level will have difference related to respondents pro-environmental purchasing behaviour.

2.4. Discussion

Research contributes in three ways. Firstly, it points out that individuals who are engaged in their community through volunteering activities will exhibit higher levels of green consumption values. These individuals will be also more prone to show pro-environmental behaviour like waste sorting, re-using and educating themselves about ecological issues. Similar to [15], whose findings point out that volunteering activities help individuals improve their pro-environmental behaviour. Hence, being engaged in volunteering helps individuals to develop their pro-environmental behaviour.

Secondly, individuals that are responsible for ecological activities in their households show higher levels of green consumption values hence, taking care about their environment when buying and consuming products. These individuals also show higher levels of pro-environmental behaviour like waste sorting, consuming products of biological origin and educating themselves about ecological issues. Furthermore, these individuals are also exhibiting higher levels of pro-environmental purchasing behaviour related to purposely choosing environmentally friendly alternative regardless of the price and analysing environmental impact of products before buying. Therefore, responsibility for ecological activities will spur effect on subsequent individuals' pro-environmental behaviour. Similar, to the findings [16] who point out that individuals that are more motivated in ecological activities by value-driven behaviour, i.e. acting as ecological citizen, are more likely than others to behave in an environmentally friendly manner in their day-to-day activities.

Third, it points out that individuals that are volunteering in different activities have developed sense of engagement with the community. Engagement develops in individuals' sense of satisfaction and emotion [17]. Extending this to the volunteering activity, it can be said that engagement in the different activities create in individuals' sense of contribution to the society. Looking in the long run if a HEI though organizing different volunteering activities in students stimulate engagement, this could be the setting ground for further collaboration between Alumni and HEIs. Also, if HEIs mission is to "develop socially responsible managers" [18] enhancing student engagement in the society through volunteering activities or identifying individuals responsible for ecological activities in their households, i.e., individual engagement at their home, can positively reflect to their pro-environmental behaviour, and contributing to organizational mission.

3. Conclusion

Research focuses on exploring students' engagement during studies in volunteering and ecological activities. It shows that engagement during studies is related to pro-environmental behaviour that extends their current engagement and could be seen as source for further collaboration through Alumni activities. Student engagement, researched as volunteering and environmental activity has societal impact. This is seen as important in referring to AACSB 2020 standards (cf. Standard 9). Also, if HEI is focusing on mission driven institutional quality, like AACSB focuses on (AACSB, 2020) and if in their mission is focus on sustainable or environmental activities, by focusing on offering students the possibility of different volunteering activities it contributes to its mission as well as it has societal impact.

Based on conducted research some managerial implications are offered. Focusing on students volunteering activities during their studies can help them develop their engagement with the community, and at the same time it contributes to student curriculum. Also, student engagement that was ignited by HEIs guidance will help in the long run to establish close relationship, as engagement has emotional, behavioural, and cognitive dimension, between HEIs and Alumni. Pro-environmental behaviour is driven through value-driven behaviour and hence, by engaging individuals on personal level either through volunteering or ecological activities at their households, will have greater impact.

Research limitations are noted in focusing only on one HEIs, and this could be extended in further research to different institutions and diverse countries. Also, research included different volunteering activities, and further research could be focused on identifying if one specific volunteering activity can contribute more to students' pro-environmental behaviour, hence, offering new contributions.

4. Acknowledgement

References

[1] H.H. de Haan, "Competitive advantage, what does it really mean in the context of public higher education institutions?", *International Journal of Educational Management,* Vol. 29, No. 1, pp. 44-61, 2015.

[2] "EFMD Programme Accreditation". EFMD Global. https://www.efmdglobal.org/accreditations/business-schools/efmd-accredited/ (accessed October 21, 2021)

[3] "AACSB Business standards". AACSB. https://www.aacsb.edu/accreditation/standards/business (accessed October 21, 2021)

[4] "EQUIS EFMD Quality Improvement System". EFMD Global. https://www.efmdglobal.org/accreditations/business-schools/equis/ (accessed October 20, 2020)

[5] C. Skikne. "AACSB Accredited Business Schools — Key Advantages". Business because. https://www.businessbecause.com/news/mba-degree/6342/aacsb-accredited-business-schools (accessed October 20, 2020)

[6] S.C. Ng, J.C. Sweeney and C. Plewa, "Customer engagement: A systematic review and future research priorities", *Australasian Marketing Journal (AMJ),* Vol. 28, No. 4, pp.235-252, 2020.

[7] J.U. Islam and Z. Rahman, "The transpiring journey of customer engagement research in marketing: A systematic review of the past decade", *Management Decision,* Vol. 54 No. 8, pp. 2008-2034, 2016.

[8] S.D. Vivek, S.E. Beatty and R.M. Morgan, "Customer Engagement: Exploring Customer Relationships Beyond Purchase", *Journal of Marketing Theory and Practice*, Vol. 20, No. 2, pp. 122-146, 2012.

[9] "Sustainable development goals". https://sdgs.un.org/goals (accessed October 21, 2021)

[10] K.L. Haws, K.P. Winterich and R.W. Naylor, "Seeing the world through GREEN-tinted glasses: Green consumption values and responses to environmentally friendly products", *Journal of Consumer Psychology*, Vol. 24, No. 3, pp.336-354, 2014.

[11] A. De Leeuw, P. Valois, I. Ajzen and P. Schmidt, "Using the theory of planned behavior to identify key beliefs underlying pro-environmental behavior in high-school students: Implications for educational interventions", *Journal of environmental psychology*, Vol. 42, pp.128-138, 2015.

[12] B.B. Schlegelmilch, G.M. Bohlen and A. Diamantopoulos, "The link between green purchasing decisions and measures of environmental consciousness", *European journal of marketing*, Vol. 30, No. 5, pp. 35-55, 1996.

[13] J.K. Elias, P. Sudhir and S. Mehrotra, "Long-term engagement in formal volunteering and well-being: An exploratory Indian study", *Behavioral Sciences*, Vol. 6, No. 4, p.20, pp. 1-15, 2016.

[14] K. Jahns "The environment is Gen Z's No. 1 concern — and some companies are taking advantage of that". https://www.cnbc.com/2021/08/10/the-environment-is-gen-zs-no-1-concern-but-beware-of-greenwashing.html (accessed October 21, 2021)

[15] V. Seymour, M. King and R. Antonaci, "Understanding the impact of volunteering on pro-environmental behavioural change", *Voluntary Sector Review*, Vol. 9, No. 1, pp.73-88, 2018.

[16] C.J. Sverker, J. Martinsson and S. Matti, "Ecological citizenship: a driver of pro-environmental behaviour?", *Environmental Politics*, Vol. 23, No. 3, pp. 434-453, 2014.

[17] A. Pansari and V. Kumar, "Customer engagement: the construct, antecedents, and consequences", *Journal of the Academy of Marketing Science*, Vol. 45, No. 3, pp.294-311, 2017.

[18] "Mission and Vision — Faculty of economics and Business in Rijeka". https://www.efri.uniri.hr/en/mission_vision_and_core_values/652/173 (accessed October 28, 2021)

80

Correlation between using gamification amongst the same group of students in the first and seventh semester

Branko Sinković[1], Karmela Aleksić-Maslać[2] and Luka Parat[3]

[1]Zagreb School of Economics and Management, Zagreb, Croatia, bsinkovi@zsem.hr
[2]Zagreb School of Economics and Management, Zagreb, Croatia, kaleksic@zsem.hr
[3]Zagreb School of Economics and Management, Zagreb, Croatia, lparat@zsem.hr

Abstract

Education is one of the fields where gamification is most broadly being implemented. Used alongside traditional learning methods and e-learning, it helps professors to keep students active and motivated through game and play. However, studies indicate that perceived enjoyment and usefulness of gamification decline with use. Although, research shows that students are motivated to use gamification regardless of age, while younger students have a more pronounced extrinsic motivation and expect rewards more often. Therefore this paper aims to investigate the correlation between using gamification amongst the same group of students in different semesters. In the experiment Kahoot, a popular game based learning platform will be used as a gamification tool. In this paper we analyzed the activity of the same group of students that used Kahoot in the 1st semester in the course Information and Communication Technologies (ICT) and again in the 7th semester in the course Management of Information Systems (MIS), and examined to find a correlation. Were those students that were more active in the 1st semester the same as in the 7th semester? Furthermore, the correlation with the final grade was examined. The results show that students in the 7th semester were satisfied with using gamification as well as in their first year, with a rise in their intrinsic motivation.

Keywords: *Gamification, education, motivation, rewards, information and communication technologies, management of information systems*

1. Introduction

Dererding et al. define gamification as a way of using game element through non-game contexts as education [1, 2] and it has been used to motivate pupils and students to be more engaged and active at class through game and fun. [3]-[5] Gamification is very popular in regular education but also in e-learning. [6]-[10] The authors of the paper "The model for the introduction of gamification into e-learning in higher education" indicate that

successful implementation of gamification leads to the higher number of satisfied students, their motivation and involvation in education. [11] One of the most important question in education is in which context gamification and game elements have been used. [12, 13] The various researches indicate gamification as a positive influence in primary and secondary education and universities. [14, 15] The teacher plays an important role in the implementation of gamification in education. [16, 17]

The awarding elements as ranging, levels, points and badges are very often used in gamification. [18]-[20] The authors of paper "The role of competition and rewards regarding student motivation in the gamification process of different age groups" have ranked motivation in different ages and show that younger students have more expressed extrinsic motivation, and older students have more expressed intrinsic motivation. [21]

Later in the article, we will analyze results of gamification using very popular Kahoot application [22, 23]. The same group of student on the beginning and the end of the study of Zagreb School of Economics and Management had been analyzed.[24, 25]

2. Gamification at ICT and MIS Courses

Kahoot has been intensively used in course Information and Communication Technologies (ICT) and Management of Information System since 2016 [26] and we will compare results of the same group of students in 1st-semester at ICT course (16/17 academic year) and 7th-semester at MIS course (19/20 academic year). Elements of Syllabus of both courses are shown in Table 1. Gamification is an additional part of the final grade but most of the students participate in the game through their smartphones.

Table 1. Grade elements - comparison of the ICT and MIS.

Regular Syllabus Elements	2016/2017 (%)	2019/2020 (%)
Mid-term exam 1	12	13
Mid-term exam 2	12	13
Mid-term exam 3	12	
Case		14
Labs	34	5
Project		30
Class Activity	5	5
Final Exam	20	20
Additional Activities		
Student Presentation	≤ 5	≤ 5
Forum Professor-Student		≤ 5%
Forum Student-Student		≤ 5%
Gamification		
Online quiz		

Kahoot is used for curriculum repetition and preparing for colloquium through game and fun, and exactness and speed are rewarded. Each Kahoot has 6 to 10 question with 4 possible answers and only one is correct, and students usually have 20 seconds to answer. ICT was the first generation of Kahoot applying and all student got apposite rewards – 1st place 1,5%, 2nd place – 1%, and all participants got 0,5%. The same rewarding system is kept through all 4 years, but now reward is possible only under the below conditions:

- The whole group must have more than 50% average

- The first 5 students can not have more than N incorrect answers whereby N varies 6-10 and depends on how difficult is each Kahoot

- From 2019 we also used gamification using badge system to motivate students at e-learning courses via Learning Management System (LMS) Moodle. [27]

3. Research and Results

Class of students were playing Kahoot quizzes during their first year (ICT course), and asked to assess their Satisfaction with Kahoot quiz usage, and the impact that playing the quiz have on their motivation to actively participate in class on the 1 to 5 scale, 1 meaning least satisfaction and least motivation. Three years later, the whole process (quizzes and assessments) was repeated during MIS course. The Final grade for students that did not pass the exam at the research time, is recorded with the value of zero.

Six quizzes were performed during the ICT course, and five during MIS course. Each Kahoot quiz is scored based on answer speed and accuracy. To avoid the influence of particular set of kahoot questions to the final score, a rank was calculated for every student for every question. Ranks were summarized by course, and totals per student were ranked again. Descriptive statistics presented in Table 2 show very similar distributions in both samples.

Table 2. Descriptive statistics of Kahoot ranks

Kahoot rank	ICT	MIS
Mean	20,45	20,35
Standard Error	1,851524	1,83504
Median	20	20
Mode	12	34
Standard Deviation	11,71007	11,60581
Sample Variance	137,1256	134,6949
Kurtosis	-1,21033	-1,19517
Skewness	0,010198	0,00329
Range	39	39
Minimum	1	1
Maximum	40	40
Sum	818	814
Count	40	40
Confidence Level(95,0%)	3,745061	3,711719

On the scatter plot (Figure 1) points represent student's Kahoot rank on ICT course (x-axes) and MIS course (y-axes). Regression statistics in Table 3 are represented with the regression and confidence band lines in Figure 1: ICT-MIS rank scatter plot, and Pearson coefficient of 0,51 suggests good correlation between Kahoot results in ICT and MIS courses.
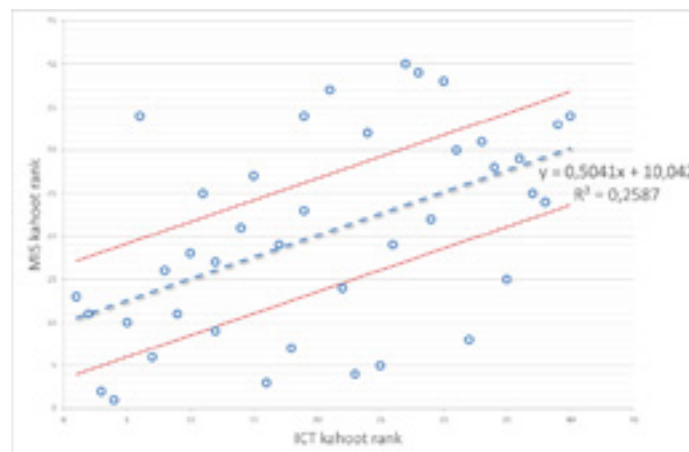
Figure 1. ICT - MIS rank scatter plot

Table 3. ICT-MIS Kahoot rank regression statistics

Regression Statistics	
Multiple R	0,508595
R Square	0,258669
Standard Error	10,1233

Scatter plot of Kahoot score and final course grade is shown on the Figure 2, where it is obvious that generally students with better final grades also achieved better Kahoot scores on both courses.

Figure 2. Kahoot score vs final course grade
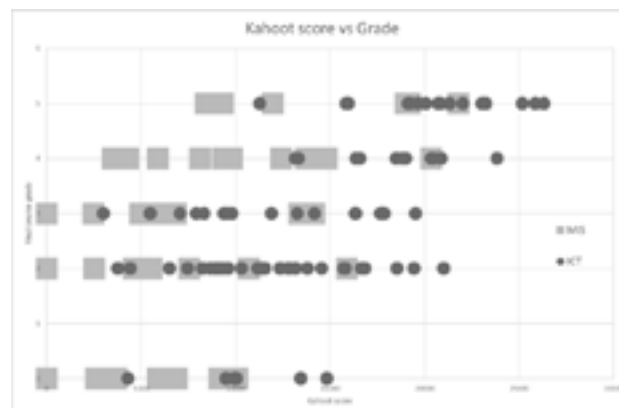
Histogram of the results of assessment questionnaires about satisfaction with Kahoot and motivation induced is shown in Figure 3. It can be seen that both results went better in senior year.

Figure 3. Satisfaction and motivation histogram

Table 4. T-Test for satisfaction and Motivation

	Satisfaction		Motivation	
	ICT	MIS	ICT	MIS
Mean	4,708333	4,846154	4,333333	4,884615
Variance	0,302536	0,135385	0,84058	0,106154
Observations	24	26	24	26
Hypothesized Mean Difference	0		0	
df	40		28	
t Stat	-1,03264		-2,7877	
P(T<=t) one-tail	0,153988		0,004715	
t Critical one-tail	1,683851		1,701131	
P(T<=t) two-tail	0,307977		0,00943	
t Critical two-tail	2,021075		2,048407	

Taking into account only the students that completed the assessment questionnaire, we wanted to check if their motivation and satisfaction of Kahoot usage increased in the senior year. For change in satisfaction, we proposed the following null hypothesis:

H0   Satisfaction level change is 0

In addition, corresponding hypothesis for motivation is:

H0   Motivation level change is 0

Table 5. Grade/Rank repeated measures ANOVA results

| ANOVA | | | | | | |
Source of Variation	SS	df	MS	F	P-value	F crit
Sample	7,122093	1	7,122093	0,089895	0,764682	3,897407
Columns	15314,7	1	15314,7	193,3015	9,71E-30	3,897407
Interaction	4,889535	1	4,889535	0,061715	**0,804108**	3,897407
Within	13310,14	168	79,22702			
Total	28636,85	171				

Results of the Two Sample t-Test Assuming Unequal Variances in the Table 4 show that null hypothesis for the satisfaction variable cannot be discarded because of the high p-values, but with both $p < 0.05$ and t critical, null hypothesis for the Motivation question can safely be discarded.

For all the students participating in both classes, overall Kahoot score was ranked within the group. Student's rank from ICT class was subtracted from corresponding rank from MIS class, yielding the rank difference. If student's Kahoot score was 12th in the ICT class, compared with 20th place in the MIS class, the result is -8, meaning decrease in Kahoot performance. Final course grade changes were also compared, yielding positive numbers for higher grade on MIS course than in ICT course. Scatter plot of Kahoot rank change and Final grade change is shown in Figure 4.
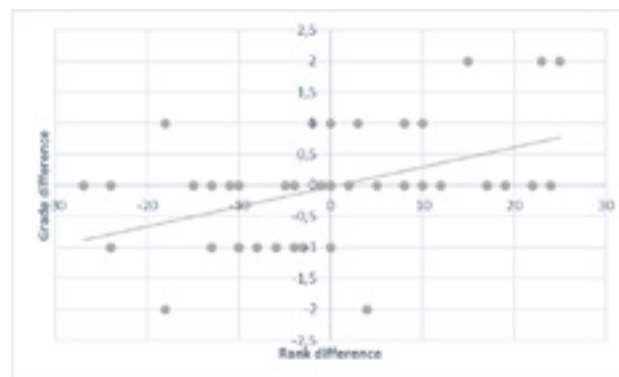
Figure 4. Kahoot rank vs Final grade differences

Results of the Repeated measures ANOVA test for the Grade / Rank differences in the Table 5 show significant positive P-value, meaning the strong correlation between the increase of the Kahoot rank and increase of final course grade.

4. Conclusion

In this paper we analyzed the activity of the same group of students in gamification in the 1st and 7th semesters. Some conclusions are as follows:

- There is a significant correlation between student activity in gamification at different ages - students who are more active in gamification in 1st Semester are also more active in 7th Semester.

- Students who are more active in gamification have a better final grade at course ICT and MIS.

- Students' satisfaction and motivation to participate in kahoot did not decrise with age, but remained the same.

- In our future research, we will extend the sample with new generations of students. In addition to kahoots and badges, we will analyze various other tools used in gamification. We will also compare student results in face-to-face and online gamification, intrinsic and extrinsic motivation etc.

References

[1] S. Deterding, D. Dixon, R. Khaled, and L. Nacke, "From Game Design Elements to Gamefulness: Defining "Gamification"", ACM, 2011.

[2] J. Hamari, J. Koivisto and H. Sarsa, "Does gamification work? – A literature review of empirical studies on gamification", Proceedings of the 47th Hawaii International Conference on System Sciences. IEEE, Waikoloa, HI, USA, 2014, pp. 3025–3034

[3] M. Ibanez, A. Di-Serio and C. Delgado-Kloos, "Gamification for Engaging Computer Science Students in Learning Activities: A Case Study", IEEE TRANSACTIONS ON LEARNING TECHNOLOGIES, Vol. 7, No. 3, July-September 2014, pg. 291-300.

[4] Glover, Play as you learn: gamification as a technique for motivating learners, *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications*, VA, AACE, 1999-2008.

[5] L. Da Rocha Seixas, A. S. Gomez and I.J. de Melo Filho, "Effectiveness of Gamification in the Engagement of Students", Computers in Human Behavior, 58, 48-63, 2016.

[6] J. J. Lee and J. Hammer, "Gamification in Education: What, How, Why Bother?", Academic Exchange Quarterly, 15(2), 2011.

[7] K. Erenli, "The Impact of Gamification - Recommending Education Scenarios", iJET – International Journal of Emerging Technologies in Learning, Volume 8, Special Issue 1: "ICL2012", January 2013, pg. 15-21.

[8] L. Zhou, L. Chen, Q. Fan and Y. Ji, "Students' perception of using digital badges in blended learning classrooms", Sustainability, 2019, 11, 2151, pp. 1-18.

[9] Antonaci, R. Klemke, C. M. Stracke and M. Specht, "Gamification in MOOCs to enhance users' goal achievement", Global Engineering Education Conference (EDUCON), 2017 IEEE (pp. 1654-1662).

[10] L. Pilar, S. Rojik, T. Balcarova and J. Polakova, "Gamification in education: current state", 13th International Conference on Efficiency and Responsibility in Education, Volume 13, Prague, 2016.

[11] M. Urh, G. Vukovic, E. Jereb and R. Pintar, "The model for introduction of gamification into e-learning in higher education", Procedia — Social and Behavioral Sciences, 197 (2015).

[12] D. Dicheva, C. Dichev, G. Agre and G. Angelova, "Gamification in Education: A Systematic Mapping Study", Educational Technology & Society, 18(3), 75-88, 2015.

[13] S. Krunić and S. Lugović, "Supporting education and learning with game design elements", Proceedings of 19th International Conference on Engineering Education, Zagreb, 2015., pg. 636-643

[14] N. Limantara, Meyliana, A. N. Hidayanto and H. Prabowo, "The elements of gamification learning in higher education: a systematic literature review", International Journal of Mechanical Engineering and Technology (IJMET) Volume 10, Issue 02, February 2019, pp.982—991

[15] E. Rivera and C. Garden, "Theory and games: developing a method for gamifying higher education", Proceedings of EDULEARN18, Palma, Mallorca, Spain, pp. 8542-8548.

[16] J. Martí-Parreño, D. Seguí-Mas, and E. Seguí-Mas, "Teachers' Attitude towards and Actual Use of Gamification," Procedia - Soc. Behav. Sci., vol. 228, no. June, pp. 682—688, Jul. 2016.

[17] J. Martí-Parreño, D. Seguí-Mas, and E. Seguí-Mas, "Teachers' Attitude towards and Actual Use of Gamification," Procedia - Soc. Behav. Sci., vol. 228, no. June, pp. 682—688, Jul. 2016.

[18] M. D. Hanus, J. Fox, Assessing the effects of gamification in the classroom: A longitudinal study on motivation, satisfaction, effort and grades, Computers & Education, 80, 152-161, 2015.

[19] R. Roy, S. Deterding and B. Zaman, "Collecting Pokémon or receiving rewards? How people functionalise badges in gamified online learning environments in the wild", International Journal of Human-Computer Studies, 127 (2019), pp 62-80.

[20] A. Ortega-Arranz, E. Erkan, A. Martinez-Mones, M. Bote-Lorenzo, J. Asensio-Perez and J. Munoz-Cristobal, "Understanding student behavior and perceptions toward earning badges in a gamified MOOC", Universal access in the information society, volume:18, Issue:3, pp. 533-549, Aug 2019.

[21] Anonymous, Anonymous and P. Vranešić, "The role of competition and rewards regarding student motivation in the gamification process of different age groups", Proceedings of EDULEARN18 Conference, 2nd-4th July 2018, Palma, Mallorca, Spain.

[22] Kahoot - https://kahoot.com

[23] P. Fotaris, T. Mastoras, R. Leinfellner andY. Rosunally, "Climbing Up the Leaderboard: An Empirical Study of Applying Gamification Techniques to a Computer Programming Class", Electronic Journal of e-Learning, May 2016.

[24] Anonymous, Anonymous and P. Vranešić, "Influence of gamification on student engagement in education", International Journal of Education and Learning Systems, Volume 2, 2017, ISSN: 2367-8933, pg. 76-82.

88

[25] Anonymous, M. Rašić and P. Vranešić, "Influence of gamification on student motivation in the educational process in courses of different fields", MIPRO 2018, 2018, 21-25 July, Opatija, Croatia.

[26] Anonymous, Anonymous and P. Vranešić, "Influence of Gamification on Student Engagement on a Course - Information and Communication Technologies", WSEAS Transactions on Advances in Engineering Education, Volume 14, 2017, E-ISSN: 2224-3410, pg. 113-122.

[27] M. Knoll and P. Kletzenbauer, "Gamification experiemces with Moodle", Proceedings of EDULEARN18 Conference, 2nd-4th July 2018, Palma, Mallorca, Spain.

Index

Meet AACSB

AACSB
Business Education.
Connected.

Our mission, together.

The mission of AACSB International is to foster engagement, accelerate innovation, and amplify impact in business education.
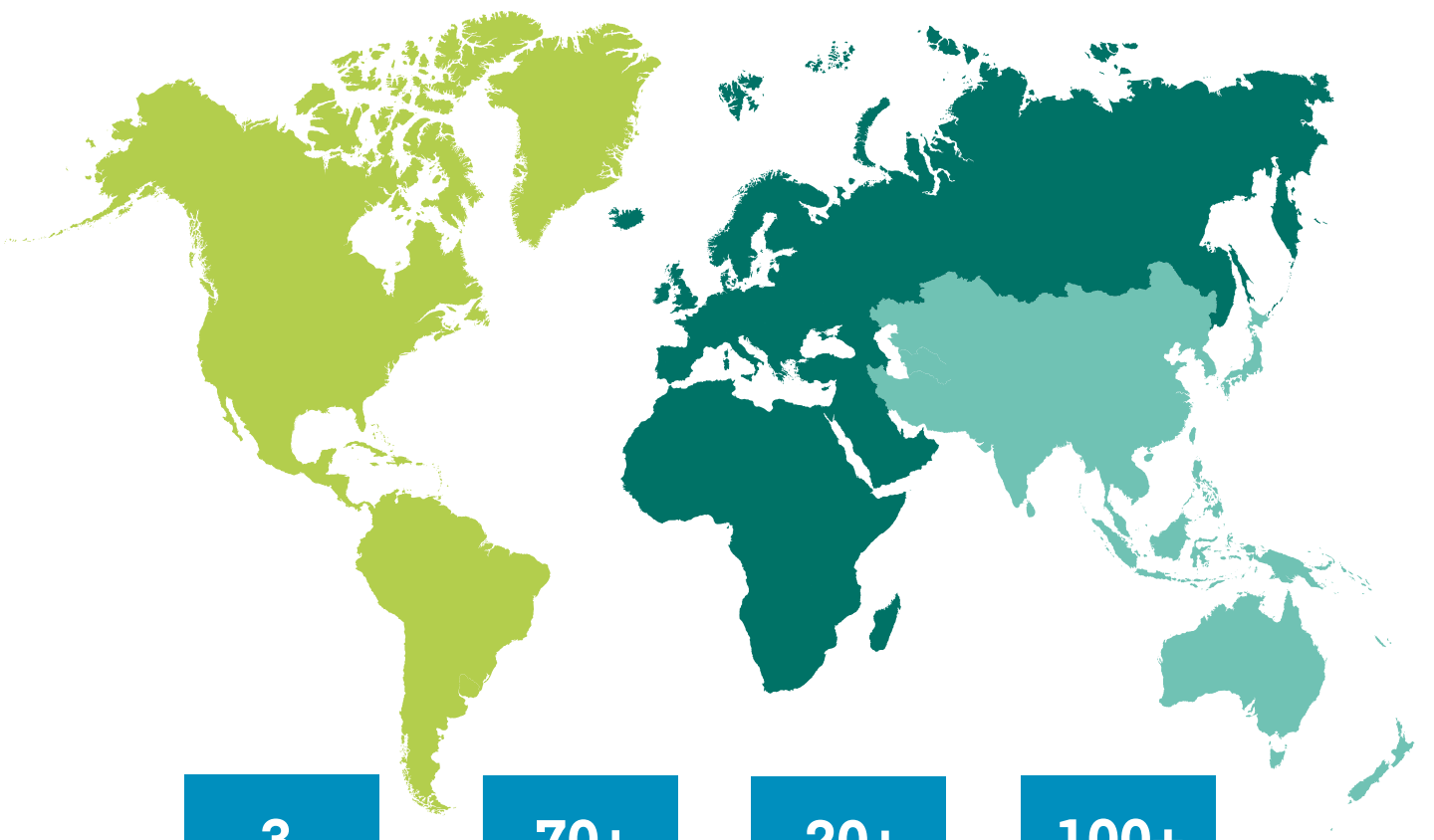
The vision of AACSB International is to transform business education for global prosperity.

100+

The number of years AACSB has promoted **quality and innovation** in the world's leading business schools.

Our presence, around the world.

3
global offices

70+
employees

20+
languages spoken

100+
learning & development opportunities annually

Our reach, in business education.

1,700+ member organizations in **100+** countries & territories

impacting **150,000+** thought leaders, educators, & innovators globally*

1,400+ volunteers in **55+** countries & territories

*Estimate based on extrapolated data from the 894 respondents from AACSB's 2019-20 Business School Questionnaire and/or Staff Compensation and Demographics survey respondents, in proportion to total AACSB members.
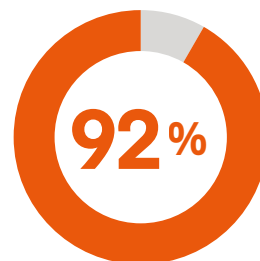
Our quality, represented.

Serving **4m+** enrolled students

900+ accredited schools in 50+ countries & territories
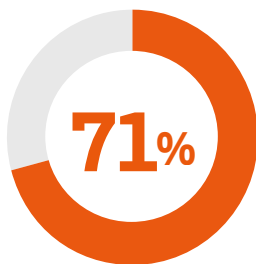
71% of alumni from AACSB-accredited schools agree that the overall value of their graduate business education was excellent or outstanding.

92% of the *Economist*'s 2021 top 90 full-time MBA programs are housed in business schools that have achieved AACSB accreditation.

Source: GMAC mba.com Longitudinal Survey® (2019)

Let's connect!
aacsb.edu

Americas
777 South Harbour Island Blvd.
Suite 750
Tampa, Florida 33602-5730 USA
+1 813 769 6500

Europe, Middle East, and Africa
UP Building, Piet Heinkade 55
1019 GM Amsterdam
The Netherlands
+31 20 509 1070

Asia Pacific
331 North Bridge Road
#10-04/05 Odeon Towers
Singapore, 188720
+65 6592 5210