ADVANCES IN HIGHER EDUCATION

learning by sharing:
strengthen the links between higher education, applied research and practice

SPACE NETWORK
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EDITORIAL

It is with mix feelings that this edition editorial begins. Despite of the sadness of not launching this year JAHE edition in our usual annual conference, not possible to meet, to discuss and exchange ideas and experiences, is also with optimism and embracing the challenges of this new time and reality we are all living in that I want to begin.

The “Digital Transformation - challenges for Work & Education” theme of last year SPCAE conference that gave these few bets papers, in a predictable way highlight the new challenges of the Higher Education Institutions are facing. The digitalization of society, and particularly, the high education is a challenging time and also very enthusiastic one. How fast did HEI had to adapt to continue to support their students and continuing to transfer their knowledge? The way HEI all over the world quickly tried to answer this demanding period.

Digitalization of education is a subject of major importance that HEI must incorporate in a definite way in their teaching and learning procedures. There are different ways to do it, but this discussion is inevitable and teachers and students have to embrace the challenge and learn to cope it, choosing the bets methods and platforms accordingly with the subject courses and learning goals. This does not mean the end of human interaction so important in education, this just means a different way to do it. We spent some years talking about it and now we were forced to implemented it despite of not being fully prepared. So, its time to do it and evolve to in a proactive and entrepreneurial perspective and develop the best options to deliver a quality education to our students.

So, it is with this positivity that this year edition of SPCE journal gives a brief analysis of the ICT use in high education, show how to self-access our performance in diverse perspectives and, therefore, try to understand to context of education in different countries.

Teresa Paiva
(Editor-in-Chief)
Empowering logistics education to tackle skills shortage

Reinhold Schodl and Sandra Eitler

1 University of Applied Sciences BFI Vienna, Austria

reinhold.schodl@fh-vie.ac.at

sandra.eitler@fh-vie.ac.at

Abstract: Skills shortage is an intensively debated topic in the logistics industry in many countries. A shortage occurs when the demand for a type of worker with particular qualifications exceeds the supply of such workers. There are various potential causes for skills shortage, like a change in required competences (e.g., due to digital transformation), increasing demand (e.g., due to booming e-commerce), low industry attractiveness (e.g., due to low wages, poor working conditions) as well as inadequate trainings (e.g., due to unsuitable curricula, poor teaching methods). The education system can potentially play a central role in reducing skills shortage in the logistics industry. Therefore, the research aims to answer, how education in logistics can help tackle skills shortage in the Austrian logistics industry.

We consider two essential levers for tackling skills shortage by the education system. First, the demand for competences in the professional field must be analysed and students or active labour must be trained accordingly. Second, the education system can supply the right information to potential labour, which has incorrect information about the situation in a specific industry.

The research takes place within the initiative “Research and Education on Transport Logistics” (RETrans), which addresses both levers for reducing skills shortage. RETrans’ mission is to build a competence centre for transport logistics in cooperation with stakeholders from research, industry, and the public sector in order to promote professions in the field of logistics and to create awareness for working opportunities in transport logistics. RETrans is a cooperation between the University of Applied Sciences BFI Vienna and the University of Applied Sciences Upper Austria and is supported by the Austrian Ministry for Transport, Innovation and Technology and the SCHIG mbH. The heart of the project is its online-platform (www.retrans.at) providing information and learning materials (e.g., classroom presentations, case studies, exercises, lecture notes) on different subjects in transport logistics, like road, rail, inland waterway, and sustainable freight transport.

Developing RETrans most effectively so that empowering trainings and overcoming prejudices among potential future employees in logistics are provided, it is vital to understand students’ perceptions of the logistics industry. Therefore, we compare the assessment of students with those of actual employees in logistics. The comparison is based on a survey among secondary school students and secondary data from an employer assessments platform. The analysis covers multiple dimensions (general image of industry, working conditions, attractiveness of tasks, environmental and social awareness, work-life balance, gender equality, career development, wages and social benefits) and relates to the logistics industry as well as other reference industries.

Results suggest that the deviation of the secondary school students' assessment from the employees' assessment strongly depends on the students’ educational background. Students attending a school with a logistics background evaluate the logistics industry more accurately than other students. It may be concluded that an initiative like RETrans is an effective measure to overcome prejudices and to reduce skills shortage in the logistics industry.
Keywords: Logistics Education; Skills Shortage; Secondary Schools; Austria; Knowledge Transfer

1. Introduction

Skills shortage is an intensively debated topic in the logistics industry in many European countries (e.g., IW 2018, WifOR/pwc 2016, UKCES 2014). A shortage occurs when the demand for a type of worker with special qualifications exceeds the supply. According to a study of a major German logistics association (BVL 2017) 90 percent of managers in the transport and logistics industry feel that the lack of skilled workers in the industry ranges from noticeable to strongly noticeable. Other studies come to similar conclusions. According to a report published by the World Bank (McKinnon et al. 2017) half of the respondents of a global survey state that the availability of suitably qualified logistics managers is low or very low. Trends influencing required skills, like digital transformation, are important causes for skills shortage (e.g., DHL 2017). Also, an increase in demand (e.g., due to the booming e-commerce), a low attractiveness to work in the industry (e.g., due to low wages, poor working conditions, lack of career prospects) and the demographic structure of the workforce (e.g., due to an aging society) can contribute to skills shortage. Last but not least, low effectiveness of the educational system (e.g., due to outdated curricula, poor teaching methods, inadequate availability and accessibility of specialized trainings) can result in skills shortage. Thus, the education system must react to an ever-changing business environment in logistics with new forms of managerial and vocational training (e.g., Ferrara/Morvillo 2018).

To reduce complexity, this work focuses on two root causes for skills shortage. First, a shortage can occur when the qualifications of applicants or active labour do not match actual requirements. Second, a shortage can result from potential employees’ lack of willingness to work in a specific industry, although being well qualified. In the first case, the education system can obviously play a central role to improve the situation. In the second case, two situations must be differentiated. If the refusal to work in an industry is justified by objective factors, like bad working conditions or inadequate compensation for work, the industry or policy maker may find ways to improve the situation. If there are no objective factors, it is a matter of imperfect information, which can result in prejudices of potential labour to the industry. Especially when young people are prejudiced by a negative attitude towards a specific industry, the education system should be able to do its bit to improve the situation. Consequently, it is safe to say that the education system should have a key role to play in reducing skills shortage in the logistics industry.

Thus, the objective of this work is to find an answer to the following question: How can higher education in logistics effectively help tackle skills shortage in the logistics industry? Following the idea above, two essential levers for tackling skills shortage by the education system offer the right trainings for effective qualifications and supply proper information to avoid prejudices. Therefore, this paper is organized as follows. First, an initiative to empower trainings and actively
address prejudices among potential future employees in logistics is presented. This initiative in higher education is facilitated by a knowledge transfer from universities to secondary schools. Then, special focus is put on school students’ perceptions of logistics, which should be considered well for the knowledge transfer in order to effectively reduce prejudices. For detailed insights, a survey has been carried out and data from an employer assessment platform has been analysed. The paper finishes with a conclusion.

2. Initiative for Logistics Education

A novel way to tackle skills shortage in the Austrian logistics industry is the initiative “Research and Education on Transport Logistics” (RETrans), which started in 2016. The initiative’s mission is to build a competence centre for transport logistics in cooperation with stakeholders from research, industry, and the public sector to promote professions in the field of logistics and to create awareness for working opportunities in transport logistics. RETrans is a cooperation between the University of Applied Sciences BFI Vienna and the University of Applied Sciences Upper Austria and is supported by the Austrian Ministry for Transport, Innovation and Technology and the SCHIG mbH.

The initiative RETrans is based on different instruments of which an online platform (RETrans 2019) is central. It provides information and learning materials on transport logistics, which is structured by four subjects, i.e. road, rail, inland waterway, and sustainable freight transport (RERoad 2019, RERail 2019, REWWay 2019, REEcotrans 2019). For each subject different learning material types are offered including classroom presentations, case studies, exercises, lecture notes, and a collection of videos and homepages. The learning materials are free of charge and can be directly applied for teaching or changed as required. Educators and students in Austrian secondary schools form the main target group. A curricula analysis has been carried out to determine which learning materials and contents provide the most effective support.

RETrans is not limited to simply offering learning materials, but also implements a train-the- trainer concept, which is intended to motivate and enable teachers to use the provided learning materials in class. Currently, in Austria the competence for education in logistics is largely located in the tertiary education sector, where several academic study programs on bachelor and master levels are dedicated to logistics (e.g., UAS BFI Vienna, UAS Upper Austria). In contrast to this, only few vocational secondary schools offer education in logistics as part of their curricula (e.g., TGM Wien 20, BHAK Wien 11). RETrans facilitates the knowledge transfer in teacher workshops where valuable feedback from the platform users is received, too. RETrans also directly addresses learners by offering special training activities, like excursions to logistics companies or presentations and workshops by experts from industry and academia. Moreover, RETrans is continuously extending content in German and adding learning materials in English as well.
3. Perception of Logistics

RETrans can be considered an initiative to reduce prejudices against logistics among potential future employees. In the following a closer look is taken at school students’ perception of logistics and the role of education in logistics to counteract bias. School students’ preconceptions can be defined as deviation of their assessment about jobs in logistics from the assessment of actual labour in logistics.

A survey among school students asking about their opinion about jobs in logistics was carried out in different Austrian secondary schools in December 2018 and resulted in 169 responses, which can be used for analysis. The assumed quality of jobs in logistics has been rated on a 5-point-scale ranging from very bad (1) to very good (5) for different dimensions. The dimensions comprise working conditions, availability of interesting tasks, environmental and social awareness, work-life balance, gender equality, career development, wage and social benefits, as well as general image. For comparison of logistics with other industries, the same questions were asked for the most popular Austrian industry for apprentice training of females and the most popular one of males, i.e., retail and metal technology (WKO 2019). Results can be seen from Figure 1. Compared to retail and metal technology, logistics enjoys a relatively positive perception. Only for two dimensions, i.e., work-life-balance and gender equality, retail is rated slightly better than logistics.
For prejudice identification, the employees’ answers to the same questions on the same scale have been analysed. Although the employees’ assessment is subjective as well, it is utilized in an attempt to capture the real situation in the industries under study. Secondary data has been derived from a popular employer assessment platform (Kununu 2019). The captured data includes 1968 ratings of employees of the top ten Austrian logistics companies, 1655 ratings of employees of the top ten Austrian retail companies, and 990 ratings of employees of the top ten Austrian metal technology companies. The respective top ten companies have been defined by turnover in the year 2017, except for metal technology, where the number of employees in 2017 is used, which gives less weight to companies related to precious metals (Statista 2019, Handelsverband 2018, Heiling 2017). Figure 2 shows the results of the data analysis. From the industries under study metal technology got the most positive responses in all dimensions, followed by logistics, which is either better rated than retail or at least received the same rating.
Based on the relative assessments across the three industries, one could conclude that school students see the logistics industry more positive than actual employees do. When having a look on the absolute deviations between school students’ and employees’ assessments per dimension, which are shown in Figure 3, it follows that for logistics the deviations are relatively small. This indicates that prejudices about logistics should be a minor issue.

![Figure 4 - Deviation of school students’ assessment about logistics from employees’ assessment](image)

However, the surveyed group of secondary school students is not homogenous, i.e., it includes students with logistics as part of their curricula as well as students without a background in logistics. Figure 4 compares results related to logistics between these two groups. For almost all dimensions under study it is apparent that school students with a logistics background have a more positive picture about jobs in logistics than actual employees in the industry. In particular, the availability of interesting tasks is overestimated by students with a background in logistics and significantly underestimated by students without a logistics background.

### 4. Conclusion

The presented initiative RETrans aims to tackle skills shortage in the Austrian logistics industry. Its open online platform does not just support logistics education to teach specific qualifications required by the logistics industry. It also helps to supply potential future employees with information to avoid prejudices about jobs in logistics. Results based on a survey among school students and secondary data derived from an employer assessment platform suggest, that early education in logistics positively affects potential future employees’ assumed attractiveness of jobs in logistics. Bearing the influence and the responsibility of an initiative like RETrans in mind, challenges and difficulties of the logistics industry should not be neglected, but actively addressed and communicated as well.

This work describes a real-life example and gives an indication of its potential impact. Further research may investigate a wider spectrum of impacts and
extend the data basis for more insights into this highly relevant topic for industry and education.

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References
Introducing the ARCADA model for student motivation and retention: Building on the ARCS and ICEBERG approaches

Mirko Ahonen¹

¹Arcada University of Applied Sciences
ahonemi@arcada.fi

Abstract: Student retention and engagement has been a constant concern at all education levels - and now there is awareness that the completion rate has decreased as education moves online. The purpose of this paper is to compare two instructional design models; the ARCS model for student motivation, and the ICEBERG model for student retention; and see how they can be incorporated into teaching at a higher education level - specifically at Arcada University of Applied Sciences in Helsinki, Finland. By comparing these two models, the author attempts to find similarities in order to synthesize the key elements. These are then incorporated into a model aligning with Arcada’s pedagogical policy.

Keywords: Instructional design; Online courses; Student motivation; Student retention; ARCS, ICEBERG; Arcada

1. Introduction

The world is filled with different learning models, theories, paradigms and perspectives. From constructivism (creating learning from experience), behaviourism (modify behaviour through consequences), cognitivism (how information is received, organized, stored, and retrieved); to design models like the ADDIE model (analysis, design, development, implementation, evaluation), backward design (starting from the goal), and gamification (applying game-related principles). With the advent of distance-learning instructional designers are using these models, or underlying theories, to create pedagogically auspicious online courses.

One challenge with distance education (and especially MOOCs) has been student retention; in other words, how to keep students ‘in class’ and have them graduate. This was one of the main goals of my 2015 thesis “Developing an Educational and Engaging Online Course: A literature review”, where I analyse recent studies on best practices regarding distance education. In my thesis, I emphasize the importance of having motivated students for student retention, and I bring up the ARCS model of motivational design, which is an instructional design model that tackles the problem of how to motivate students. Recently, I stumbled upon an article called “Learning Design for Student Retention” (2018) that deals with
similar questions I’ve been trying to answer. As a conclusion in their paper, they created a new model called ICEBERG which is an instructional design model focused on student retention. My hypothesis is that there is a clear correlation between student motivation and student retention, and I am intrigued to see how these two models compare. This paper considers how they can be incorporated into teaching at Arcada.

2. Model 1: The ARCS model of motivational design

The model by John Keller was first introduced in the year 1979. His latest book (Motivational Design for Learning and Performance: The ARCS Model Approach, 2010) informs the version of ARCS used below. The model suggests that there are four key steps that must be met for student motivation: Attention, Relevance, Confidence, Satisfaction (ARCS).

2.1. Attention

Attention is key when learning, and it can be gained by stimulating senses and thinking. E.g.

- Using relatable examples
- Stimulating thinking by conflicting ideas
- Using humour and making learning fun
- Having hands-on tasks
- Asking questions that provoke thinking
- Using a variation of teaching methods

2.2. Relevance

Relevance is gained by focusing on that the students want to achieve, aligning teaching with the student’s basic motivations, and by using familiarity. E.g.

- Showing how the information will help them now and, in the future,
- Talking to the students to align with their needs
- Giving options and control over their learning
- Use their existing knowledge and skills

2.3. Confidence

Confidence is gained by challenging the student and removing doubt. E.g.

- Set expectations and provide evidence of learning
- Provide several ways to learn and succeed
- Give them control, so they feel it is they who are succeeding
2.4. Satisfaction

Satisfaction is gained when the student feels the goals and needs are met. Try to augment their motivation with intrinsic and extrinsic factors. E.g.

- Encourage students to achieve higher goals and to continue learning on their own
- Give feedback, encouragement, and rewards for a job well done
- Have high standards so they can be proud of their achievements

3. Model 2: The ICEBERG model for student retention

ICEBERG is also an acronym and it stands for the following words: integrated, collaborative, engaging, balanced, economical, reflective, and gradual. The model was founded as a conclusion in the 2018 paper called “Learning Design for Student Retention”, where they came up with these seven key factors that influence retention.

3.1. Integrated

The course content works together in a meaningful way, so that the learning outcomes, assessment, activities and support material effectively help the student pass the course.

3.2. Collaborative

Meaningful collaboration and communication lead to deep learning, and social support.

3.3. Engaging

An interesting course keeps the student enthusiastic. If the curriculum matches student interest and career aspirations, they are more likely to be retained. Use relevant case studies and different activities to contribute to an engaging curriculum.

3.4. Balanced

The study workload is well-paced and evenly distributed. Student’s know exactly what they are expected to do. Discuss organization skills and planning.
3.5. Economical

Prioritize key concepts and outcomes. Clear link with activities and learning aims. Do not overwhelm students with excess information.

3.6. Reflective

For the students to engage in deep learning it is important that they can reflect on their learning. Incorporate regular summaries and self-assessment.

3.7. Gradual

Gradually introduce more complex tasks. Build their confidence as you go.

4. Discussion

My hypothesis was that the models for student motivation and student retention are ultimately trying to solve the same problem: how to have satisfied students that learn and graduate. Below, I create a picture on how these models intertwine.

While not necessarily intuitive, by examining characteristics of each theme it is possible to combine the models in a productive manner.

The I of the ICEBERG is “integrated” which emphasis having a course that is a coherent whole, where the learning outcomes, assignments, and activities are aligned. The ARCS model does not specifically make this point, but in my opinion, it is closely linked with student confidence and satisfaction. By making the course structure clear, showing what they will achieve, and having them reach these goals in manageable steps, will lead to more confident and satisfied students.
Bonding with your fellow students will surely make a course more manageable and creating opportunities for collaboration can lead to better student retention according to the ICEBERG model. ARCS does not specifically point out collaboration as a key for motivating students, but I connect it with the “attention” category as it brings variety in the teaching method; links with hands-on activities; and can be fun if executed properly. I would also argue that the benefits of a well-executed group work boost the confidence and satisfaction of students.

Having an engaging course is something I hope we all are striving for and it is the “E” in the ICEBERG model. I link it to “attention” and “relevance” in the ARCS model, as interesting and relevant content will grab the attention of the student and engage them in the course.

A balanced workload will retain students as they can plan their weeks. This links perfectly with student confidence, as it will be higher when the workload is not highly fluctuating, and they know what is expected from them.

The “E” in the ICEBERG model is economical, and it points out the importance of “less is more”, that one should not overwhelm the students with too much content. To me this one feels more like a filler word in the model, as we already have “integrated” which pointed out the importance of having a clear connection with the content in a course, and “balanced” which stressed that the course should be evenly loaded. Nevertheless, I connected “economical” with “relevance” in the ARCS model, as the course content should obviously be relevant to the student.

Reflection is mandatory for deep learning and has earned its place in any learning model. Reflection gives the opportunity for the student to think about what has been taught and why it is important. I would argue reflection is important in all the categories in the ARCS model too, but I added it to “satisfaction” and “relevance”. When students have the time to reflect, they will find the relevance, and become satisfied with the course.

Gradually increasing the complexity and giving the students manageable chunks to deal with at a time, is important for a good course, and the last letter in the ICEBERG model. This connects perfectly with student confidence, as you are gradually building the student’s belief in oneself with increasingly harder tasks.

5. Creating the Arcada model

So, what if we would create a model for Arcada based on the strengths of these two? How would it look? Let us start by having a look at Arcada’s pedagogical policy before proceeding.

The key points in Arcada’s pedagogical policy are:

- The student as subject
  - Student should be in the centre of everything we do, but also give the student responsibility for his/her own learning.
- Arcada as an innovative university – A place for space
  - Link research with education. Emphasize problem-solving and cooperation.
• Competence driven curriculum and active learning
  o Courses should be relevant and flexible.
• Teacher teams and pedagogical competence
  o Teachers work together to provide sufficient knowledge in courses.

When I attempt to combine ARCS and ICEBERG in line with Arcada’s pedagogical policy, I find the following:
• Coherent whole and a clear narrative
  o Constructive alignment, i.e. linking activities with assessment and learning outcomes. (Integrated)
• Engaging content and activities
  o Active learning, real life questions, problem-solving. (Attention, relevance, satisfaction, engaging)
• The student in focus
  o Flexible curriculum. Relevant content for future career. (Relevance, confidence)
• Even workload in manageable chunks and a gradual learning curve
  o (Balanced, gradual, economical, confidence, satisfaction)
• Time and space for reflection
  o Deep learning. (Relevance, satisfaction)
• Communication and collaboration
  o Emphasize the importance of communication and teamwork. Between teachers, teacher-student, student-teacher, student-student. Everyone is working for a common goal. (Collaborative)

These steps incorporate both the ARCS model of motivational design and the ICEBERG model for student retention, while being in line with Arcada’s pedagogical policy.

5.1. The ARCADa model

With minor modifications to the words, let me propose the ARCADa model for student motivation and retention:
  Active (Engaging activities, content, and active learning)
  Relevant (The student is most relevant)
  Coherent (Coherent whole and a clear narrative using constructive alignment)
  Achievable (Even workload in manageable chunks and a gradual learning curve) Deliberation (Time and space for deliberate reflection and deep learning)
  Association (Striving for a common understanding, by communicating and collaborating)
References

HEIs’ digital capacity in supporting innovation and entrepreneurship: self-assessment by HEINNOVATE

Catarina Alves¹, Teresa Felgueira¹ Teresa Paiva¹,²

¹Polytecnic of Guarda, Portugal
²CI&DEI – CI&DEI – Center for Studies in Education and Innovation; NECE – Research Center in Business Sciences
calves@ipg.pt
tfelgueir@ipg.pt
tpaiva@ipg.pt

Abstract: The challenges and opportunities presented to all sectors of the economy by the continuous development of digital technologies also affects higher education. In fact, digital transformation and capabilities underpin, catalyse and sustain the development of an entrepreneurial and innovative higher education institutions (HEI). Digital transformation offers many opportunities to entrepreneurial and innovative higher education institutions, but it also creates new challenges.

The HEInnovate platform was used as an experimental tool to evaluate and understand how Polytechnic of Guarda (Portugal) adopts and integrates digital technologies in support of innovation and entrepreneurship. The “Transformation and digital capability” dimension of HEInnovate self-assessment tool was applied to the main organizational centres of the institution (Presidency, school directions and department coordination).

Results show that Polytechnic of Guarda is already deploying digital technologies, however the uptake and integration varies among and within the group analysed. HEI should make the most out of the opportunities presented by digital transformation and consider digital technologies as a key enabler.

Keywords: Entrepreneurship Education, Higher Education Institutions, HEInnovate, Transformation and Digital Capacity

1. Introduction

In professional and personal lives, people around the world interact, learn and access knowledge and information through the new technologies. At least 93% of European workplaces use desktop computers and there is almost no job that does not require at least basic digital skills (EPSC, 2017). Technologies, smart applications and other innovations in the digital economy can improve services and help address policy challenges in a wide range of areas, including health, agriculture, public governance, tax, transport, education, and the environment, among others.

The last decades were times of great change due to the spread of digital technology and they are transforming higher education to affecting pedagogy and the way how education is delivered (European Commission, 2014). Open education
perspectives and materials, learning skills enabled by technology opened the possibility of emerging a huge set of platforms and portals that give an easy access to education from institutions around the world and permit more people to reach and undertake courses online. The concept of higher education is changing and being challenged, their competition environment toughened where a wider group of entities provide different elements of higher education such as courses platforms, certification services, learning support systems and analytics (European Commission, 2014).

Despite of the still noticeable unequal access to digital skills and technologies, today, young people are more proficient in these popular skills than their older peers. This has a massive impact in the labour market since 88% of the workplace is not prepared yet to tackle with the lack of digital skills of their employees, and we may observe almost the same scenario in many higher education institutions (EPSC, 2017). The need of improving these types of skills in teachers and the need to positioning HEI in this new wave of technology is an imperative (European Commission, 2014).

The importance of this theme leads to the analysis of how HEI, in Portugal, are dealing with these challenges, how they are addressing and engage in solutions to maintain and improve their capacity of attraction of students and knowledge transfer, so they contribute for a better society a social and economic development. Not every HEI has the same capability in adapting and find solutions to quickly improve and answer to these types of challenges. The purpose of this study is to perform the self-assessment of an HEI and observe and reflect on the level of adoption and the integration of digital technologies, in particular to support entrepreneurship and innovation in Guarda Polytechnic.

This paper presents a theoretical background to fully understand the main issues of entrepreneurship education, programs and policies. It outlines the key constituents and component measures used within the OECD Guiding Framework for Entrepreneurial Universities (2012), which have been incorporated into the HEInnovate entrepreneurial university evaluation tool co-sponsored by the European Commission. Namely it offers a diagnose of the digital transformation so needed in a HEI, nowadays, the case of Guarda Polytechnic Institute.

2. Theoretical Background

2.1. The Entrepreneurship Education Context in Higher Education Institutions

In contexts of high youth unemployment, economic crises and rapid changes linked to the complex economy and knowledge society, it appears that soft skills, especially entrepreneurship, are essential for young people to become active, creative and entrepreneurial citizens (European Commission, 2012). In this context, Universities have been increasingly recognized as a source of entrepreneurial activity (Etzkowitz et al., 2001), and within these are the academics who have come to play a more prominent role in the development of a knowledge society (Etzkowitz, 2001; Davey
et al., 2016; Klofsten & Jones-Evans, 2000).

According to the European Commission (2006a) entrepreneurship is an essential competence for growth, employment and personal fulfilment. The overall goal will be "to ensure that young people can systematically acquire entrepreneurial competences across all phases of the education system" (European Commission, 2006a).

The Entrepreneurship education is one of the facilitating elements for the promotion of innovation and creativity, as well as for strengthening the social, cultural and economic society growth and development (Parreira, Pereira, & Brito, 2011). Fleming (2005) adds that entrepreneurship education makes young people aware how to create their own work and encourages them to be more creative in finding more opportunities.

The European Commission in its communication "Rethinking Education: Investing in Skills for Better Socioeconomic Results" (European Commission, 2012), emphasizes transversal and particularly entrepreneurial skills. Thus, the main objective of entrepreneurship education in higher education should be the development of entrepreneurial skills and mentalities. In this context, entrepreneurship education programs may have different objectives, such as: (i) developing entrepreneurship among students (awareness and motivation); (ii) train students in the skills needed to create a business and manage their growth; (iii) developing the entrepreneurial capacity to identify and exploit opportunities.

Although it is a relatively recent field of research, there is already a solid body of evidence demonstrating the benefits of entrepreneurship education for both the individual and society. While some countries have been involved in this process for more than a decade, others are still starting to approach entrepreneurship education as part of their educational policies (European Commission, 2012; McCoshan et al., 2010).

Not all HEI have governance structures that allow them to involve social partners, trade associations and other external actors in the design and implementation of business programs. At their level of responsibility, HEI could (European Commission/EACEA/Eurydice, 2016):

i. Establish a strategy and an action plan for teaching and research in entrepreneurship, incorporating activities based on practice, including the creation of new businesses (start-ups e spinoffs).

ii. Create an education department for entrepreneurship, which will serve as entrepreneurship centre at the institution and disseminate entrepreneurship education in all other departments.

iii. Offer content related to the introduction of entrepreneurship and self-employment to all HEI students in the first year, allowing them the opportunity to attend seminars and lectures on this subject.

iv. Establish incentive systems to motivate and reward teachers in supporting students interested in entrepreneurship, recognizing the academic value of research and activities developed in this field.

v. Develop and implement clear institutional rules on matters relating to intellectual property.

vi. Grant academic credits for practical work in business projects outside the
Entrepreneurship education should not be confused with general and economic business studies, since its purpose is to promote creativity, innovation and self-employment, and may include the following elements (European Commission/EACEA/Eurydice, 2016):

i. Development of personal attributes and competencies that form the basis of an entrepreneurial mindset and behaviour (creativity, sense of initiative, risk taking, autonomy, self-confidence, leadership, team spirit, etc.).

ii. Sensitize students for self-employment and entrepreneurship as a possible career choice.

iii. Develop specific business skills and knowledge on how to start a business by running it successfully.

In this context, HEI constitute a place that drives the construction of new learning, experiences and knowledge, with the mission to train professionals, to face the new political, economic and social challenges.

2.2. Policies and Programs to Support Entrepreneurship

The development and promotion of entrepreneurship education have been one of the main objectives of EU and the Member States policies a few years ago to this date (European Commission, 2003, 2006a, 2006b, 2012, 2015).

The European Commission in its “Entrepreneurship 2020' action plan: Reigniting the entrepreneurial spirit in Europe” identified entrepreneurship education as one of three immediate intervention areas (European Commission, 2013).

The European Council, in December 2014, stresses that the development of entrepreneurship has undeniable and considerable advantages for citizens both in their professional and private lives. In this document, Member States are invited to “encourage the development of a coordinated approach to entrepreneurship education throughout the education and training system”. If the role of the State is relevant, the HEI role is central to the development of a coordinated approach to education and training for entrepreneurship and other facilitation/support services to entrepreneurship (European Commission, 2015).

The literature review allows us to identify a multifaceted set of measures and instruments that influence academic entrepreneurship and the performance of the companies created within or with their support: orientation of HEI policy towards knowledge transfer (Siegel, Westhead & Wright, 2003; Clarysse et al., 2005); the existence of offices supporting the transfer of R&D and the registration of intellectual property (Di Gregorio & Shane, 2003; Siegel et al., 2004); the existence of incubators (Clarysse et al., 2005, Phan, Siegel & White, 2005); access to technological and financial resources (Van Auken, 1999; Dahlqvist, Davidsson & Wiklund, 2000; Davidsson & Klofsten, 2003; Gregory et al., 2005; Clarysse et al., 2007); access to specialized consultancy support (Scillitoe & Chakrabarti, 2010), the preparation of the business plan, management training or proof of concept, among others.

The complexity and turbulence of global economies and societies affect a wide variety of organizations, where higher education institutions are included.
Universities are increasingly moving towards more entrepreneurial configurations in an attempt to seek more development, more innovation, and more social and economic commitment (Simeone et al., 2018).

In this context, we intend to analyse, through the HEInnovate tool, observe and reflect on the level of adoption and the integration of digital technologies, in particular, to support innovation and entrepreneurship in Higher Education, in particularly in Polytechnic of Guarda.

### 2.3. Key Constituents and Characteristics of Entrepreneurial University – HEInnovate Framework

The incentive for *HEInnovate* was the University-Business Forum in March 2011, an annual event organised by the European Commission for HEI and their key strategic partners where delegates expressed a need for support and guidance in implementing practices to help them become more innovative and entrepreneurial institutions.

*HEInnovate* was developed collaboratively by the Directorate-General for Education and Culture (DG EAC) of the European Commission and the Centre for Entrepreneurship, SMEs, Local Development and Tourism of the Organisation for Economic Co-operation and Development (OECD). The OECD and the European Commission have combined to promote *HEInnovate* (2012), a major research initiative and an evidence-based tool, which attempts to evaluate entrepreneurial practices in higher education institutions. *HEInnovate* was supported by a network of innovation and entrepreneurship professors and a panel of independent experts from across European Union countries.

Based on the OECD guiding framework for entrepreneurial universities, their research work has identified the entrepreneurial characteristics of HEI and enables organisations to evaluate themselves against best practice. It was developed for HEI to organise a participatory stocktaking exercise to review achievements and identify areas for improvement. It is possible to involve a wide range of stakeholders (leadership, staff, academic and administrative staff, key partner organisations etc.), and to repeat the exercise over time.

*HEInnovate* tool is a freely available online self-assessment tool (www.heinnovate.eu) and provides a guiding framework for the entrepreneurial university presented as eight dimensions. These eight key constituents include: (1) Leadership and Governance, (2) Organisational Capacity: Funding, People and Incentives, (3) Entrepreneurial Teaching and Learning, (4) Preparing and Supporting Entrepreneurs, (5) Digital Transformation and Capability, (6) Knowledge Exchange and Collaboration, (7) The Internationalised Institution and (8) Measuring Impact.

The eight dimensions in *HEInnovate* (HEInnovate, 2018) can be summarised as follows:

*Leadership and governance* are two critical and challenging factors in developing entrepreneurial and innovative HEI. Positive and responsive leadership is

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1 For each of the eight dimensions, Guidance Notes are available online on www.heinnovate.eu.
what maintains a dynamic and successful organisation, particularly in times of uncertainty, unpredictability and complexity. Leadership and governance can stimulate innovation of all kinds in an organisation that is held together by a shared vision and culture, not overloaded with managerial systems, constantly striving for its autonomy via the entrepreneurial management of its various interdependencies with stakeholders.

Organisational capacity: funding, people, incentives. Entrepreneurial and innovative HEI continuously aim at developing their organisational capacity. To this end, incentives and rewards are in place for entrepreneurship champions, staff, students and stakeholders who are promoting the entrepreneurial agenda, and removing barriers and constraints within the organisation. The aim is to empower individuals throughout the organisation to own their own initiatives, engage in innovation and build personal trust-based stakeholder relationships across external and internal boundaries in search of synergy.

Entrepreneurial teaching and learning require something other than standard textbooks and ordinary classroom settings. An ‘entrepreneurial’ pedagogy seeks to enhance entrepreneurial capacities and capabilities amongst students by giving them more autonomy and responsibilities in the learning process through experimental, collaborative and reflexive learning.

Preparing and supporting entrepreneurs entails teaching strategies and learning environments which offer targeted support for students and staff that aim at setting up a business. HEI can provide this support directly themselves or refer potential entrepreneurs to specialised start-up support services within the (local) entrepreneurship ecosystem.

Digital transformation and capability cut across all aspects of modern HEI. It is increasingly important that institutions make the most out of the opportunities afforded by digital technologies, which are a key enabler of innovation and entrepreneurship. Ensuring that HEI can do so entails fostering a positive digital culture, developing and maintaining a fit-for-purpose and up-to-date digital infrastructure that serves the strategy and the missions of the HEI, and developing digital competences among staff and students to fully exploit the opportunities provided by digital technology and tools.

Knowledge exchange and collaboration is determined by the perceptions of the respective "other". A negative attitude towards entrepreneurship, entrepreneurs and businesses within a higher education institution can limit and hinder network formation and collaboration with business partners. Communication that ensures that both sides of a knowledge exchange network have a clear understanding of respective expectations, limitations and requirements, is a major building block of the entrepreneurial and innovative HEI.

The internationalised institution. Internationalisation is an important indicator for quality in higher education and it represent a vehicle for continuous change and advancement. HEI can internationalise through their activities in teaching, research and knowledge exchange, and through their staff and students. Becoming a truly internationalised institution will build on both.

Measuring impact of certain practices on the entrepreneurial and innovative HEI is neither easy nor straight forward. To measure the impact of the entrepreneurial
agenda, it is important to start by monitoring and reviewing entrepreneurship within the leadership of the higher education institution. This will help establish an understanding of how important entrepreneurship is to the governing and executive boards – compared to other strategic objectives, such as, for example, sustainability, excellence in research, attraction of international students. Excellence is judged through the eyes of all its stakeholders in pursuit of the creation of public value.

As seen above, \(\text{HEInnovate}\) presents a variety of ways in which higher education institutions can act in an entrepreneurial and innovative way in their strategies and practices, and it is essential to do so from a whole institution perspective.

### 2.4. Transformation and Digital Capacity

In June 2018, due to new topics and emerging topics, such as transformation and digital capabilities, there was a need to update conceptually \(\text{HEInnovate}\). Thus, this section discusses how HEI can demonstrate entrepreneurship and innovation in how they incorporate digital technology into their activities.

Information and Communications Technology (ICT) contribute not just to innovation in products, but also to innovation in processes and organisational arrangements. New approaches to education, training, re-skilling, skills use throughout the economy, and adjustment assistance to meet the fast-changing demand for new skills, will be key to maximising the benefits of a digital and inclusive economy and society today and in the future (OECD, 2017).

The renewed EU agenda for higher education (European Commission, 2017) stresses the need for HEI to address digital transformation, implement digital learning strategies and exploit the potential of technology to the benefit of their staff and students.

During the last fifty years, knowledge production has fundamentally changed. HEI are increasingly impelled to enhance their capacity to focus upon ‘useful’ problem-centred sources of knowledge, create wider partnerships for learning, cross-disciplinary boundaries and promote trans-disciplinarily, and to discover, exploit and share knowledge in new ways. There is a growing societal demand for HEI to take up the role of translating and communicating knowledge to wider audiences. The response to challenges and opportunities implies a different approach to teaching and requires a "rethinking of the education mode" (Etzkowitz et al., 2012) that involves a significant effort of organizational innovation.

The digital transformation offers many opportunities to entrepreneurial and innovative higher education institutions (OECD, 2017) but it also creates new challenges. Digital capabilities, defined as the ability to integrate, optimise and transform digital technologies in all possible processes and activities is becoming a key element fostering innovation in HEI. The entry point for digital transformation in HEI was connected to online teaching and learning, however digitalisation covers much more than the online delivery of content. As with the concept of entrepreneurship, digital transformation is a broad domain, and there are many areas that higher education institutions should consider.
Regarding digital transformation and capability, the HEInnovate framework consider that HEI should take full advantage of the opportunities that digital transformation offers and consider digital technologies as fundamental for their development, although this is already the guideline of many institutions. However, the level of adoption and integration of digital technologies varies between HEI and within them, to support innovation and entrepreneurship.

The digital transformation and capability dimension aim to promote reflection on the digital capacity of HEI, understood as their competence to integrate, optimize and transform digital technologies to support innovation and entrepreneurship. This reflection is guided by five areas of action: (i) HEI promotes a digital culture as a vehicle for innovation and entrepreneurship; (ii) Digital infrastructure is planned, managed and continuously improved to align with the vision, mission and strategy of the innovative HEI; (iii) HEI is committed to the application of digital teaching, learning and assessment practices; (iv) Open science and innovation practices are disseminated throughout the HEI and (v) the HEI has a dynamic digital presence that supports all of its activities.

Thus, in each of the areas of activity, this HEInnovate dimension includes several topics of reflection, namely: (i) having the leadership and the commitment of a culture based on shared values that foster digital transformation for the benefit of innovation and entrepreneurship; (ii) ensure the implementation of an operational plan for the management, optimization and adaptation of ICT systems and services with clear objectives and performance indicators; (iii) ensure that ethical, legal and regulatory requirements related specifically to digital aspects are implemented and widely understood, including in respect of innovation and intellectual property rights; (iv) integrate digital skills and competences into curricula and learning outcomes desired in all disciplines; (v) provide faculty with training and development opportunities as regards the use of digital technologies for teaching, learning and evaluation; (vi) promote an environment conducive to open science and innovation in different curricular units and faculties, as well as with external stakeholders; (vii) present communication, collaboration and networking strategies supported by the use of digital tools; (viii) use digital tools and practices to achieve a more transparent and integrated sharing of relevant information with faculty and students, as well as with external stakeholders, among others.

3. Methodology

3.1. Case study

Located in the centre region of Portugal, the Polytechnic of Guarda is a small Portuguese polytechnic institution (approximately 3000 students and 250 teachers), which began its teaching activities in 1986 and has been focusing on quality, in connection with the business, cultural and social environment of the region, as well as in cooperation with Portuguese universities and polytechnics and foreign institutions (IPG, 2018).
The Polytechnic of Guarda is an institution of higher education dedicated to preparing students for their future professions and is made up of four schools: The School of Education, Communication and Sport (oriented towards teaching, scientific investigation and support to the community); The School of Technology and Management (provides higher education in the areas of technology and management. Its aims are teaching, research and other scientific and technical activities. It has a fundamental link to the local community, promoting human resources, an area that is indispensable for the process of modernization); The School of Tourism and Hospitality Management (provides higher education in these two areas. The main priority of this school is to offer higher qualifications and to train future tourism professionals for the needs of the tourism industry); and The School of Health Sciences (offers highly skilled training in the areas of nursing and assistant pharmacist. It prepares professionals for general and specialized nursing care and assistant pharmacists). Their training offered includes the formation of 1st cycle (Graduate), 2nd cycle (Master), postgraduate and specialization courses, and a professional higher technical course (CTeSP) that gives a superior professional technician diploma. It is a comprehensive and multidisciplinary offering with courses in multiple areas of knowledge.

In addition to the training offer, the Polytechnic of Guarda develops activities in the fields of research, of the transfer and valorisation of scientific and technological knowledge, of the provision of services to the community, of support for development and cooperation in extension areas of education, culture and technical.

The context of the Polytechnic of Guarda is characterized by a region in the interior of Portugal, typically deserted, not only in terms of population, but also in terms of business. The statistics have a business density of 2.4 (n. º/km2) and a new business creation rate of 10%. Comparing with the national average of 107.1 (n. º/km2) or even the Central region, 8.9 (n. º/km2), it is notoriously a territory with a low number of companies, located in a region, also itself with a low business density (INE, 2016). Despite being in a low-density territory with a business environment composed of SME, with a low dynamism and innovation (INE, 2010), the Polytechnic of Guarda plays a decisive role in the fight against the interiority and desertification of the interior.

For several years, the Polytechnic of Guarda and other institutions, in similar circumstances, struggle against this process of depopulation, but undoubtedly contributing to the region’s growth and development (Rosa et al., 2011). The social and economic impact of the Polytechnic of Guarda in the region is felt in Guarda district in two cities (Guarda and Seia), using the American Council of Education (ACE) model, shows an economic impact with a total value between 16.7 million euros and 28.3 million euros, by a multiplier of 1.0 and 1.7 respectively. This represents a considerable economic boost for the region, corresponding to 1.1% and 1.8% of GDP in the entire Guarda region (Rosa et al., 2011).

It should be noted that every euro spent by the Portuguese government financing the Polytechnic of Guarda, produces a multiplier effect, and generates between 1.4 and 2.4 euros of economic activity in the region (Rose et al., 2011). In addition, the
number of jobs associated with the Polytechnic of Guarda function is about 1585 jobs, representing 3% of the region's employment rate and 2.6% of the region's active population.

This context allows us to conclude on the importance of the Institute as an engine of the dynamism and economic development of the region where it is inserted, and makes pertinent its self-analysis so that, as an entity for the promotion of entrepreneurship and innovation, reflects on its own ability to promote a culture that suggests to the outside these areas of development and economic and social growth.

3.2. Data Collection

The objectives of this study are to perform the self-diagnosis of an HEI and observe and reflect on the level of adoption and the integration of digital technologies, in particular to support innovation and entrepreneurship in Polytechnic of Guarda. The HEInnovate platform was used as an experimental tool to evaluate and understand how Polytechnic of Guarda adopts and integrates digital technologies in support of innovation and entrepreneurship. The HEInnovate self-assessment tool was applied to the main organizational centres of the institution concerned, in particular the "Transformation and digital capacity" dimension.

In the questionnaire survey developed by HEInnovate, as already mentioned in the previous section this dimension is composed of five statements. Statements have been designed so that individuals can rate them on a scale of ‘not applicable’ (n/a) to 5, according to how much they agree or disagree with the statement in relation to their institution. On the scale, 1 represents the lowest and 5 the highest score.

As part of a group, the self-assessment has a group function where individuals can be invited by an assigned group administrator to complete the tool for the purposes of internal comparison. The application of the survey by questionnaire, sent by e-mail, involved the Presidency of the Polytechnic of Guarda (Presidency), the directions of the four Organizational Units (School directions - Higher School of Technology and Management, Higher School of Education, Communication and Sports, Higher School of Health and Higher School of Tourism and Hospitality), and the Coordinators of the eleven Technical-Scientific Units (Department coordination), which make up a total of 18 respondents.

The data collection period was between October 26 and November 8, 2018. The response rate was 77.8%, which corresponds to a total of 14 questionnaires completed.

4. Results

As we may observe in Figure 1 the overall score of the items, in average terms, reaches or exceeds the intermediate point of the scale (3 values), being between 3 and 3.5 values, except for the item "The digital infrastructure is planned, managed and continuously improved to align with the vision, mission and strategy of the innovative
HEI." As regards the scores given by the different groups, in average terms, it is verified that the item "The HEI is committed to digital teaching, learning and assessment practices", which has the highest scores.

![Figure 1 – Digital transformation and capability results](Source: HEInnovate (2018))

Analysing the results by group, we observed that the Presidency rank on average with higher scores (3.30), followed by School Directions and Department Coordination with an average value of 3.15 and 3.13, respectively.

Given the results obtained, it is important to observe the actions effectively implemented in the Polytechnic of Guarda in the scope of the digital transformation and capability for each item.

1. *The HEI fosters a digital culture as a mean for innovation and entrepreneurship* obtain a value of 3.14. The digital culture is the main base and its existence rests on shared values between leadership, staff and students.

In this area, Polytechnic of Guarda enable students and staff to understand, explore and promote new ways of working that are digitally driven, for example, using digital research methods (B-on, ProQuest Nursing & Allied, Statistics Portugal Web Portal (INE), Electronic Consolidated Legislation\(^2\) and Digital Library of Polytechnic of Guarda). The digital stakeholder engagement and communication is ensured by Polytechnic to Business (P2B) platform where it’s possible to establish partnerships with the business community while promoting research and innovation and represent an effective transfer of knowledge applied to the market and promote entrepreneurship (business creation).

\(^2\) Translated from the original name in Portuguese - Diário da República Eletrónico
Polytechnic of Guarda uses a virtual secretary that offers e-services to academic citizens integrated in a pedagogical Platform named SIGARRA that represents a set of digital facilities, infrastructure, and services.

Finally, respecting with digital teaching, learning, and assessment, the statutes/regulation of Polytechnic of Guarda consider a Distance Learning Organic Unit (UED), despite of not yet being implemented, that has the main goal of giving a wider range of action, reaching new learning targets and students.

However, it is noted that the strategy and related action plan is in implementation phase to respond fully to the needs of the whole institution and there is a role for all staff to maintain the relevance of digital strategy and to communicate its added value and benefits.

The institution's digital culture must be aligned with its overall strategy and future direction.

2. **The digital infrastructure is planned, managed and continuously improved to align with the vision, mission and strategy of the innovative HEI.** This area obtained the lowest self-assessment (2.93). Ideally, HEI must ensure that the institution's digital infrastructure is consciously planned and aligned with the overall strategy and missions of the HEI.

In fact, Polytechnic of Guarda lacks an operational plan to develop a digital infrastructure that integrates the institution's learning technologies and platforms, research, and administrative systems and support for ICT services. There is an effort to procure newest technologies, but it is also difficult to reach when the institution faces financial constraints. The concern with digital infrastructure exits but it needs to include clear objectives and performance metrics to address specific requirements for the institution, its staff, students, and wider environment.

3. **The HEI is committed to digital teaching, learning, and assessment practices.** This question obtained the highest classification in the self-assessment (3.36).

In terms of digital teaching and learning, the Institution presents a multi-faceted use of digital technologies. For example, several MOOCs were developed in partnership with other HEI in the following areas, communication, industrial property, organizational culture, marketing, business plan, financial management, marketing, and financing instruments. The purpose is to deliver educational content to broad audiences via online platforms and to innovate educational content. Accordingly, the innovative educational content is improved with the implementation of new teaching methodologies as design thinking, mind mapping, problem-based learning.

In support of the institution's pedagogy, some disciplines use specific software, for example, PRIMAVERA Software (an accounting information system) or in areas of engineering and industrial design it exists Fab Lab Guarda in Polytechnic of Guarda that offer support in digital 3D modelling and 3D printing to promote innovation and to create prototypes.

4. **Open science and innovation practices are widespread across the HEI** obtain a 3.07 score. The Open science means a commitment to open outputs, open infrastructure, and culture change.

As previously mentioned, Polytechnic of Guarda has a digital library that disseminates scientific production as an online workspaces or repositories.
The Institution promote the dissemination of the websites of the external co-financing projects in which it is a promoter as a form of communication strategy to promote an understanding of open science practices across the institution and, engagement with researchers and citizen science alongside standard research.

But there are still some gaps that can be addressed with the implementation of an action plan which considers, for example, mechanisms or programmes for increasing trust and confidence in an open science approach, training on data management practices to support open science publishing and embedding open science in teaching and learning practices.

5. The HEI has a dynamic digital presence supporting all its activities obtain a value of 3.29. This statement incorporates active communication

In fact, Polytechnic of Guarda use digital communication (webpage, Facebook, emailing, digital brochures, P2B) to encompass marketing and promotion. But this digital communication serves to facilitate networking and collaboration as the same time.

As recommended by HEInnovate, we identify that the Institution should develop institutional guidelines and common practices which promote the use of social media platforms and ensure continued usefulness and relevance of the Institution’s digital presence.

5. Conclusion

This paper represents a case study of a single HEI. It was possible to understand the contributions and gains that the tool of HEInnovate can bring to the development and action of Polytechnic of Guarda, as well as the importance of this self-reflection so that the positioning and culture of the institution promotes entrepreneurship and innovation. In the case of the competence of Digital transformation and capacity there is still a lot to be done despite the change already reached. This is a theme of constant and rapid development and financial constrains are a barrier to the speed of adaptation and solution implementation.

Although there are already some case studies that prove the usefulness of the HEInnovate tool for self-reflection and evaluation, guiding and providing a diagnosis and consequent strategic direction in the context of the entrepreneurial development of the HEI, the Dissemination of the tool is still not enough to produce the desired impact. In recent studies it was possible to analyse 31 case studies of European HEI created based on the methodology of HEInnovate (Alves et al., 2018). It was here possible to observe that the HEI, alone or in conjunction with other partner entities, carried out a self-assessment process in the different dimensions of the tool but the digital transformation and capacity dimension was not one of most applied, so it become difficult to engage in a comparison of results.

The imperative of the digital transformation and capacity of the HEI still emerge to survive and for the positioning and recognition. Without this development and update in use of technologies it will not be possible to be in the new wave of education.
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ICT Skills of Greek teachers

Vasiliki Maria Panatsa¹, Natalia Panatsa¹, Stavros Valsamidis², Dimitrios Maditinos²

¹Western Macedonia Institute of Technology, Greece

bessiepan@yahoo.gr
nataliapan@yahoo.gr

²Eastern Macedonia and Thrace Institute of Technology, Greece
svalsam@teikav.edu.gr
dmadi@teiemt.gr

Abstract: This study investigates the skills of Greek primary school teachers regarding the use of ICT. It also investigates issues related to schools’ ICT capacity (availability of ICT and accessibility) and the extent to which they are used by teachers, as well as issues related to the extent to which teachers have access to training in various areas of ICT and the extent to which they consider them effective. In order to achieve the above objectives, a questionnaire was distributed in printed and electronic form to Greek primary school teachers. The results showed that teachers have moderate to high level skills in word processors, the web and email and, secondly, to file navigation, presentation packages and spreadsheets. On the contrary, very few teachers have skills in using the school network and databases and most of them have never even used them. Male teachers, young teachers and teachers with less teaching experience are more likely to have higher ICT competence scores. Regarding school ICT capacity, teachers' responses showed that many of the ICTs were available only from a very small number of schools, and it was often not easy to access them. However, teachers tend to use ICT which are available in their school. Finally, almost all teachers have attended professional training in computer use, word processing and presentation software, while many have been trained in spreadsheets. A smaller number of teachers have been trained on how to integrate technology within the curriculum and fewer than half have been trained in databases. Finally, the majority of teachers consider the training they have received as effective.

Keywords: Information and Communication Technologies (ICT), primary school teachers, skills, training.

1. Introduction

The inclusion of Information and Communication Technology (ICT) in education shows that it is crucial and forms the environment what is called a technological learning environment. In terms of the ICT usage by teachers, the first argument that could be expressed is that it differs significantly according to each reference country, since there are countries where teachers extensively use of ICT in the
school classroom, while there are others where ICT usage is rather the exception than the rule (Drossel et al., 2016).

Similar considerable differentiation is also noticed among European countries, where a higher uniformity in teachers' habits would be expected. The IEA Trends in International Mathematics and Science Study (TIMS, 2012) reveals that in countries such as Denmark, UK, Ireland, the Netherlands, Portugal, and Sweden, a very high percentage of teachers (90%) use ICT in the classroom, as opposed to other countries, such as Italy, Poland, Romania, Hungary, and Spain, where this percentage is fairly lower (between 39.8% and 57%) (Drossel et al., 2012). Govender and Govender (2009) conducted a survey by using a questionnaire as a methodological tool on 1,222 teachers from South Africa, aiming to investigate their views about the knowledge and skills that they have in using computers, regarding three ICT categories: word processing, electronic mail (email) and Internet. The biggest percentage believed that they did not possess any skills at all (24.7%) or possessed a minimum level of skills (45.7%) in using computers to perform most of the functions that teachers are required to within the context of their work, while only a small percentage (6.6%) believed that they possessed a high level of skills in using computers. In another survey that was conducted by Tezci (2009) on 1,540 primary school teachers in Turkey, the teachers of the sample were asked to evaluate their skills in using 14 ICT categories: word processing, databases, spreadsheets, graphics, multimedia publishing software, presentation software, conceptual maps, the Internet, electronic mail, publishing software, website building software, programming languages, modelling software, and microworlds/simulations. The results of the survey showed that teachers have very few knowledges on these 14 ICT categories in overall. According to teachers' responses, they have the most knowledge in using Internet, word processing, electronic mail, presentation software, and graphics, whereas they have the lowest knowledge in using microworlds/simulations, and subsequently, in modelling, and programming languages. The results of the survey also showed that the teachers' knowledge depends on their gender, with male teachers showing statistically more knowledge in using ICTs, compared to their female colleagues.

Similar results are also reached by the survey of Alazam et al. (2012), where the skills of 329 teachers in Malaysia were investigated. This survey revealed that the skills of the teachers of the sample were moderate, with higher skills being shown in the use of Internet. On the contrary, the lowest level of skills was presented by teachers in simulations, followed by programming languages, digital video and animation production, and the use of Microsoft Excel. Male teachers demonstrated statistically better skills in the use of ICTs, compared to their female colleagues. Furthermore, in this survey, the age and years of service also affect the teachers' skills in the use of ICTs, with younger teachers with less years of service having better skills.

The inverse correlation of age and years of service with the use of ICTs is also confirmed by the survey of Buabeng-Andoh (2012) on 231 teachers from Ghana. This survey agrees with the finding of the surveys that were mentioned above that teachers demonstrate poor skills in using key ICT tools. More
specifically, the teachers of the sample believed that their databases skills are low, while their word processing skills are moderate.

Reference should be also made to the survey that was conducted by the Australian Ministry of Education, under the main purpose of investigating the skills of teachers who work at public schools of Western Australia (WADETEAD, 2006). In this survey, which was conducted by using a questionnaire, a list was presented to the teachers, consisting of eight ICT categories, i.e. word processing, Internet, electronic mail, spreadsheets, databases, SIS curriculum manager, presentation packages, and computer file navigation. The results of the survey showed that the overwhelming majority of the teachers (more than 95%) possess high usage skills only in word processing, Internet, electronic mail, and computer file navigation, whereas only 30% of the teachers of the sample have used databases. Moreover, it was shown that the highest skills in using the ICTs were held by male and younger teachers, as well as teachers with less years of service.

The subject of this study has been chosen for a number of reasons, which make it fascinating. First of all, the level of knowledge that the teachers possess regarding the use of ICT is highly important for the understanding their behaviour inside the classroom, which would consequently lead to new reforms in the education and also effective training for the teachers. Furthermore, the value of study is maximizing because of its involvement with the ICT categories, such as word processor, Internet and presentation software, which are considered highly valuable for an effective education. Without basic ICT skills, the integration of ICT by the teachers into their educational practice is greatly uncertain. Therefore, the above arguments show the importance of the conduction of this study, especially for the Greek standards since there is a great lack of study on teachers’ skills in Greece. The basic aim of the present study is the investigation of the skills of Greek primary education teachers regarding the use of ICT.

2. Approach

With this aim as a basis, the following research questions were put forward in the present study:

1. Which is the level of the teachers’ skills of primary education regarding the use of ICT?
2. Specifically, the study focuses on the investigation of teachers’ skills regarding eight big ICT categories: (a) Computer file navigation, (b) Electronic mail, (c) World Wide Web – Internet, (d) Word Processors, (e) Presentations, (f) Spreadsheets, (g) Databases and (h) School Network.
3. Are there statistically significant differences in the teachers’ skill levels due to demographic factors (gender, duration of service, age group, area of school unit)?
4. To what extent is ICT available at schools and to what extent is it used by teachers? Specifically, the study focuses on the availability and the ease of access to the following ICT categories: intranet school network, Internet, printers, digital cameras, specific software applications, technical support, digital projectors, interactive whiteboards, personal electronic mail accounts, desktop/portable computers or notebooks for teacher use, desktop or portable computers inside or outside the school classroom for pupils use.

5. To what extent do teachers have access to training in various topics of ICT (computer use, word processors, spreadsheets, presentation software, databases, means of integrating technology in the curriculum) and to what extent do they consider it effective?

The initial questionnaire developed by the Department of Education and Training of Western Australia (WADETEAD, 2006), as part of study that it carried out with the basic aim of investigating the expertise and skills of teachers of state schools in Western Australia; it was adopted and adapted to Greek circumstances to answer the aforementioned research questions. However, the questionnaire was not used in its entirety, but only the questions relevant to the research questions of the present study were selected.

Moreover, the questionnaire was enriched with additional questions that responded directly to the Greek framework and was distributed either printers or in electronic form to Greek primary education teachers from all parts of Greece.

Data collection was done with a questionnaire in print and electronic form that was distributed to the teachers of the sample. More specifically, and regarding the structure of the questionnaire, it is comprised of four parts. The first part included an introductory note with a few words about the research, and explained that there were no correct or wrong answers, while it also asked the participants to fill information regarding demographics. The second part included questions that regarded the availability and ease of access to 15 ICT categories at the teachers’ school, as well as whether they have been used by the teachers or not. Then, in the third part of the questionnaire, the participants were asked to answer on which of the aforementioned ICT topics they have received some training and, if they have, to state whether they think it effective. The fourth and last part of the questionnaire contains eight groups of questions, each of which investigates the teachers’ individual skills regarding eight ICT categories: (a) computer file navigation, (b) electronic mail, (c) world wide web – Internet, (d) word processor, (e) presentations, (f) spreadsheets, (g) databases and (h) school network.

After the preparation of the questionnaire, the process of carrying out the pilot stage of its implementation followed. The pilot research was carried out on a sample of 15 teachers so that potential weaknesses of the questionnaire could be discovered and corrected. After correcting the errors that emerged, the main carrying out process of the research followed, which lasted from May until June 2018.
In the present study the sample consisted of a total of 678 teachers of primary education from all parts of Greece, which served in public or private schools during the academic year of 2017-2018. The selection of the participants was done through convenient sampling (teachers who could easily be approached by the researchers). What follows is the analytic citation of the characteristics of the sample, as it results from the answers given by the participants in the first part of the questionnaire.

3. Results

Regarding the level of ICT capabilities of the teachers, the data analysis showed that the teachers (100%) have knowledge and capabilities in three categories of ICT: word processing, web and e-mail. Still the devastating majority of the educational (95.6%) have the capabilities of file navigation in computers and Software presentation. A big percentage (94.7%) has capabilities of spreadsheets. Less are the teachers which state that they cannot use the functions of the school network (68.1%), while just only the 39.8% of the teacher’s state that have capabilities of database (39.8%).

There are significant statistical differences in the levels of teachers’ capabilities depending on demographic factors (gender, years of service, age, area of school unit). Regarding the gender, different answers of the teachers that concern the file navigation in computers, e-mail, web, presentations, spreadsheets and database. On all occasions the male teachers show in higher skills, unlike the female teachers.

The significance test of the teachers’ answers regarding their capabilities, in relation with the work experience, it showed that there are differences in the answers of the teachers in 27 capabilities that concern navigation of the files in computers, e-mail, web, word processor, presentations and the school network. Teachers with less work experience showed higher percentages regarding their capabilities in comparison with the teachers that have more work experience. From the significance test of the teachers' answers, in relation with their age, it showed that there are differences in the answers of 14 capabilities that concern navigation of the files in computers, e-mail, web, word processor, presentations and the school network. The younger teachers showed that they have higher percentages in their capabilities in comparison with the older teachers.

The significance test of the teachers' answers in relation with the area that the school is located (isolated or not) appears that this factor does not affect the levels of capabilities of the teachers, when it could found any statistic difference in their capabilities.

The fourth part of the study concerns the attendance and the corresponding effectiveness of the teachers' trainings in six topics of ICT: computer use, word processing, spreadsheets, presentations, databases and means of technology integration in the curriculum. The reason for those questions is to understand whether these trainings can be used to improve their knowledge and capabilities of the teachers and in which degree these trainings were effective. Table 1 portrays the percentages of teachers' answers.
Table 1- Degrees of attendance and effectiveness of the teachers' trainings in six ICT topics

<table>
<thead>
<tr>
<th></th>
<th>Attendance (%)</th>
<th>Effectiveness (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer use</td>
<td>93.8</td>
<td>89.6</td>
</tr>
<tr>
<td>Word processor</td>
<td>93.8</td>
<td>92.4</td>
</tr>
<tr>
<td>Presentation software</td>
<td>90.2</td>
<td>93.1</td>
</tr>
<tr>
<td>Spreadsheets</td>
<td>89.3</td>
<td>85</td>
</tr>
<tr>
<td>Embedding technology in the</td>
<td>70.5</td>
<td>96.2</td>
</tr>
<tr>
<td>Database</td>
<td>49.6</td>
<td>80.4</td>
</tr>
</tbody>
</table>

4. Discussion and Conclusions

The analysis of the results of the above questionnaire reveals the relationship between Greek primary school teachers and ICT.

First of all, with regard to the first research question that participants asked to state whether they possess knowledge and skills in any of the eight ICT applications (word processing, Internet, electronic mail, file navigation, presentation, spreadsheets, school network, databases) and if so, in which one, the findings of this study were very interesting.

The participants’ responses show that all teachers possess sufficient knowledge and skills in three ICT categories: word processing, Internet and e-mail, while the overwhelming majority of teachers also have skills in file navigation, presentation software and spreadsheets. On the contrary, a relatively small percentage has some knowledge and skills in the use of the school network, while a surprisingly high percentage of teachers (60.2%) have no skills in databases.

Teachers were mostly skilled in word processing, with the vast majority being fully skilled. The only skill that seemingly challenges teachers in word processing is the “Mail merge” that only half of the teachers possess. Electronic mail presents a contradictory view. Though, it constitutes an ICT application that all teachers have used, there are skills relevant to it with teachers who are almost totally familiar, such as “accessing electronic mail” and “composing and sending of e-mails”, and there are others that only almost half of the teachers are familiar with, such as the “creation of a chat list” and “adding a signature to the e-mails”.

The vast majority of teachers also seem to be fully skilled as to Internet navigation. The skills in this topic possessed by fewer teachers concern the “change of preferences in the browser” and the “carry out of complex searches”. Teachers also seem quite familiar with file navigation, as a high percentage of them possess most of the skills related to it. The skill that seems to create a certain level of difficulty for them is the “carry out of complex file searches”.

Regarding the presentation software, we could say that teachers show high levels of familiarity in certain functions, such as the “creation of a new presentation,
inserting images, changing the font and the layout, or editing an existing presentation”. However, at the same time, a significant percentage of teachers are unable to use several other functions, such as “adding navigation buttons”. The teachers seem to be semi-familiarized with spreadsheets, as the vast majority is able to use basic functions, such as “cell formatting” and “data entry in existing spreadsheets”. Nevertheless, a large percentage of teachers seem to be unfamiliar with several other significant functions, such as “data entry and/or export, access to multiple worksheets and use of filters”. Finally, approximately half of the teachers possess advanced skills, such as “conditional formatting”, “application of complex formulas” and “use of absolute and relative cell references”.

The databases constitute the ICT application, in which teachers result less skilled, as most of them have never used it. Finally, regarding the school network, it can be argued that teachers are slightly familiar with it, as a large percentage (32%) stated to have never used it, while most of those who stated to have used it, are familiar with only one of its functions, that of “using electronic mail”. The rest of its functions are possessed by an impressively small percentage of teachers, a very disturbing finding, given that the services provided by the School Network are extremely helpful for the teachers’ educational practices and able to enhance the learning outcomes.

The aforementioned findings agree with the results of other studies that investigate teachers’ skills in ICTs. In particular, the study by Tezci (2009) reached similar results, as he found that most of the teachers possess more knowledge in the use of Internet, word processing, electronic mail and presentation software, in comparison with other ICT applications. Furthermore, the results of the present study agree with the results of the research conducted by Alazam et al. (2012), who found that the skills of the teachers that formed their sample were of a medium level, with the use of Internet presenting one of the highest skill levels. In addition, in both the present survey and the one conducted by Alazam et al., the teachers presented medium level skills in the use of spreadsheets. As far as databases are concerned, the findings of this study are in accordance with those introduced at the study by Buabeng-Andoh (2012), in which the teachers of the sample considered their skills to be few to non-existent. However, the results of the present study differ from those of the Buabeng-Andoh’s research, as the teachers of his sample assessed their skills in word processing as low, while in the present survey it was found that almost all teachers possess all skills regarding word processing, except one (that of “Mail merge”). Finally, it is worth comparing the results of this survey with the ones of the survey conducted by the Department of Education and Training of West Australia (WADETEAD, 2006). The research on Australian teachers has reached similar findings, coming to the conclusion that the overwhelming majority of teachers (more than 95%) present advanced skills only in using word processing, Internet, the electronic mail and the file navigation, while a mere 30% of the sample’s teachers have used the databases.

Regarding the second research question that focused on the study of the demographic factors which may affect the development of the ICT skills, the survey revealed that male teachers tend to possess many of the ICT skills in a greater extent compared to their female colleagues. At this point, we should not omit to mention the
existence of a certain disproportion at the sample, as the female teachers that participated in the survey were quadruple in number, in comparison with their male colleagues. This reflects the general situation in primary education, which could be characterized as an almost female-dominated sector.

More skills were also shown to be more often possessed by teachers with fewer years of service or of a younger age. Similar results were also found in Tezci’s research (2009) showing that the knowledge of the teachers depended on their gender, as male teachers presented statistically more knowledge on the use of ICTs compared to their female colleagues. Similarly, in the survey of Alazam et al. (2012), male teachers presented statistically better skills in the use of ICTs compared to their female colleagues, while age and years of service also appeared to affect their skills in the use of ICTs, as teachers of a younger age and with fewer years of service presented better skills. The inverse correlation of age and years of service with the use of ICTs is also confirmed by the survey of Buabeng-Andoh (2012), while, finally, the study conducted by the Department of Education and Training of West Australia (WADETEAD, 2006) confirms that more skills in the use of such ICTs are possessed by male teachers, teachers of a younger age and also by teachers with fewer years of service.

The fact that the difference between male and female teachers was not statistically significant in every skill but only in few of them, is encouraging and unveils the big steps made in our country the last few years regarding education and the attitude of females towards the use of technology. However, it cannot be ignored that a considerable gap still exists as to the effectiveness of both males and females in the use of technology that should be addressed by appropriate actions so that females can become more interested in it and acquire more skills in the use of technology. In the matter of the fact that teachers of a younger age and fewer years of service are more likely to retain some skills, it could be interpreted bearing in mind that “most of today’s teachers were taught during a time when “educational technology” was limited to the blackboard (Makrakis, 2005). Thus, it should not be surprising that they note a certain delay in their familiarization with the ICTs, in comparison with the rest of their colleagues.

The third research question concerned the availability and ease of access to the 15 ICT categories in the schools where these teachers teach, as well as their use by the teachers. The teachers’ responses revealed that there are certain ICT categories that are only available in a relatively small number of schools. Typical examples include specific application software, the intranet school network, digital cameras, interactive whiteboards, technical support services, and educational software. The absence of these specific ICTs from the majority of primary schools, could act potentially as a barrier to teachers' intentions in using them to facilitate their work. The problem tends actually to become more severe if it is taken into account that even in the case of different ICT categories being available in schools, it is often difficult to access them, as it results from the participants’ responses, a fact that provokes additional obstacles in the teachers’ work. In each case, the results indicate that the use of the ICT categories is proportional to their availability. In other words, teachers tend to use, in a lesser or greater extent, the ICTs available in their school, which highlights the imperative need to equip properly the schools
with all ICTs necessary for teaching and learning. The only ICT application that teachers seem to largely avoid using, despite its availability in schools, is the educational software. This reluctance may reflect the lack of knowledge to use this category of software or the teachers’ incapacity to integrate ICTs in their teaching, a fact to be taken seriously into consideration by the future developers of curriculum or training programs.

The fourth and final research question concerned the access of teachers at training programs regarding ICTs and to what extent they considered them effective. The results indicate that almost all teachers have attended training programs on computer use, word processing and presentation software, while several of them have attended courses on spreadsheets. A smaller number of teachers have been trained on issues regarding the proper way to integrate technology in the curriculum, while less than the half have been trained in databases. Regarding the effectiveness of these training programs, it could be sustained that the majority of the teachers consider the training as effective. These results largely reflect the view presented by the teachers when asked about their skills in these topics. In particular, teachers were found to possess high and medium level skills in the topics in which they have undertaken training (word processing, presentation software, computer use, spreadsheets) and low or no skills in the topics they have never been trained into (databases).

At this point, there are two remarks. Firstly, it appears that the training programs in the various ICT types seem to work favourably on the skills developed by the teachers. Therefore, actions should be taken to ensure the realization of such programs involving many ICT types which are considered critical for the teachers’ work. Secondly, it should not be overlooked that teachers have undergone less training on how to properly integrate technology in the teaching process, compared to the training on separate ICT types (e.g. presentation software). Nevertheless, it should be noted that the proper way to integrate technology in the teaching process is equally, if not more, important with the acquisition of the separate ICT types. For this reason, the relevant issues should always take precedence in the agenda of the developers of training programs.

The above findings highlight how important is for teachers to familiarize themselves, either during their core training, or within the context of further training sessions, with the above ICT topics and, although they are very elementary, compared to other ICT applications, such as simulations, programming languages, etc., they seem to cause major problems to teachers. An imperative need for teachers to familiarize themselves with databases and the school network, since only a few of them have skills in those applications. Furthermore, while teachers are educated or receive further training in the above ICT topics, even in those topics that most teachers have stated that they make use of, emphasis should be placed on covering all the relevant skills, in order to eliminate the phenomenon, according to which, teachers may be highly familiar with some basic skills, whereas, at the same time, they evidently lag behind in some other more complicated ones. In this way, teachers will be assisted in their attempt to take full advantage of the benefits and teaching assistance that are provided by the ICT applications in their work.

Moreover, it is recommended to equip schools with a large variety of ICTs, in order teachers to be assisted and encouraged for their use. Finally, it is
recommended that further training sessions should be held on how technology can be incorporated into the curriculum. In this way, teachers will be able to apply effectively in their teaching practice, the skills that they possess in individual ICT applications. The relevant further training programs will possibly be able to reduce the phenomenon of non-use by teachers, of the ICT applications that are available in their schools, as it has become particularly evident through this survey, in the case of educational software packages.

Regarding to the survey's limitations, it could be argued that it is limited to primary education teachers. Further to that, the sample of the survey was small (778 teachers), while it resulted from convenient sample taking, which does not make it representative, in order to draw generalizations. Thus, future research could expand over an investigation of the skills held by secondary education teachers, by using a larger sample and utilizing different sample taking methods. Finally, as a form of future research orientation, it could be recommended to explore the skills possessed by teachers in other ICT areas, such as programming languages, robotics, simulations, Web 2.0 tools, and educational software.

References


Factors that affect ICT usage in higher Education

Ioannis Kazanidis¹, Ioannis Petasakis¹, Sotirios Kontogiannis², Stavros Valsamidis¹

¹Eastern Macedonia and Thrace Institute of Technology, Greece

kazanidis@teiwt.gr jpetasakis@hotmail.com

svalsm@teikav.edu.gr

²University of Ioannina, Greece

skontog@cc.uoi.gr

Abstract: In the recent years, the use of Information and Communication Technologies (ICT) has great application to human activities in all sectors. ICT are used in all the levels of education, while IT courses are taught from primary to tertiary education, including technical and vocational education.

This work explores the students' attitudes with ICT based on seven factors as they emerge from the literature. We have collected and analysed responses from secondary school pupils so that we have real data on the use of ICT in Greek education. The results have highlighted the extent to which the controlled factors easy to use, useful, social influence, fun, uniqueness, innovation and quality affect the intention to use ICT related to the type of educational unit and the gender of students. Research findings are useful and can be considered and used in future studies, since the issue of ICT use in education is particularly important and certainly involves education stakeholders and users.

Keywords: Information and Communication Technologies (ICT), Higher education, Models of the use of technological applications, Intent to use ICT, Factors, Cronbach’s Alpha, Shapiro Wilk, TEI EMT.

1. Introduction

Nowadays, Information and Communication Technologies (ICT) are widely applied to human activities in all sectors, such as trade, production, services, health, science and education. In education, primary, secondary (technical and vocational) and tertiary, ICT courses are taught from a minimum to a higher level. We investigate students of higher education for their opinion about ICT, whether they use ICT in their courses and whether they are useful to the student in learning.

The use of ICT in tertiary education is an interesting challenge. Today's student is a good user of the technology and familiar from very young ages because of the widespread use and use of a variety of related devices (mobile phones, tablets, laptops, etc.). On the other hand, the evolution of technology
offers today many software applications that the current student can use. It would be interesting, therefore, to study and illustrate the different use of ICT by students on the basis of some factors such as gender and school.

The purpose of this study is to explore and understand the impact of factors that affect the intent of using ICTs by students not only theoretically but also in real terms. The research attempts a dual approach to the influence of both the gender and the student's faculty on factors such as Ease of Use, Utility, Social Influence, Entertainment, Uniqueness, Innovation and Quality in the Use of ICT. The study consists of the following sections. Firstly, the background is described, and then the aim and objectives of the study and the resulting research questions are presented. Then the method is specified; in next section the data is analysed, and the results are presented. Finally, reference is made to the contribution of ICT to higher education, some limitations are highlighted, and proposals are made to overcome some future research.

2. Background

In order to understand which factors, lead to the adoption of technology, it is good to predict who will benefit from the adoption. Several theories on technology acceptance and use have been developed over the last 60 years (Oliveira & Martins, 2011). Venkatesh et al. (2003) simultaneously tested a total of 32 structures out of eleven theoretical models to identify the structures that had the greatest influence on the use of ICT (Genuardi, 2004). The most important theories of the models in ascending chronological order are shown in Table 1.

<table>
<thead>
<tr>
<th>Theory</th>
<th>Year of Appearance</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Cognitive Theory (SCT)</td>
<td>1986</td>
<td>Bandura, 1986</td>
</tr>
<tr>
<td>Technology Acceptance Model (TAM)</td>
<td>1989</td>
<td>Davis, 1989</td>
</tr>
<tr>
<td>Model PC Utilization (MPCU)</td>
<td>1991</td>
<td>Thompson et al., 1991</td>
</tr>
<tr>
<td>Motivational Model (MM)</td>
<td>1992</td>
<td>Davis et al., 1992</td>
</tr>
<tr>
<td>Innovation Diffusion Theory (IDT)</td>
<td>1995</td>
<td>Rogers, 1995</td>
</tr>
<tr>
<td>Task-technology Fit model (TTF)</td>
<td>1995</td>
<td>Goodhue &amp; Thompson, 1995</td>
</tr>
<tr>
<td>Technology Acceptance Model 2 (TAM2)</td>
<td>2000</td>
<td>Venkatesh &amp; Davis, 2000</td>
</tr>
<tr>
<td>Unified Theory of Acceptance and Use of Technology (UTAUT)</td>
<td>2003</td>
<td>Venkatesh et al., 2003</td>
</tr>
<tr>
<td>Unified Theory of Acceptance and Use of Technology 2 (UTAUT2)</td>
<td>2012</td>
<td>Venkatesh et al., 2012</td>
</tr>
</tbody>
</table>

In order to assess the intention to use ICT by students, some concepts directly related to life should first be defined and studied: (a) Ease of use of ICT, (b) Utility of ICT, (c) Social influence through ICT, (d) Entertainment through ICT; (e) Uniqueness through ICT; (f) Innovation through ICT; and (g) Quality through ICT.

The involvement of young people in ICT depends to a large extent on the stimuli they receive from their family, as with any other activity. If the family urges
the child to engage in new technologies, then s/he is more likely to develop digital skills (Cassell & Jenkins, 1998). The perceived ease of use and the perceived usefulness of using a particular technology are the two most important factors for adopting it according to Davis (1989). Social influence is defined as a person's belief that people who are important to him/her believe or not to apply that behaviour (Davis et al., 1989). Innovation diffusion theory proposes mechanisms for adopting innovative products and predicts the success or failure of an innovation (Rogers, 1995). Moore and Benbasat (1991) have used the Innovation diffusion theory for ICT. Personal innovation is about exploring the willingness of students to test new technologies (Lu et al., 2005; Yoon & Kim, 2007). The quality of ICT systems and services is a combination of elements based on reliability and responsiveness as well as security and quality of content (Kuan et al., 2003; Wang et al., 2006). According to Hong & Tam (2006), the need for uniqueness is defined as the tendency for the user to look for diversity through the adoption and use of innovative products that make him/her unique. In their research, they demonstrated that the need for uniqueness has an impact on Behavioural Intent for Use. Behavioural Intent for Use is a measure of the percentage that a person will use a particular application (Ajzen και Fishbein, 1980). Perceived entertainment is defined as the extent to which the use of a particular application is considered to be entertaining regardless of the expected effects of performance (Hong & Tam, 2006; Bina et al., 2007). Perceived entertainment is considered to have a direct impact on the Behavioural Intent for Use. Behavioural attitude reflects students' behavioural tendency to use ICT (Yoon & Kim, 2007). Studies have shown that it is better to study the intention to use than the end-use when our data is collected all at a specific time (Agarwal & Prasad, 1999). The acceptance of ICT by students and the factors contributing to their intent to accept and use them was based on the UTAUT model, which was also used by Attuquayefio & Addo (2014).

3. Method

Since the purpose of this study is to investigate and understand the impact of factors influencing the intent of using ICT by students, some goals have been set. The most important of these are:

- The investigation of the extent to which students’ gender and faculty (school) affect the intention of using ICT.
- The assessment of attitudes-perceptions towards ICT.
- The measurement of particular factors in the intention to use ICT.

In order to derive at a conclusion on the interconnection of the above concepts, this study will be based on fourteen (14) research hypotheses:
1. The ease of use of ICT depends on gender
2. The usefulness of ICT depends on gender
3. The social influence through ICT depends on gender
4. The entertainment through ICT depends on gender

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5. The uniqueness through ICT depends on gender
6. The innovation through ICT depends on gender
7. The quality of services through ICT depends on gender
8. The ease of use of ICT depends on faculty.
9. The usefulness of ICT depends on faculty.
10. The social influence through ICT depends on faculty.
11. The entertainment ICT depends on faculty.
12. The uniqueness through ICT depends on faculty.
13. The innovation through ICT depends on faculty.
14. The quality of services through ICT depends on faculty.

A questionnaire was used with ten questions groups, related with ICT knowledge, attitudes and perceptions over ICT, ease of use, usefulness, social influence, entertainment, uniqueness, innovation, quality of services, performance expectation and effort expectation.

The questionnaire is consisted by 32 items divided into general questions and questions regarding to 7 factors, according to the literature. The first 4 questions are general questions and the next 4 questions are about their opinion on ICT Knowledge. Then there is the third group that has to do with the attitudes towards ICT consisted by 4 questions. In the other 7 thematic groups, there are questions about Ease of Use, Utility, Social Influence, Entertainment, Uniqueness, Innovation and Quality. Twenty-one items take values from 1 to 5 in a Likert scale, where 1 corresponds to totally disagree and 5 to totally agree. Table 2 shows the factors (question groups), the questions and the studies which they are depicted. We avoided complex questions because they confuse the respondent and does not give the right answers.

<table>
<thead>
<tr>
<th>Table 2 - Factors, Research Hypotheses and Relevant studies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Factor</strong></td>
</tr>
<tr>
<td>Ease of use</td>
</tr>
<tr>
<td>Usefulness</td>
</tr>
<tr>
<td>Social influence</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Entertainment</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Uniqueness</td>
</tr>
<tr>
<td>Personal Innovation</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Quality of Services</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Reliable sample of a questionnaires-based survey can be considered as about 10% of the corresponding population. For the selection of the survey participants, we use a random sample, which is the simplest probabilistic method. According to this method, every member of the population has equal and well-known possibility to be selected. The satisfactory sample means that the size of selected population is enough to provide representative information (Kotlrik & Higgins, 2001). The survey was conducted with the process of submitting, completing and collecting the questionnaire by the participants in person. It was
shared in total of 250 tertiary education students with the aim to obtain at least two hundred completed and valid questionnaires. The completed questionnaires were 222, with a response rate at 88.8%. The sample was consisting of 94 males (42.3%) and 128 females (57.7%), all students of the Eastern Macedonia and Thrace Institute of Technology. In particular, 82 (36.9%) of the respondent’s study at the School of Technological Engineering, 62 (27.9%) at the School of Agricultural Technology and 78 (35.1%) at the School of Business and Economics.

4. Results

The statistic package SPSS was used for the statistical analysis. Initially, we checked if the aforementioned seven factors have consequence and cohesion in the data of the study. Cronbach's Alpha coefficient was used in order to check this, whose values must be higher than 0.700 (Cortina, 1993). The value of Cronbach's Alpha coefficient was higher than 0.7 for all the examined factors, so we conclude that there is cohesion and consequence. The examined factors, the corresponding questionnaire items and the Cronbach’s Alpha are presented in Table 3.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Items</th>
<th>Cronbach’s Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ease of use</td>
<td>Learning Information Technology is easy. The use of Information Technology is clear and comprehensible. It seems easy to use ICT in education.</td>
<td>0.702</td>
</tr>
<tr>
<td>Usefulness</td>
<td>Information Technology helps to access and retrieve information. Information Technology helps students to collaborate. Information Technology helps communication between students and teachers. Information Technology helps me do my job faster.</td>
<td>0.757</td>
</tr>
<tr>
<td>Social influence</td>
<td>Information Technology helps to access and retrieve information. Information Technology helps students to collaborate. Information Technology helps communication between students and teachers. Information Technology helps me do my job faster.</td>
<td>0.726</td>
</tr>
<tr>
<td>Entertainment</td>
<td>The use of ICT is pleasant. The use of ICT is amusing. The use of ICT is interesting.</td>
<td>0.819</td>
</tr>
<tr>
<td>Uniqueness</td>
<td>I use Information Technology to promote my personal image. I use Information Technology to enhance my uniqueness.</td>
<td>0.725</td>
</tr>
<tr>
<td>Personal Innovation</td>
<td>I like exploring new information technologies. When I hear about new technologies I like to learn about them. Among the fellow students I learn from the first about new technologies</td>
<td>0.709</td>
</tr>
<tr>
<td>Quality of Services</td>
<td>It is important that Information Technology is safe to use. It is important that ICTs are accurate and reliable. It is important for ICT to upgrade the quality of studies. It is important that ICT systems are fast, online and accessible. It is important that ICT services are easy to navigate and download.</td>
<td>0.828</td>
</tr>
</tbody>
</table>

The results of the students' answers, as means of each factor, are presented at Table 4. It was revealed that the students have the strongest positive view for the quality of services offered through ICT (average 3.99) while on the other hand they had neutral to negative view for the factor «Uniqueness» (average 2.55).
For the rest of factors, a slightly positive view is expressed (average between 3.18 to 3.65).

<table>
<thead>
<tr>
<th>Examined Factor</th>
<th>Mean value</th>
<th>Standard Deviation (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ease of use</td>
<td>3.19</td>
<td>0.7</td>
</tr>
<tr>
<td>Usefulness</td>
<td>3.56</td>
<td>0.67</td>
</tr>
<tr>
<td>Social influence</td>
<td>3.18</td>
<td>0.76</td>
</tr>
<tr>
<td>Entertainment</td>
<td>3.48</td>
<td>0.81</td>
</tr>
<tr>
<td>Uniqueness</td>
<td>2.55</td>
<td>1.85</td>
</tr>
<tr>
<td>Personal Innovation</td>
<td>3.20</td>
<td>0.82</td>
</tr>
<tr>
<td>Quality of Services</td>
<td>3.99</td>
<td>0.83</td>
</tr>
</tbody>
</table>

Due to the nature of the data and the results of the variance test Shapiro Wilk for normality (Shapiro & Wilk, 1965) for each one of the seven examined factors, in which the values of the statistics is between 0.912 to 0.972 with the corresponding p-value lower than 0.001, non-parametric controls were applied, with purpose to find possible differences of factors between demographic characteristics. Initially, we applied the non-parametric Mann-Whitney test for two independent samples (Pettitt, 1979), to find potential differences between males and females.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Gender</th>
<th>Mean value</th>
<th>Mean Rank</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ease of use</td>
<td>Male</td>
<td>3.1844</td>
<td>113.84</td>
<td>0.535</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>3.1901</td>
<td>109.78</td>
<td></td>
</tr>
<tr>
<td>Usefulness</td>
<td>Male</td>
<td>3.5106</td>
<td>106.28</td>
<td>0.204</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>3.6036</td>
<td>115.34</td>
<td></td>
</tr>
<tr>
<td>Influence</td>
<td>Male</td>
<td>3.1986</td>
<td>111.41</td>
<td>0.985</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>3.1693</td>
<td>111.57</td>
<td></td>
</tr>
<tr>
<td>Entertainment</td>
<td>Male</td>
<td>3.5177</td>
<td>114.52</td>
<td>0.442</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>3.4479</td>
<td>109.28</td>
<td></td>
</tr>
<tr>
<td>Uniqueness</td>
<td>Male</td>
<td>2.6755</td>
<td>120.32</td>
<td>0.043</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>2.4570</td>
<td>105.92</td>
<td></td>
</tr>
<tr>
<td>Personal Innovation</td>
<td>Male</td>
<td>3.5213</td>
<td>136.41</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>2.9538</td>
<td>93.20</td>
<td></td>
</tr>
<tr>
<td>Quality of Services</td>
<td>Male</td>
<td>3.8794</td>
<td>102.50</td>
<td>0.059</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>4.0677</td>
<td>118.11</td>
<td></td>
</tr>
</tbody>
</table>

The p-value from the Mann-Whitney t-test for two independent samples

We can observe that the factor “innovation”, meaning the exploration of new computer technologies, is considered to be more important for the males compared to the females. This difference of the two means is statistically significant (p-value< 0.001). We can point out similar behaviour for the factor “uniqueness” (p-value 0.043). We can also observe that the factor “quality” is more essential for the females. The p-value is lower than 0.1 that means that their difference is indicatively statistically significant. No significant differences are observed for the other factors. Then, we use the Kruskal-Wallis statistic test for two or more independent samples (Breslow, 1970), and we tried to spot possible differences concerning the above factors based on students’ different educational backgrounds. The results are portrayed in Table 6.

Table 6 shows that the for factor “ease of use”, students’ answers are significantly different (x²=7.203, df=2, p-value=0.027). Engineering students are
seemed to have the highest mean value, while the Economics students have the lowest. For the factor “use of use”, students’ answers are statistically significant different ($x^2=8.836$, df=2, p-value=0.012). Engineering students also seem to have the highest mean scores. For the factors “social influence” and “entertainment”, students’ answers are indicatively statistical different with the p-value between 0.05 and 0.1. Engineering students also show higher results.

In the factor “individuality”, students’ mean scores are statistically significant different, with the Economics students having the highest mean scores ($x^2=9.096$, df=2, p-value=0.011). For the factor “innovation”, students’ scores are statistically significant different ($x^2=7.512$, df=2, p-value=0.023). Economics students again indicate higher scores, with minor differences. Finally, no statistically important differences are observed for the factor “quality”.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Faculty</th>
<th>Average</th>
<th>Mean Rank</th>
<th>p-value (Chi-Square)$^1$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ease of use</td>
<td>Engineering</td>
<td>3.33</td>
<td>126.29</td>
<td>0.027 (7.203)</td>
</tr>
<tr>
<td></td>
<td>Agronomics</td>
<td>3.03</td>
<td>98.19</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Economics</td>
<td>3.16</td>
<td>106.48</td>
<td></td>
</tr>
<tr>
<td>Usefulness</td>
<td>Engineering</td>
<td>3.72</td>
<td>126.38</td>
<td>0.012 (8.836)</td>
</tr>
<tr>
<td></td>
<td>Agronomics</td>
<td>3.56</td>
<td>114.02</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Economics</td>
<td>3.43</td>
<td>97.46</td>
<td></td>
</tr>
<tr>
<td>Social Influence</td>
<td>Engineering</td>
<td>3.24</td>
<td>121.72</td>
<td>0.079 (5.088)</td>
</tr>
<tr>
<td></td>
<td>Agronomics</td>
<td>2.97</td>
<td>96.17</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Economics</td>
<td>3.25</td>
<td>111.50</td>
<td></td>
</tr>
<tr>
<td>Entertainment</td>
<td>Engineering</td>
<td>3.64</td>
<td>124.83</td>
<td>0.054 (5.821)</td>
</tr>
<tr>
<td></td>
<td>Agronomics</td>
<td>3.42</td>
<td>109.12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Economics</td>
<td>3.37</td>
<td>101.54</td>
<td></td>
</tr>
<tr>
<td>Uniqueness</td>
<td>Engineering</td>
<td>2.38</td>
<td>101.60</td>
<td>0.011 (9.096)</td>
</tr>
<tr>
<td></td>
<td>Agronomics</td>
<td>2.37</td>
<td>99.69</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Economics</td>
<td>2.79</td>
<td>126.57</td>
<td></td>
</tr>
<tr>
<td>Personal Innovation</td>
<td>Engineering</td>
<td>3.28</td>
<td>116.59</td>
<td>0.023 (7.512)</td>
</tr>
<tr>
<td></td>
<td>Agronomics</td>
<td>2.88</td>
<td>90.50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Economics</td>
<td>3.30</td>
<td>119.05</td>
<td></td>
</tr>
<tr>
<td>Quality of Services</td>
<td>Engineering</td>
<td>4.12</td>
<td>119.86</td>
<td>0.147 (3.840)</td>
</tr>
<tr>
<td></td>
<td>Agronomics</td>
<td>4.03</td>
<td>116.19</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Economics</td>
<td>3.85</td>
<td>101.76</td>
<td></td>
</tr>
</tbody>
</table>

$^1$The p-value derives from the Kruskal-Wallis test for more than two independent samples

5. Discussion and Conclusions

The purpose of this research was to investigate and measure the effect of demographic characteristics and faculty on the intention of use of ICT by students and the measurement of differentiating intention of use based on various factors such
as the ease of use, usefulness, social influence, uniqueness, innovation and quality of services.

There has been an analytic study about the issue of the study, in which has been shown the significance placed by the researchers towards the study of the factors that affect the use of ICT. The use of ICT has constituted a phenomenon of the last decades worldwide with multiple consequences. The study examined the above through a primary study with the use of questionnaires addressed to students of higher education. No participation criteria were applied, except of their student’s attribute. Statistical results tend to approach and confirm previously conducted relevant research about this issue. In conclusion, research findings are significant and can be considered and used for further research, concerning the issue of ICT use.

This research could not be considered complete, since the sample size is small and regards to a specific area. Future deeper research will help approach the issue with greater accuracy for better results. The sample of respondents must be consisting of many different universities. Also, there should be a second questionnaire for instructors. A causal model will be adopted which will explain the factors which affect the intention to use. A confirmatory factor analysis will be performed in the model. All in all, ICT is a look into the future, while at the same time being the typical reality of students’ everyday life.

References


Teacher burnout – the problem in higher education and some directions to solve it

Anabela Mesquita¹, Ilgiz Sinagatullin²

¹ Polytechnic of Porto, Institute of Accounting and Administration, Portugal
² Birsk Branch of Bashkir State University, Birsk, Russian Federation

abmesquita@gmail.com
siniledu@gmail.com

Abstract: The article examines some issues of teacher burnout. Within the previous two decades this problem has been at the centre of attention not only in secondary schools, but also among the academic circles of higher institutions in many countries. Representing a gradual painful process of continual stresses, burnout may end with an ultimate physical and psychological exhaustion. Burnout is a threat to the entire systems of education, including working teachers, teacher educators as well as a wide range of higher school lecturers and instructors. In addition to theoretical questions, the study is based on the results of the survey conducted among a group of university teachers in Portugal and Bashkortostan (an autonomous republic in Russia). Lastly, the study presents some recommendations to higher authorities, institution administrators, and working educators on how to avoid teacher burnout.

Keywords: Teacher burnout, stress, factor, Portugal, Bashkortostan, exhaustion, education, higher school, the teaching profession, professional activity.

Teachers give a lot—and get too little in return.
Eric Gaillard

1. Introduction

Even though we all live in an age of globalization and technology boom (Mesquita & Peres, 2015; Mesquita, 2017; Sinagatullin, 2013; “The teacher burnout epidemic,” 2016), we experience tides of regression in some other spheres of professional activity and life, including also the domain of teaching. One of the “sores and weak places” of this profession is teacher burnout. Burnout is a gradual painful process of continual stresses, which may end with an ultimate emotional and physical exhaustion. Stress occurs when an individual’s demands exceed his resources; when it happens, the latter begins to trigger stress responses. Burnout presents a huge dilemma for working teachers, teacher educators, and a wide range of higher school lecturers and instructors. In fact, it is a threat to the entire
systems of education. Burnout poses a challenge to teachers, especially in higher education. It is important to identify and understand the factors triggering burnout in order to minimize their impact and, if possible, to prevent them. It is also crucial to verify if this burnout is the same across countries or if the triggering factors vary depending on the requisites of the profession or even the culture. Taking this into consideration, a cross-cultural research was carried out in Portugal and Bashkortostan (an autonomous republic in Russia), and in this paper we present the results. Thus, the paper is organized as follows: first we introduce some theoretical prerequisites concerning burnout and then we describe the study. We identify the major causal factors and provide some recommendations in order to help teachers to correctly deal with this situation.

2. Some Theoretical Prerequisites

Within the previous 40 to 50 years teacher burnout has received a global attention. Maslach and Jackson (1981) claim that the category of burnout includes at least three major variables: emotional exhaustion, a feeling of emptied emotional resources; depersonalization, when a person distances himself from others and feels that his feelings and ideas are not important, and a low sense of personal accomplishment, when an individual devalues his work. When teachers begin to experience a continual state of fatigue, anger and irritability in working with students, feelings of helplessness, when they start engaging in conflicted relationships with colleagues, maintaining a negative attitude towards schooling, then, it becomes clear that these manifestations are the warning signs of the emerging burnout. Other signs are withdrawal from colleagues, a declining sense of professional importance, feelings of meaninglessness of the teaching activity, absence of motivation and commitment to teaching, and health problems such as hypertension, insomnia, chronic bronchitis, asthma, and diabetes.

Huston (1989) underlines that a series of stressful situations may lead to depression common signs and symptoms of which are a loss of interest in activities one enjoyed previously, feelings of worthlessness and helplessness, a desire to escape to some unknown place, easy irritability, and thoughts about committing suicide. Huston postulates that Protestant teachers are more depersonalized than Catholic teachers, and teachers in their 40s are more depersonalized than younger and older groups. Men are believed to have greater burnout than women. Traditionally through the year’s women have nurtured children and have much more interpersonal relationships with them in general (Maslach & Jackson, 1981). Married teachers burn out less frequently than single teachers, elementary school teachers—less than middle and high school teachers, and religious teachers—less than non-religious ones.

Pillars (2014) identifies at least four visible indications of burnout: (1) exhaustion, a fatigue so deep that there’s no way to turn it off, no matter how badly a person wants to; (2) extreme graveness, an existence without smiling or laughing for hours or days; (3) anxiety, a constant, nagging feeling that an individual can and should do more, while simultaneously realizing he needs to
unplug and spend more time with his family; (4) isolation that means a person wants to head for the deepest, darkest cave where no one will see his vulnerability, a place where his limits are unseen and unquestioned and all is quiet.

Short periods of intensive work resulting in success and acknowledgement rarely lead to burnout, chronic stress does. It undermines an educator’s self-worth, reduces the sense of accomplishment, and uses up emotional resources. Chronic stress builds a wall between an individual and the professional environment that could otherwise energize him and provide the support he needs. All this represents a vicious circle: the more serious is the burnout, the stronger the isolation becomes. The chances of reintegrating into a healthy professional context diminish as a result.

In addition to the teaching profession, burnout often affects people in other helping professions such as lawyers, doctors, social workers, and managers (Enyedi, 2015).

Sadly, not only after each academic year but virtually every school day tens of thousands of teachers across the world change schools or completely leave the field of education to seek a better job. Some young people with teaching certificates never begin teaching, knowing beforehand about the strenuous conditions in which some practicing teachers find themselves. Continuous stressful situations coupled with other negative determinants make educators view the teaching profession as an extremely nerve-racking and back-breaking occupation. Such a situation forces a considerable number of educators on both sides of the Atlantic change their attitude to their chosen work. For instance, according to the OECD’s international TALIS study, which surveyed around five million teachers in 34 countries, only 34% of American teachers consider teaching as a respected profession (Crowell, 2017).

3. **Survey Results: Portugal vs. Russia**

Today the problem of burnout often occurs among the teachers in higher institutions, also including teacher education institutions. As a matter of fact, today’s demands in higher education are contributing for teachers at this level to feel more and more stressed, with the sentiment of not being able to cope with all the challenges, and thus facing burnout. The reasons for this scenario may vary from situation to situation and even from country to country.

What is Burnout triggered by? Are those causal factors the same across countries? In order to answer these questions, we researched university teachers from two countries: Portugal and Russia. To gather data, we used interviews, hoping that this tool would allow us to get more information about the causal factors and about the burnout itself as we wanted to understand the whole phenomenon. We interviewed a number of university teachers from Portugal and northern Bashkortostan (Russia) by addressing them with the question: «Could you name some causal factors that may spark and give rise to teacher burnout? »

Before moving to the presentation of results, it is necessary to say that in Portugal, a teacher in higher education must perform tasks and duties covering three areas – pedagogical field (teaching, preparing materials, assessing students,
organizing pedagogical activities, etc.), scientific field (researching, publishing in indexed journals, participating in scientific events, collaborating with other researchers both from their country and other countries, organizing scientific events and doing extension activities such as events for the industry, collaborating with the industry etc.), and management field (participating in the management activities of the institution like working in committees and working groups, etc.). Teachers have their performance assessed every 3 years and so they need to obtain points (perform tasks) in all the mentioned areas in order to progress in their careers. Failing to do so may mean not advancing in the career and eventually being fired.

In Portugal, we interviewed eight educators from the higher education system. The results show that the factors causing burnout can be divided in two big groups – intrinsic and extrinsic. Intrinsic factors are related to the educator. These concern the personal demand the educator assigns to herself or himself, the lack of self-motivation, the lack of recognition of the work done, the fear of failure, the anxiety due to external circumstances, not being able to balance personal and professional life and not being able to compartmentalize. Obviously, it is possible to say that some of these factors are not the source of burnout per se but the result of the external conditions in which the educator lives.

Extrinsic factors are those that emerge in the environment where the educator works. We identified two big groups within this one – the factors provoked by the system itself (these can be originated in the central government or legislation) or by the way the institution decides to organize the work (internal administration). Of course, one can say, ultimately, that the way the institution organizes itself is a consequence of the legislation of the policies of the government. For instance, the decision to cut the budget of a higher education institution can have consequences in the number of faculty members and then in the number of students per class or number of different units a lecturer instructs. Anyway, the factors listed by the teachers were:

- Four areas of intervention (four responses). Teachers must perform tasks covering four main areas – pedagogical, scientific, management and extension. Tasks can be lecturing, department management, managing a journal, researching, writing, supervising students, internships, taking care of Erasmus students, just to name a few. So many areas to cover means not much time left to dedicate to each one. Moreover, it can be difficult for a teacher to reconcile lecturing and researching activities. Knowing that at the end of a 3-year period the teacher will be assessed in all the areas, and being aware that the time to dedicate to each area is reduced, causes a lot of stress and the teacher has always the feeling of not performing well in any field.

- Excessive bureaucracy (four responses). This issue is usually related to the demands of the central government (each year legislation demands more and more things from the teachers) or the institution. As one teacher said, “These days there is more paperwork, more forms to fill in”. And this administrative work is not supported by the institution. There are more and more areas to cover, with more strict deadlines. For teachers it sounds like if they were in a race.

- Absence of sabbatical leave (four responses) to upgrade knowledge, do research and prepare papers to publish in indexed journals. One teacher complained that there
is no sabbatical leave in her institution although such a possibility is contained in the law. In fact, this situation requires the institution to hire someone to replace this teacher or distribute the classes among other teachers. As said above, budget cuts are forcing institutions to fire teachers, to increase the number of students per class and to reduce the number of classes. And of course, this means that there is no budget to cover the costs of someone during a sabbatical leave.

- Big classes and students’ inappropriate behaviour. As said before, the cuts imply bigger classes, with more students. There are situations where a practical class/laboratory can have more than 80 students. This can lead to disturbances in the class and students’ inappropriate behaviour.

- Too many curricular units to teach. Again, this is related with the cuts in the budget. As explained, the cuts imply reducing the number of teachers and forcing those that remain in the system to prepare and lecture more curricular units (more material to learn, more classes to prepare, more students to correct and assess. All these and related factors lead to exhaustion.

  As for Bashkortostan, higher education teachers perform their main work – pedagogical (teaching, preparing materials, evaluating students’ academic activity, organizing pedagogical activities), research and scientific work (preparing articles and monographs, participating in local and international conferences), social activities (preparing and organizing social activities with students). Like in Portugal, higher school faculties in Bashkortostan must fulfil approximately the same objectives as their Portuguese colleagues.

  As in Portugal, in Bashkortostan we also interviewed eight teachers from the higher education system and addressed them with the same question. Equally, the results can also be divided into two groups – intrinsic factors and extrinsic factors. The intrinsic factors embrace such categories as the fear of failure, lack of motivation from the work performed because some students themselves lack interest in academic activities. Huge academic load is another factor reducing motivation and creating misunderstandings between professional activity and personal life. The extrinsic factors are greater in number and they inevitably make a negative impact on educators. Six teachers named excessive bureaucratic intervention as one of the main factors hindering their professional activity. Five respondents named insufficient salary as a factor. All the interviewees are not satisfied with a huge paper-pushing activity. Three educators pointed out the emergence of too many subjects that they should teach, which in turn requires more time to prepare classes.

4. Major Causal Factors

Our personal longitudinal observations, the results of this survey as well as numerous studies indicate that the causes bringing about the symptoms of an educator’s emotional and physical exhaustion are great in number. Among them we can mention just a few assumptions.

  *Socio-political factors.* The general atmosphere of social and political unrest, especially when an unstable situation takes on a lingering form, inevitably makes an unfavourable impact on higher education teachers and the whole domain
of education. Socio-political metamorphoses may bring about a wave of incessant reorganizations of the goals and strategies of teaching, various changes in the content of textbooks and other teaching materials, and an atmosphere of professional uncertainty, personal uneasiness, and suspense. In some countries, urgent problems lying outside higher education make federal and local authorities reduce efforts and cut estimated expenses, thus “neglecting” the vital needs of educators and teacher educators. Such is the case not only in the system of higher education but also in the state-dependent social and economic sectors. As Maher and Tetreault (1999) indicate, since the mid-20th century, a strange and atypical tendency had started taking shape. Even in higher institutions where teacher education is important or central to the institutional mission, teacher education began to look like a subordinate objective. This trend may be illustrated by the California State University, which was originally a system of normal schools. These schools became comprehensive universities in the 1950s by minimizing their teacher-training function and expanding other programs, thus seeking to ameliorate their position in the hierarchy of higher education This "vogue" is now taking a new turn across the Russian Federation. As the enrolments in teacher education institutions are not very high, a great number of such institutions "squeeze" and supersede teacher education programs. Instead they open programs targeted at preparing people for technical professions.

Economic factors. It is quite understandable that the quality of the functioning of the overall system of education and related variables is largely dependent on a society's overall socioeconomic development. Institutions ranging from secondary schools and on to universities are the places “through which all citizens of the world pass,” i.e. all people having been born to this world study at school and then, possibly, he or she enters a higher institution. To make it short, every young girl and boy should study at an educational institution. Teaching is the most essential profession on the surface of Plane Earth.

Some educators complain in complete accord about experiencing a secondary status in society. One of the main causes of this inferiority complex is low pay. For instance, the educators we held an interview within Bashkortostan are unanimously dissatisfied with their salaries. Teachers may have quite a positive image and prestige in society but earning little money immediately decreases this prestige. Insufficient salary represents not only a major factor diminishing the status of education but also a cause considerably aggravating teachers’ motivation to professional activity. An unjustifiably low pay also contributes to a declining sense of professional importance. Dissatisfaction with the salary is one of the main factors making educators leave the profession in schools and higher institutions to find another job; the same factor prevents some young graduates, for example, graduating from teacher education departments, from entering the profession.

Rigid and systematic control. Every teacher in higher education is known to be striving to become a professional worker to bring his or her contribution to the sacred matter of educating the young. But teachers’ professionalism and expertise are often challenged by systematic, unexpected and, oftentimes, unfair control by administrators and ministerial officials. When the administration puts pressure on teachers, it can be quite a discouraging announcement. Besides the pressure, lack of support can lead to frustration as well.
Sometimes a supervision and accreditation control represent an unfair and prejudiced practice, and such practices make a devastating impact on the whole university environment, including students. Some accreditation practices end with calamitous consequences. An institution may be closed or consolidated with some other institution, and some educators may immediately become unemployed. The students may be distributed among other educational institutions. Frequent and rigid administrative and supervisory practices constitute a considerable and painful blow on a teacher’s emotional and physical state and self-esteem.

**Working conditions.** Unsatisfactory working conditions represent a salient factor contributing to teacher stress and burnout. Across the world, school and university teachers work in different working environments. Even in the economically developed countries their working conditions may differ. Some urban school and a large-size university may enjoy all necessary conditions for occupational safety and health, whereas in some isolated and remote rural school and a small-size university the work environment may be poles apart. In the northern hemisphere, working conditions for teachers and the learning environment for students may be called relatively favourable, whereas in most of the southern countries, much should be done to improve the situation.

When a working person is satisfied with his everyday activity, he often shares his insights with his colleagues in the institution’s premises. When one or several educators “bring their stress” to the institution and start engaging in an unpleasant conversation with others, they begin infecting the overall professional aura of the institution. As Enyedi (2015) assumes, a burned-out teacher may affect others; therefore, burnout is not only an individual problem. Continual complaints and discontents, not getting involved in activities going on around them – this way of behaviour can become accepted, influence others and eventually come to define the climate of the institution.

**Unnecessary paperwork.** Contemporary educators are burdened with excessive paperwork, as was mentioned by the interviewees. Paper pushing is based on “strict” hierarchical criteria, with each bureaucratic layer checking a lower layer and with a single teacher as the last one to endure the entire nightmare. It means that both the administration and higher authorities keep teachers busy with paper-making chore, leaving less time for teaching and interacting with students. Retired teachers unanimously acknowledge that in the years long gone into history they had not spent so much time on preparing various pieces of documentation and on discharging unnecessary duties. Systematic and unnecessary paperwork makes a negative impact on an individual’s self-esteem, pride, and, undoubtedly, on the condition of body and mind. Not without reason, it is excessive paperwork that the overwhelming majority of teachers we solicited input from are not satisfied with.

**“Testing nightmares.”** One of the difficult problems plaguing higher school teaching personnel is testing, which is an equal woe for schoolteachers and pupils at their charge. Testing creates numerous stressful situations. Some teachers start working just for the sake of a future testing, ignoring the curriculum requirements aimed at providing learners with a good quality of knowledge and
skills. This new wave of test-based teaching or, in other words, “test insanity” has become a normal practice in many educational institutions across the world.

The high pressure and demands of testing have been criticized by the educational public within the previous decades. Apparently, educators are not against testing, they are against an inordinate pressure on testing to the detriment of other instrumental strategies of assessment.

**Student management factors.** When students lack motivation and are unwilling to learn, this can become very trying on a teacher. As interesting and motivating lectures and seminars are, disciplinary problems may arise. It is universally known that there is a close linkage between group control and teaching. The more a faculty member is involved in the active process of teaching and the more students are actively occupied with cognitive activity, the fewer problems may arise with discipline and so on. Conversely, the more able he in handling discipline, the easier may be the process of teaching-learning activity. Other things being equal, continual problems with discipline gradually affect a teacher’s professional activity and personality and often lead to physical and moral exhaustion.

**Professional factors.** A low level of education a young faculty member receives at college or university may be a factor engendering stressful situations and eventually destroying his career. Equipped with inadequate modes of teaching and interacting with students, low-achieving lecturers and instructors, sooner or later, may find themselves in a difficult situation and their profession may become a burdensome activity for them. The roots of a weak competency of young educators may be hidden in two causes. Some teachers in higher education are reluctant to become good specialists, but they do not reject their profession. Others exert efforts but their cognitive and intellectual potential do not allow them to become high achievers.

The above-mentioned factors portray only a small file of constituents igniting professional burnout. The list may be longer. For example, constant stressful and frustrating situations may be triggered by personal and psychological causes. For instance, a teacher-perfectionist boasts extremely high expectations, thus believing that anything less than ideal and perfect is unacceptable. Perfectionists continually criticize themselves and others and, by blaming themselves and being constantly unsatisfied with their own work, they may eventually damage their nervous systems. Also, educators are susceptible to a wide range of professional diseases. Among them are chronic bronchitis, blood pressure, headaches, and insomnia. Educators often get colds and the flu because of frequent contacts with a great number of students and faculty.

5. **Recommendations**

Our discussion of the issues of burnout thus far leads to the following important implications for higher authorities, institution administrators, and working educators. **National and regional efforts.** Every nation and regional confederacy (the European Union, for instance) should build a foundation for enhancing the role and
status of education in society. As a tremendously multifaceted organism, any country possesses lots of possibilities to improve the current state of higher education, raise educators’ salaries, and improve their working conditions. Governments and public at large in each country should have a transparent understanding that education is a stronghold of statehood and a foundation for the further progress of each country.

**Financial investments.** The situation when governments allot just the crumbs from the master’s table for the needs of education should be changed. Education in general and the teaching profession in particular must become a priority for state investments. It goes without saying that educators’ salaries should be raised accordingly. Oligarchs and businessmen also need to have a more profound understanding of the importance of investing in education.

**Fair supervision.** It is high time to rethink the very essence of teacher’s supervision and evaluation. The supervision and evaluation of the work of university educators should be conducted fairly. Instead of drawing all the attention on teachers’ flaws and on punitive conclusions about their work, on how they prepare their plans and documents, administrators and ministerial inspectors are required to render necessary assistance to college and university educators. The issues of education need a delicate and subtle handling. Education is an occupation in which a rigid outside interference is inadmissible.

**A favourable working environment.** Administrators are expected to promote and maintain the highest degree of occupational safety and healthful atmosphere for the teaching personnel. It becomes necessary to protect educators in their place of employment from various risks such as temperatures, dilapidated buildings that can cause harm to people, excessively long working hours, and administrative pressure. In other words, the professional activity of educators should be protected from psychological (overwork and violence), mechanical (collisions and falls from height), physical (electricity and noise), biological (virus and bacteria), and chemical (acids, noxious gases, explosion, and conflagration) hazards (“Occupational safety and health,” 2011). Initiating and valuing innovations, rationalizing administrative duties, creating a good atmosphere for educators to share ideas and learn from each other, encouraging professional co-operation - all these initiatives are worth considering (Enyedi, 2015).

**Favourable relations in the family.** An educator, never minding in what type of educational institution he or she works, spends most of his time in the circle of the spouse, children, and, probably, in the assembly of the extended family. Strained relationships with the spouse and children and other disagreements immediately impact the professional work of the educator. Conversely, a key determinant adding to his successful professional activity at the institution’s premises is maintaining an appropriate climate and relationships in the family circle.
6. Conclusion

When a person is in a prolonged state of emotional breakdown or feels an approaching depression, it is better to focus attention off the condition that nags the person. We recommend an educator to find an interesting theme for conversation with some other people (colleagues, spouse, children, or neighbours); visit a place that renews; participate in sports; do physical exercises; view a good movie or listen to mild, soothing music; or read some religious material. Reading a good book or viewing a documentary on how to combat stress and a depressive state will inevitably help.

It is educators’ obligation to take control of their own burnout. But society can also do a lot more to show educators - and people in other high-burnout professions - how much we understand the value of their work (Crowell, 2017). Getting burnt out is a gradual process; it does not happen overnight. We should become more aware of the reasons that may eventually cause it, then we can extinguish the flame before it evolves into a smouldering fire.

References

EDITOR-IN-CHIEF

Teresa Paiva,
UDI – Instituto Politécnico da Guarda, Portugal

SCIENTIFIC COMMITTEE

- Anabela Mesquita
  CICE – ISCAP/IPP, Portugal

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