Dear Reader,

The unique theme of this year's third issue of **Opus et Educatio** is the importance of soft skills in the labour market and education's response to this growing demand in the 21st century.

The first study of our recent issue, written by ***Ildikó Holik*** and ***Dániel István Sanda***, presents their research in technical higher education, which aimed to map the competencies of engineering informatics students and determine development opportunities. Courses that focus on self-knowledge and self-esteem and the development of cooperation, adaptation, confidence-building, and empathic skills were rated as extremely important. Cooperative methods, collaborative learning, project method and problem-based learning also play a fundamental role in higher education. ***Helena Manojlovic***'s study presents a self-developed method for advancing soft skills. This method is the educational escape room, which offers a new learning opportunity that enhances learning with engaging experiences, and in parallel, evolves soft skills through solving complex problems. Applying critical thinking and problem-solving skills is essential, and lack of time encourages students to collaborate. Finally, ***Zsófia Kocsis*** writes about students' part-time work related to their studies to gain exceptional professional experience and relationships. However, even work not related to the studies may develop skills and abilities.

Agnes Fazekas, Tibor Baráth and ***Tamas Kersanszki*** presented theoretical models created during their student organization research. The interviewed teachers and leaders are typically satisfied with the quality and effectiveness of pedagogical work in their school; the most advanced learning organization dimensions are shared goals, vision, risk-taking and innovation willingness. Knowledge-focused leadership, responsibility, collaboration, knowledge sharing is missing. ***György Molnár*** highlights in his study that teaching effectiveness also depends on teachers knowing when to use digital technology and when to stick to traditional methods. In the recent pandemic, the technological challenges have been replaced by pedagogical and methodological challenges during online education. This required the long-term preservation of crucial competencies, highlighting understanding, patience, resilience, collaborative thinking, working together online, and maintaining a cooperative perspective. Ottília Fülöp presents student feedback, suggesting that university mathematics courses can be efficiently transformed into a digital format. A surprising result of their research was that students felt communication with the instructor was more direct and closer during online learning than in face-to-face classes with the same instructor.

In the world of work section of our recent issue, two topics are displayed. First, ***Monika Pogatsnik*** reviews the purpose and benefits of dual training and shares first-hand information on practice and training sites. Bringing the world of trainers and the world of work closer together can increasingly meet the economic challenges of the 21st century. In addition to professional knowledge, the on-the-job practice provides an additional opportunity to develop soft skills that are highly valued by employers nowadays. These skills can best be developed during activities, e.g., communication skills, cooperation skills, networking. ***Judit Módné Takács*** points out that the development of soft skills positively affects security awareness and expected competencies in today's job market. Additionally, cybersecurity as a competency has grown into a 21st-century, essential, scalable skill. Therefore, new training methods, systems and measuring systems are required considering different skills, ages and generational characteristics, improving safety awareness attitude.

In the consciousness section of our recent issue, you can read about a unique country, Myanmar, and the role of teacher education in the curriculum reform of primary education since 2010. Whether the new curriculum in basic education can be implemented remains in question in the current political situation. For the future generations of Myanmar students, humanitarian aid from the international community should continue to support curriculum improvements.

In the Project section, we present the ***OPENSSL Project***. In the framework of the innovative project, partners from Hungary, the Netherlands, and Malta collaborate to create three Massive Open Online Courses (MOOC) for higher education students developing social-emotional skills that are highly relevant for employability: presentation skills, teamwork, stress management skills.

In the review section, ***István Simon*** reports the release of the first volume of a new series, the Vocational Training Pedagogical Scientific Publications (Szakképzés-Pedagógiai Tudományos Közlemények) edited by ***András Benedek***. The aim of the volume, including 16 studies, is to present research results arousing the interest of other researchers, initiate further scientific discussions and research activities.

As the guest editor of this issue, I hope that by focusing on a timely and interesting topic to our readers, in addition to professional exchange and practical use, we have also provided an incentive for further empirical.

Budapest, September 2021

Monika Pogatsnik

Guest Editor of this Issue

Ildikó HOLIK – István Dániel SANDA

Opportunities for the Development of Soft Skills in Engineer Education

Soft skills in higher education

The technological development of the 21st century and the constant changes in the labour market pose new challenges for higher education. Rapid changes lead to a change in attitudes in higher education (Wolhuter, 2020). It is becoming increasingly important for students to acquire up-to-date, theoretically grounded and practical knowledge that will enable them to stand their ground in the world of work and everyday life. Thus, one of the critical goals of higher education is to prepare students for successful work. This can be done by developing hard and soft skills at the same time.

The term complex skill is used for knowledge that can be acquired in school from textbooks. "The development [of hard skills] is well measurable, verifiable, and their evaluation system is in place. The acquisition of these general and professional knowledge and skills determines the rules and routines for students that prescribe what to do and how to act in different situations. Employers can easily gain information about these skills (e.g. qualifications, language skills, numeracy, computer skills)." (Daruka, 2017: 10)

Soft skills are often defined in terms of "those skills, abilities, and personal attributes that can be used within the wide range of working environments that graduates operate in throughout their lives" (Fraser, 2001:1).

Soft skills are classified in various ways in the literature:

- For example, Bennett et al. (1999) identified four main categories: self management, information, others and tasks.
- Gallivan et al. (2004) name six categories: communication, interpersonal, leadership, organization, self-motivation and creativity. According to their research, these appear in 26% of online job advertisements.
- Beard et al. (2007), based on surveying 250 employers, mention 13 different soft skills expected by employers. These include communication, analytical, teamwork, interpersonal and organizational skills, motivation, flexibility and detail orientation. (Kolosai – Bognár, 2007.)
- Chamorro-Premuzic et al. 15 identified a system of soft skills comprising 15 components: "self-management, communicational, interpersonal, team-working skills, the ability to work under pressure, imagination/creativity, critical thinking, willingness to learn, attention to detail, taking responsibility, planning and organizing skills, insight, maturity, professionalism and emotional intelligence." (Chamorro-Premuzic et al., 2010: 223)
- Schulz named the following soft skills: "communication skills, critical and structured thinking, problem-solving skills, creativity, teamwork capability, negotiating skills, self-management, time management, conflict management, cultural awareness, common knowledge, responsibility, etiquette and good manners, courtesy, self-esteem, sociability, integrity/honesty, empathy, work ethic, project management, business management". (Schulz, 2008: 147)

The development of hard skills is prominent in the training program of higher education institutions, but less conscious effort is dedicated to the development of soft skills. However, these two sets of skills are complementary; they are both critical and "their synergy can ensure more effective learning-teaching processes in higher education, thus increasing the efficiency and quality of education" (Daruka, 2017: 10).

In engineering education, a crucial question is the abilities and skills that are important for an engineer in a rapidly changing information society. (Conlon, 2008; Lappalainen, 2009; Williamson et al., 2013). There is a growing demand for flexible, adaptable and communicative engineers (Kolmos, 2006). In addition, employers expect newly-graduated engineers to have professional knowledge and qualities such as problem-solving (Pogatsnik, 2019), openness and creativity, treating people well, and working in a team (Kersánszki – Nádai, 2020).

Engineers must collaborate with other engineers, their employees, marketing and financial professionals, traders, many other corporate employees, and representatives of other companies, foreign partners, and even communicate with users (e.g., when presenting products) (Bajzát, 2010). Soft skills provide the basis for the effective handling of problem situations (Schulz, 2008).

Engineering education focuses primarily on developing professional competencies and technical skills and does not adequately prepare students for the demands of the workplace. For example, Schomburg (2007) draws attention primarily to the lack of social, communicative and personal competencies. Other studies highlight the importance of interpersonal skills concerning engineering work (Direito et al., 2012; Berglund - Heintz, 2014) and emphasize the need to rethink the "traditional pathways" of engineering education because of technical innovations and to develop competencies that meet the expectations of the labour market.

According to the research results of Williamson et al. (2013), the engineers surveyed differ from the research subjects of other occupations in that they have more intrinsic motivation and are more persistent. However, they are less characterized by qualities such as confidence, conscientiousness, emotional stability and optimism.

Other studies (Lappalainen, 2009; Direito et al., 2012) also draw attention to the weaknesses of engineers: they have difficulty in effectively communicating, collaboration, teamwork, project management and lifelong learning.

A survey conducted among students of Linköping University in Sweden pointed out that engineering students had significantly lower levels of empathy than psychology and social worker majors. Differences were also found among engineering students: applied physics students performed worse than engineering informatics students. These results also indicate the need to develop engineering students' empathic skills. (Rasoal et al., 2012)

About the research

Our research among engineering students has also drawn attention to the need to develop soft skills. The research aimed to map the competencies of engineering informatics students and to consider development opportunities.

Our research questions were the following: What are the personality traits of students entering engineering informatics education? How can students' competencies be developed during engineering education?

475 first-year engineering informatics students were surveyed, 9.1%- of whom were female, and 90.9% were male. This ratio is not surprising, as the proportion of women in this field is relatively low.

The average age of respondents was 20.15 years. The youngest student was 18 years old, and the oldest one 35. The majority of surveyed students are from the capital (37.3%). 11.8% of them come from county seats, 33.1% from small towns and 17.9% from villages. 42.74% of students started their studies in the engineering informatics major after graduating from secondary school.

The Hungarian version of the Big Five Questionnaire (BFQ, Caprara et al., 1993) examined students' personalities (Tordai – Holik, 2018a; 2018b). This personality testing tool includes 5 dimensions and 10 subscales, as well as a social desirability scale, which shows how much respondents want to portray themselves in a positive way (Table 1). Students rated 132 items on a 5-point self-assessment scale.

Table 1. *Factors, sub-scales and sample items of BFQ*

Dimension	Sub-scale	Quality
Energy lively, extroverted, captivating	Dynamism	dynamic, active, talkative, enthusiastic
	Dominance	dominant, high self-confidence, confident
Friendliness helpful, understanding, tolerant	Cooperativeness	cooperative, sensitive to the needs of others, empathic
	Politeness	polite, kind, humane, well-meaning, obedient
Conscientiousness responsible, neat, diligent	Scrupulousness	accurate, precise, reliable, orderly, thorough
	Perseverance	persistent, steadfast, able to carry out activities
Emotional Stability balanced, calm, patient	Emotion control	able to master own emotions, cope with anxiety
	Impulse control	able to master own impulses (manage anger and irritability)
Openness creative, imaginative, well-informed	Openness to culture	open to cultural experiences, cultural interest
	Openness to experience	open to new experiences and values, customs and ideas different from own

When examining the reliability of the questionnaire, the Cronbach's alpha was 0.86, which is considered good. Based on the data, the personality characteristics of the interviewed students were outlined (Table 2).

Table 2. *Means and standard deviations (SD) of engineering informatics students on five personality factors and the social desirability scale compared with the Hungarian norm group (N=475)*

	Engineering informatics students Mean (SD)	Hungarian norm group (N=774) Mean (SD)
Energy	74.87 (12.06)	77.51 (11.85)
Friendliness	78.40 (10.09)	82.25 (10.09)
Conscientiousness	81.89 (10.80)	81.34 (11.11)
Emotional stability	73.03 (12.59)	68.60 (15.83)
Openness	79.55 (11.11)	85.52 (6.88)
Social desirability	**34.17 (5.45)**	29.54 (6.88)

Compared to the results obtained during the domestic adaptation of BFQ (Rózsa et al., 2006), we obtained lower scores in the Energy, Friendliness and Openness dimensions, which were close to average in the Conscientiousness and higher in the Emotional Stability dimensions. The surveyed students also scored higher on the Social Desirability Scale, suggesting that they would like to present themselves more favourably.

We interpreted the results both in the high and low zones of each dimension (Table 3).

Table 3. *Distribution of the sample in the low, average and high zones of BFQ dimensions (N=475)*

BFQ Factors	Low	Average	High
Energy	37%	41%	22%
Friendliness	34%	43%	23%
Conscientiousness	23%	44%	33%
Emotional stability	20%	44%	36%
Openness	54%	33%	13%
Social desirability	2%	35%	63%

Converting the raw points to a standardized T-value, the averages achieved on each main scale were classified into low, average and high categories. (T<45: low, 45<=T<=55: average, T>55: high).

The majority of students achieved an average or low value in the Energy Factor. That is, they are less dynamic and communicative, have low self-confidence, are more deliberate, withdrawn and prefer working independently. This dimension suggests weaker social skills.

Regarding the Friendliness factor, they also achieved average or below results, which suggests that they are less characterized by tolerance, empathy, helpfulness and selflessness; therefore, they are presumably less suitable for teamwork and cooperation.

In the Openness dimension, the vast majority scored low, indicating adherence to familiarity, rejection of change and innovation, less original and creative thinking and a lack of interest in the arts and sciences.

However, average or high results were achieved in the dimensions of conscientiousness and emotional stability. This means that they are characterized by reliability, perseverance, accuracy and responsibility, as well as being balanced, calm, and patient. These personality traits are indispensible to engineering work.

Strikingly many respondents achieved a very high score in terms of Social Desirability, which means that they wanted to present a positive image of themselves and meet expectations to a great extent.

Opportunities for the development of soft skills

In technical education, just like in other areas of Hungarian higher education, “traditional”, frontal and knowledge-based teaching is widespread. This form of teaching actually works better in groups with more homogeneous abilities, where the students’ work pace, way of thinking and knowledge are on a similar level.

Its disadvantage is that it cannot take into account the students’ individual abilities and skills. It is not interactive, so it is not suitable for the development of several abilities. However, the labour market demands more and more applicable skills from recent graduates, and students also increasingly demand active and interactive, learner-centred teaching, which enables them to cooperate and use technology (Bates et al., 2017).

In technical education, the psychological order of cognitive processes plays a prominent role: sensation, perception, attention, memory, imagination an thinking. Most of the time in education, however, due to the lack of time, of human resources or of tools, the greatest emphasis is placed on attention (class work) and memory (classroom test) (Rády, 2011).

The development of soft skills also requires the development of students’ self-knowledge (Fűzi – Jármai, 2019), the application of methods by which participants recognize and identify their abilities and characteristics, and then consciously shape them through experiential learning and interactions (Nagy, 2020; Seetha, 2013).

A good basis for personality development is provided by the introduction of various teaching methods and forms of work based on the active participation of the student, which go beyond the content and information transfer of education.

This is what we strive for in our elective courses for engineering students. The Communication course focuses on students’ verbal and non-verbal communication skills. During the practical classes, students perform a number of communication tasks that improve their oral expression skills, vocabulary and presentation techniques. Introductory communication tasks serve the purpose of getting to know each other. Team building tasks help cooperation and conflict management within the group. Tasks that develop communication skills help students in their academic and everyday communication. The topic of communication within the family, school and workplace is of particular interest. Topics such as

communication in the process of job-searching and negotiation techniques are also considered very important by students. The issue of assertive communication is met and practiced with keen interest, too.

The Social Development course provides an insight into some topics of social psychology. It focuses primarily on human nature and social interactions. Self-knowledge, self-esteem and self-awareness play an important role in it. Interpreting one's own and the other person's behaviour, extroversion, introversion, and person perception are also included in the topics. Students are particularly interested in how to make a "good impression" in their environment or what the halo effect is, and during classes, they often express their experiences of stereotyping. Social relationships are also a focus of interest, as the twenties age-group often find it difficult to build and maintain relationships. The exercises in the Social Skills Development course improve students 'self-knowledge in small groups, as well as the social skills that make them more sensitive and open in their social relationships. By improving communication, conflict management and cooperation skills, this course contributes to students' individual well-being and social success.

In our practical classes, different methods are used for the development of soft skills. Debate and discussion within the group provide an excellent opportunity for students to express their thoughts, elaborate their point of view, use arguments and pay attention to their discussion partners.

Situational games are both entertaining and educational, providing an opportunity for students to try themselves in different situations.

Collaborative learning is an excellent opportunity to develop soft skills, as it aims to provide students with an active learning experience. In collaborative learning, the result of learning together is the successful achievement of a common goal. This is achieved through joint activities, which also indirectly develop students' cooperation skills (Benedek – Molnár, 2019).

Cooperative methods can be given an important role to play in higher education, too (Pap-Szigeti, 2007), the application of which also serves the development of soft skills, because these methods are based on student cooperation. The four principles of cooperative learning (Kagan, 2015) – constructive interdependence, individual responsibility, equal participation and parallel interaction – promote the development of soft skills. Research findings point out that the use of cooperative learning techniques and social skills development courses have had a positive effect on co-operation at work and on personal relationships (Smith et al., 2015).

The application of the project method builds on the interest of students and the joint activities of teachers and students. Therefore, it is suitable for the development of cooperation, empathy, conflict management and communication. The project usually focuses on a practical problem, so it provides an excellent opportunity to develop problem-solving skills, too. When this method is applied, the traditional teacher-student relationship also changes (Simonics – Makó, 2016). This is also important because an essential condition for both academic and social integration is the proper cooperation of students and staff members (Engler, 2015). A study by Berglund and Heintz (2014) reported that project-based learning in a real workplace environment develops abilities and skills that facilitate students' employment, such as teamwork, communication, problem solving, and conflict management.

Problem-based learning (PBL) can be particularly effective in engineering education because it confronts students with practical problems, thereby preparing them for creative, critical and analytical thinking.

However, the widespread use of the above methods in higher education also requires the development of the methodological culture of educators. Our research results also confirm that we must strive for high-quality education and the transfer of knowledge that is applicable in the world of work.

Summary

Technological development and labour market expectations pose new challenges for higher education. Competence-development based on labour market needs, the role of practical training and the application of student-centred methods are becoming more and more important. Besides so-called hard skills, the development of soft skills also plays a key role in education.

The results of our research among engineering students have shown that the students surveyed need to be developed in terms of soft skills, especially in the areas of openness, communication and cooperation. The main conclusion of the research is that greater emphasis should be placed on the development of communication skills, social skills, self-knowledge and on the motivation and activation of students. Opportunities should be given to group work, as this form of work provides excellent ground to practice cooperation, adaptation, trust, selflessness, empathy and helpfulness. It is important that students be given assignments in which they can unleash their creativity and teachers should also seek to arouse students' interest in various areas of science. As students achieved a very high score in the field of social desirability, it is necessary to reduce the external control attitude and the desire to meet external expectations and, in doing so, facilitate a shift towards an internal control attitude.

Students' personality development can be facilitated by courses that focus on developing self-knowledge and provide opportunities for student activity and cooperation. Cooperative methods, collaborative learning, the project method and problem-based learning can also play an important role in higher education. The spread of student-centred teaching methods in higher education can be advanced by a change of attitude and the improvement of the methodological culture of teachers.

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Heléna MANOJLOVIC

How do educational Escape Rooms help in improving Soft Skills?

Introduction

The need for a knowledge-based society and the expectations of employers generate the need for highly educated young people with diverse skills and competencies that can be directly applied in practice to enter the labour market. In addition to the cognitive skill gap, we face the problem of people with non-cognitive skill gaps (Casner-Lotto & Barrington, 2006). The main reasons for the growing demand for soft skills are related to the nature of technological development on the one hand and urbanization on the other, which is increasing the demand for personal, cultural services. So, there is a growing need for networking, collaboration, a flexible, innovative workforce, emotional intelligence, imagination, empathy, and openness. These skills cannot (yet) be produced by automation and artificial intelligence.

The field of education is under pressure like never before. The aim is to prepare students for new ways to participate productively in the labour market. Together, the dual power of globalization and rapid technological development is transforming the needs of employers. In recent years, new conditions have emerged for those entering the job. These conditions apply to soft skills. These include competencies that make it easier for graduates to find employment. Commitment to development can be felt in many schools worldwide, which includes personality formation, the development of social and emotional skills, and the development of 21st-century competencies (Bebell & Stemler, 2013). In addition to acquiring knowledge, schools strive to develop the need for lifelong learning in their students, to become a skilled worker, a confident and persistent problem solver, an organized and conscientious leader, a person who formulates innovative ideas, and so on.

The OECD recognized the growing importance of soft skills, and a pilot assessment of students socio-emotional skills was conducted in 2013. Twenty-four thousand students took part in the evaluation. PISA tests are also gradually being supplemented with types of tasks that are suitable for measuring non-cognitive skills. In addition to math, comprehension, and science tests, tests to measure global competence have also emerged. Under global competence, there are skills such as interpreting intercultural phenomena, applying different perspectives, collaborating with people from other cultures.

One way to practice, develop, and evaluate soft skills is for an educational escape room. Escape rooms are "a live-action team-based game where players discover clues, solve puzzles, and accomplish tasks in one or more rooms to accomplish a specific goal (usually escaping from the room) in a limited amount of time" (Nicholson, 2015:1). Educational escape room games is an educational method explicitly designed to acquire expertise or develop key competencies through collaborative play activities (Fotaris & Mastoras, 2019). Escape rooms offer not only fun activities but also team-building exercises, active teaching of creative and group problem-solving, and exploring research issues related to problem-solving thinking, communication and collaboration skills (Pan et al., 2017). Using the escape rooms in an educational context has been shown to benefit students, such as facilitating the practice and development of teamwork, leadership, creative and problem-solving thinking, and communication skills (Taraldsen et al., 2020).

What are soft skills?

"Soft skills are character traits, attitudes, and behaviours – rather than technical aptitude or knowledge. Soft skills are the intangible, nontechnical, personality-specific skills that determine one's strengths as a leader, facilitator, mediator, and negotiator." (Robles, 2012:457). These differ from

"hard skills" (cognitive skills), such as comprehension and knowledge of mathematical tools that are relatively easier to teach, learn, and measure. The term "soft skills" encompasses attitudes, behaviours, and strategies that underpin school and work success, such as motivation, perseverance, and self-control. Appear in the literature as character skills (Marshall et al., 2017; Zamarro et al., 2016), non-cognitive skills (Scorza et al., 2016), social-emotional skills (Guerra et al., 2014; Humphrey et al., 2011), transversal skills (Magnoler, 2018), transferable skills (Nägele & Stalder, 2017), life skills (Pierce et al., 2016), 21st-century skills (Binkley et al., 2012), work skills (Cournoyer, 2016), critical competencies for a successful life and a well-functioning society (Rychen & Salganik, 2003) or skills for social progress (OECD, 2017).

Soft skills are all abilities that define characteristics that transcend professional knowledge. These include communication skills, critical and structured thinking, problem-solving skills, creativity, teamwork, collaboration, negotiation skills, self-management, time and conflict management, cultural awareness, shared knowledge, responsibility, etiquette and good manners, courtesy, self-esteem, integrity, empathy, work ethic, project management, business management and with that, the list of soft skills is far from over (Hirsch, 2017; Majid et al., 2021; Moore, 2020). These skills we need to succeed in life but are not easily quantifiable (Beheshti, 2018; Majid et al., 2021). Regardless of the difficulty of defining the concept and scope of soft skills, the importance of teaching soft skills in higher education is felt. Today, communication skills, critical thinking, and interpersonal skills, including listening, problem-solving, and cultural awareness, are essential (Nealy, 2005). Soft skills could also be categorized into intrapersonal, interpersonal, and additional skills and knowledge.

In schools, the traditional curriculum focuses on teaching technical or "hard" skills, but despite this, the importance of soft skills is becoming more prominent (Beheshti, 2018). To ensure effective education, teachers need to address the teaching of soft skills. Purposeful education through soft skills programs brings significant results in the development of social and emotional skills (Boncu et al., 2017). To be effective, lessons should also include elements that students find fun and valuable (Lemberger et al., 2018).

Gamification, game-based learning and escape room

Gamification is one way to be suitable for teaching hard and soft skills in a fun and meaningful way through a combined approach (Sowell, 2020). The term "gamification" became popular in 2010. The process of gamifying classrooms means that teachers add game design elements to classroom experiences to increase student engagement in the curriculum through an immersive experience (Dichev & Dicheva, 2017; Martí Parreño et al., 2016). Research supports the claim that gamification in education increases student academic performance and retention of material when compared to traditional teaching models (Chen et al., 2018; Khan et al., 2017). Gamification offers a shift to active, learner-centred models that provide students with transferable attitudes and mindsets, including resilience, perseverance, adaptability, problem-solving, and teamwork (O'Brien & Pitera, 2019).

Unlike gamification, game-based learning relates to the use of games to enhance the learning experience. Game-based learning is not new to the educational environment. It offers opportunities related to active learning, creativity, problem-solving, self-regulation, fun and social interaction (Bober, 2010). "Games-based learning takes advantage of gaming technologies to create a fun, motivating, and interactive (virtual) learning environment that promotes situated experiential learning." (Tang et al., 2009:1) This constructivist approach to education includes elements of competition, commitment, and immediate reward. Students should receive immediate feedback, for example, on their results or, for example, when they have completed a goal. The game-based learning environment allows them to compete with each other or, more usefully, collaborate. This is a level of challenge that motivates learning and provides a framework story that encourages active student participation (Romero et al., 2015).

Figure 1.: *The differences between Gamification and Game-Based Learning*

Source: Moodley, 2018

One game that teachers are exploring incorporating in the classroom is the escape room. The escape room game is based on game-based learning and includes elements of gamification (Duggins, 2019; Grande-de-Prado et al., 2021; Guckian et al., 2020; López-Belmonte et al., 2020). The educational escape games combine the teaching of both hard and soft skills (Sowell, 2020).

Escape rooms - or escape games - are a relatively new entertainment genre that became popular worldwide in the early 2010s and can be found in many cities around the world (Heikkinen & Shumeyko, 2016). The escaping room is characterized by group play and is usually 4-8 people in group size. The duration of the game also varies, but most of the time, participants have one hour during which they have to solve various puzzles to get out of the room and complete the task successfully. The game takes place within a comprehensive narrative that is the basis for further design, such as how the room is designed, the look of the room, and the types of puzzles it contains (Nicholson, 2015).

Escape rooms have become increasingly popular leisure activities, and instructors have quickly recognized learning opportunities. An educational release room is defined as a creative learning environment - it can be built, for example, in a primary or secondary school, youth centre, college, etc., or in any place where learning is a part (Macías & Rocío, 2017).

Creating a good escape room for educational purposes is not an easy task as it involves creating the right combination of fun and playfulness and a planned learning goal. A balance of fun and learning is essential to designing an effective educational game. The advantage of the escaping room is that it is easy to build and test. Video game development is outside the purview of most teachers, but escape games can be made by anyone with some imagination (Clarke et al., 2017).

Educators report that through escape games, students developed soft skills, including teamwork, problem-solving, and communication skills (Humphrey, 2017). There are many pedagogical reasons why educational escape games are an attractive approach to learning. In addition to curriculum delivery, they are also suitable for developing many transversal or soft skills (Grande-de-Prado et al.,

2021; Guckian et al., 2020; Sowell, 2020; Taraldsen et al., 2020; Veldkamp & Knippels, 2021; Wiemker et al., 2015):

- Developing Social Skills - Escape rooms offer students the opportunity to work in groups to solve various problematic situations by solving puzzles. The goal is not to solve them alone, so the game requires communication and collaboration.
- Problem Solving - The escaping rooms contain several types of puzzles: from codes and cryptography, through traditional puzzles, to complex digital puzzles. Players face different problems that need to be solved. While working on puzzles, among other things, problem-solving skills develop.
- Players develop resilience and creativity as they repeatedly try to solve a puzzle in different ways and develop novel solutions each time.
- Lateral Thinking - Many of the problems and puzzles that players face in escaping rooms require them to think differently from their usual way of thinking and vary objects and ideas in novel ways. This type of thinking is important and supports creativity and innovation.
- Time management is also a test in the time-based challenge and can facilitate personal resource management.
- Engagement - The fact that you are participating in an exciting, time-dependent, immersive game can be appealing to many students, and the physical reality of the game provides a gaming experience that can be motivating for many.

In addition to these soft skills, the escape rooms also offer the opportunity for subject-specific learning. The mechanics of the escaping rooms are based on puzzles, tasks, quizzes, which can be used to integrate the content elements into the game. Furthermore, each step of the room can be designed to encourage or test specific knowledge or skills, thus creating an effective learning environment for the subjects' content (Grande-de-Prado et al., 2021).

Escape rooms are also interesting in that they offer a large number of opportunities for researchers and designers to explore a wide range of social and technical research issues (Pan et al., 2017).

Testing the self-developed escape room environment for educational purposes

The design of the educational escape room requires several steps. The process encompasses preparation, development, and finally, presentation. Between the development and demonstration phases, testing the game is a must. The game test at this stage allows you to discover if the balance between play and learning is right and allows you to refine the puzzles or add new ones if needed. As the developer observes people while playing his game, he may notice many design flaws.

The self-developed escape game was tested on September 4 2020, at the Subotica Music School in Subotica (Serbia). Two groups of graduating students from the school participated in the game. We had two rooms. The pre-room, where the introduction to the game took place, and all the rules were described, in addition to the monitoring during the game. The escape room was furnished in the school's IT room.

Figure 2.: *The appearance of the escaping room before starting the game test*

Source: Own photos

The first group consisted of three members (two boys and one girl). After starting the game test, it turned out that the camera speaker was not working as expected. Unfortunately, the students did not understand what the observer wanted to send them. There was crackling at the beginning of the game, and no sound went through after that. Because we anticipated all possible errors, the specific deficiency could be addressed. Before starting the game, a chat window point was set up on one of the computers for this case. Everything was fine with the microphone, so the observer heard everything that was said in the room, so the communication between the participants could be followed.

After entering the room, the group noticed the first task, the teacher's letter. The release of the scissors and the decoding of the coded part of the letter also went smoothly. The first box already caused a lot more headaches for the participants. Here, it turned out that one of the puzzles completely misled them, so as a result of the test, the Domino task will no longer be part of the game. Since the group didn't ask for help once, they got help with the Domino game, which was also a good sign of the crackling, as they knew their message had arrived in the chat window. After the crackle also disappeared, the game master had no means of signalling that their help message had arrived. This slowed down the game a bit. During the game, great emphasis should be placed on communication with the game master. For the game, it is important to test the communication as well as the tips and clues system. This system allows you to interact with players, which can greatly affect the flow of the game, so it must work smoothly.

In the first group, it was the communication that did not go smoothly. In fact, for a moment, the picture froze, so the gamemaster didn't see what was happening in the room for approx. for 5 minutes after opening the second box. The solution to the technical error was that you had to go into the escape room and restart the camera. Participants were informed in the introductory section that they were the first subjects in the game and that such mistakes could occur. They were also aware that the game master could also watch events from the room if the camera could not be quickly restored to its original mode during play. There were no additional technical issues until the end of the game, other than the camera not showing the correct time, but this was considered less important during the first test.

The first group ran through the boxes in a row. The participants didn't jump through a single puzzle. They fully followed the logic of building the game. The group successfully opened the last box after 72 minutes. True, 60 minutes are foreseen for the game, but since the goal here was to test the game, we didn't limit the time. It was important to play all the puzzles throughout so that you could ask back to every element of the room during the interview.

Figure 3.: *The first group while playing*

Source: Own photos

After the game, participants answered our questions about the room and the puzzles during the interview. The goal was to find out in which direction the game elements needed to be improved or further developed to provide an even better experience for future participants. As a result, the following was pointed out:

- There was not enough space. At the beginning of the game, when the puzzles were packed in boxes, the room seemed empty, but after unpacking, it filled quickly, and they felt it would have been better if the boxes had been farther apart.
- Deceptive puzzles. The Domino puzzle, which was also drawn out after the test, and the cards that could be found in all directions in the room. These are parts of the puzzle belonging to the third box, but visible places were placed from the beginning of the game. This confused them as they were constantly looking for the connection between the cards and the puzzles. A disturbing element in the Logistori game was a spreadsheet, which was part of the puzzle. They tried to fill it out, but they came up with different logic for the solution.

- Previous experience. Participants have never participated in an escape room game. One participant thought there would be someone in the room with them, a built-in person who would know what to do.
- Multiple coding tasks. The code and secret writing elements appear in two tasks. This was found to be especially fun, on the one hand, because they knew these types of tasks from the past.
- Several items were built into the room. The jacket, which was part of the game but still did not look like it, resulted in complete immersion. Incorporating even more of these elements can help the player forget the natural world around him.
- More movement. Because the boxes were close together, there was no need to move around the room. Almost everything happened in one place, so participants did not feel so much time pressure. If the elements of the game were thrown better apart and you had to change positions or run from one part of the room to another several time, it would make the game more dynamic.
- Group size. They think another member would have made their job easier. However, the five people are already found by many.
- Too easy / too heavy. "How many squares do you see in the picture?" game was known from the past, so this was solved very quickly. No puzzles were highlighted as too difficult, but the difficulty of the escaping room was rated 4 and 4.5 on a scale of 5, respectively. They think they could not have done it without help. The entertainment level was rated 4.7 and 5, respectively.
- Their questions. Participants were curious about how long the development and construction process of the escaping room would take. In addition to this, the escaping room board games came into question, the so-called escape boxes, which are characterized by puzzles hidden in a box. These types of escape rooms exist for education too.

Students noticed that everyone showed outstanding knowledge in other tasks. Therefore, collaboration was an essential part of the game. They were all referring to each other. Without collaboration and communication, they would not have been able to play the game all the way through.

There was a two-hour break between the two groups while the room was set up again. The reorganization consisted of putting all the puzzles back in the appropriate box, arranging the boxes, placing the posters, pasting additional items next to the boxes, and replacing the scribbled puzzles. The Domino game in the second test was no longer included in the game. We were also wondering if that task could be solved without the game. In addition, space was expanded based on feedback from the first group. The first box was in the other half of the room, and the second and third boxes were further apart. We do not change anything about the placement of the cards.

The introductory part has been supplemented with information that the speaker is not working on the camera, and to do this, watch the chat window more often, where tips can come if they are very far from the right path. As for the technical issues, everything went smoothly for the afternoon group.

The second group started with five participants, but after 20 minutes, one of the players had to leave, leaving four until the end. They completed the game in less time; they needed 65 minutes, though there was a minor puzzle in the room. The two groups differed in that the second did not solve the tasks in a row but skipped one task at a time and later returned to the still unsolvable tasks. They also skipped the teacher's letter and decoded it at the beginning of the game instead of starting the game with the first box. However, the game flow was better as they followed the instructions on the monitor, so they did not waste time on useless things.

Figure 4.: *The second group while playing*

Source: Own photos

After the game, participants in the second group also answered our questions about the room and the puzzles during the interview. As a result, attention was drawn to the following:

- The appearance of the room. After the rearrangement, this group already judged the look and layout of the room to be just right. They also thought it seemed a little empty at first, but the room filled quickly as the puzzles came out of the boxes.
- Deceptive puzzles. Next to the first box, you can find an image with flags with the names of the countries. The image is used to help participants if they do not know the flags of the countries in the game. However, this help completely confused them. Some did not even understand what the picture was for at the end of the game. It was suggested to include fewer flags. They saw no logic in the gear game, just watched the letters and solved the puzzle based on it.
- Group size. They have been found suitable, and a maximum of five people are recommended for the game.
- Group roles. They believe there were no roles. Everyone had a chance to make a difference. For the variety of puzzles, each participant was able to excel in one of them. It is for this reason that they feel that a situation of conflict could not have arisen.

- Too easy / too heavy. Nothing was considered too easy or too heavy. The structure of the puzzle was perceived as entirely logical. It was highlighted that memory plays a significant role in the game as they needed to know where they stopped at the previous box. This was because they did not go along a path but left a puzzle unfinished. The difficulty of the escaping room was rated between 3 and 4 on a scale of 5. However, they, too, think they could not have done it all the way through without help. The fun level was rated 5.
- Entertainment. The fun and team-building nature of the game was recognized. What first arose in them is when they will have the opportunity to participate in such an experience again.
- Their questions. Participants wondered when they could play again. In the end, they even covered their own mistakes. It is believed that the excitement was a bit disturbed by the concentrations. In the beginning, for the sake of great haste, no basic things were noticed.

Students in the second group also noticed that everyone showed outstanding knowledge in other tasks and that communication was an essential part of the smooth play.

Figure 5.: *The look of the room after playing the game*

Source: Own photos

As a result of the game test, the puzzles have been further corrected: the Domino game will not be included in the puzzles in the future, the Logistori game and the flag help will be given a different look. In addition, great emphasis should be placed on the arrangement of the props in the halls. These two tests showed that it depends on the layout of how the participants start the game. Care must also be taken to have enough space while also paying attention to the game's dynamics.

We do not know what to do with technical errors. They can happen at any time. For example, if something happened to the camera or computer during the game, the game master would continue to follow the events from the room. Thus, instead of recording video, you would take notes based on the elements of the evaluation criteria system.

What's more worth emphasizing is that the students on the test have been classmates for at least three years. So they know each other well. However, students participating in the measurement may not be in such a close relationship. This fact can affect the frequency of collaboration, and within that, communication.

Conclusion

The puzzles and tasks of liberating play for educational purposes require learners to apply soft skills through solving complex problems. Applying critical thinking and problem-solving skills is a must. Time constraints encourage students to collaborate. The game is an immersive, action-based experience that is interesting and motivating for students, leading to a higher level of task activity (Chen et al., 2018; O'Brien & Pitera, 2019).

Soft skills such as collaboration, problem-solving, communication, adaptability, leadership, and time management are not part of the traditional curriculum. The development of soft skills needs to be integrated into the school education curriculum. Educators should be encouraged to play a role in developing soft skills. These skills are also very important in the development of an individual's personality. During recruitment interviews, employers are explicitly curious about what employees can offer in this area beyond technical or scientific knowledge.

Soft skills play an important role in shaping an individual's personality, enabling social competence, and complementing hard skills that meet the technical requirements of the job. As such, soft skills are of equal importance to hard skills, but should not be abused to disguise a person's lack of expertise in certain areas.

It is important to develop classroom activities that provide good practice in developing soft skills because they are key to learners and education reform. The focus is on increasing and measuring the development of students' soft skills; incorporating soft skills into the school curriculum; schools should encourage organizations and individuals to increase their interest and investment in many of the unknown points of soft skills reform. The educational escape room focuses specifically on these competencies.

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Zsófia KOCSIS

Working and learning? Features of student employment during COVID-19[1]

Theoretical background

International and national research have indicated that employment of university students is increasing (Masevičiūtė 2018, Pascarella & Terenzini 1998, Perna 2010, Riggert et al. 2006, Teichler 2011). According to previous research in the Eastern region of the European Higher Education Area, the main motivations of students can be linked to material aspects, such as financing leisure activities, independence from parents and financing living costs. Gaining work experience was also a motivating factor while motivating factors (such as expanding the network of contacts, gaining acquaintances) from which students could benefit during their last employment were less typical for higher education students (Kovács et al. 2019, Pusztai & Kocsis 2019). EUROSTUDENT VI data show that in two-thirds of the surveyed countries, 45% of students have study-related work. In almost all countries, Master's students were characterized by a horizontal fit between work and study. Examining the field of study, students in IT, education, health and social studies were more likely to have a study-related job (Masevičiūtė et al. 2018). According to the results of Kocsis and Alter (2021), technical, natural science and non- STEM fields can be considered relatively homogeneous in terms of the frequency of work and the horizontal fit between work and study. However, the proportion of students in the medical sciences who have work related to their studies is the lowest. In contrast, IT students' work is more likely to fit their field of study. The results also indicate that making new acquaintances is particularly important for IT students.

According to the literature, study-related work enhances the positive effects of student employment. The relationship between work and study is significant for future returns. Employers have a set of expectations for career starters. Young people who already have the professional, practical knowledge to get a job as soon as possible may be more successful (Gáti & Róbert 2011). When students do study-related work, they are much more likely to gain skills and experience that they would not do at a university. Educational methods in Hungary are theory-centred. There are fewer opportunities to integrate theoretical and practical knowledge and solve problems. The major problem is that the needs of the labour market do not appear in the curriculum of higher education institutions. The knowledge and curriculum that students know are so far removed from problem-solving and work situations. As a result, the development of critical competencies is not solved either (Kovács 2016). A study-related job can be beneficial when entering the job market after graduation. However, if they do work where there is no link between work and study, they are less likely to gain specialized work experience. They may also fail to mention these non-study related jobs on their CV, especially if they have done physical work or had these jobs that have low social esteem (Markos 2014).

Conflicting results have been obtained regarding the impact of student work on academic performance (Astin 1993, Hámori et al. 2018, Pascarella & Terenzini 1998, Perna 2010, Riggert et al., 2006). Research on the impact of student work can be interpreted, on the one hand, as a risk factor confirming social inequalities and dropout rates (Darmody & Smyth 2008, Kovács et al. 2019), on the other hand, as a supportive factor playing an identity-forming role, promoting academic engagement, and having a positive impact on soft skills and future labour market performance (Beerkens 2011, Perna 2010, Pollard et al. 2013, Sanchez-Gelabert et al. 2017). A quarter of students who interrupted their studies referred to workplace reasons (Masevičiūtė 2018); in their case, the attractiveness of the labour market is more pronounced. According to domestic research on dropout (Kocsis 2020, Kovács et al.

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2019, Pusztai & Szigeti 2018, Kocsis & Pusztai 2020), one of the main reasons for dropping out is financial difficulties and work. Students working due to financial constraints, are disappointed with university education, or are pursuing a job that provides a secure income without a degree may be more likely to drop out. An essential question for our current research is how vulnerable students who have taken up work mainly because of financial constraints and do not have study-related work are. According to Euro student VI., almost half of Hungarian students could not afford to study at university without a paid job. (Masevičiūtė et al. 2018).

The novelty of our research is that no scientific research has been carried out in Hungary yet, which examines the impact of the pandemic on students' work. The research results may be necessary for universities, especially for assessing the situation after the end of the epidemic period. In the research, we study the risk factors caused by employment, and we can identify the risk groups affected by the epidemic and their problems. Our results may help identify further research directions as well as for supporting policy decisions.

Research questions and hypotheses

An important question from educational research is how does the current situation affect students' attitudes toward learning? Is it possible that students will drop out of college because they cannot finance their studies without paid work? Previous research shows that one group of dropouts were those who interrupted their studies for financial and professional reasons (Kovács et al. 2019), so we hypothesize that some students decided to interrupt their studies and prefer to work in the labour market, even in a profession that may be less affected by the epidemic and does not require a university degree. Furthermore, based on previous research (Kocsis 2020, Kocsis & Alter 2021, Kovács et al. 2019), we hypothesized that a low percentage of students have study-related work.

Methodological background

For our exploratory research, we used convenience sampling. Thus, the closest and available subjects participated in the research. Our future goal is to test the research on a larger and more representative sample, depending on the current research results.

University students who regularly work or have worked alongside their studies took part in the research. The online survey was conducted between January and March 2021. The questionnaire was completed voluntarily by 235 students, 73% of whom had worked regularly at university prior to COVID -19.

The first block of the questionnaire explored pre-coronavirus work habits: frequency of work, motivation, and relationship between work and study. We also investigated students' financial background and tendency to drop out of college. The second block of the questionnaire focused on the period in spring 2020, on work during the period of restrictions. We explored the impact of the interventions on employment opportunities, financial situation and housing. We also felt it was essential to assess how working students' attitudes to learning had changed. We also wanted to obtain information about changes in employment opportunities during the summer and fall periods and the labour market situation of student respondents when they completed the questionnaire (January-March 2021). Finally, we explored the main epidemiological experiences and work-study relationships and the students' family and institutional background.

In our current research, we focus on the relationship between work and study.

The sample

We processed data from 235 full-time higher education students, 86.4% enrolled in state-supported education. The sample included full-time students BA /BSc (55%), MA /MSc (19%) and students on undivided training courses (26%). They all have active student status at the time of answering the

questionnaire. According to the distribution of respondents by institution, 74.8% of the students study at the University of Debrecen, followed by the students' study at the University of Nyíregyháza (8.1%), Eötvös Loránd University (5.1%) and the University of Miskolc (2.1%). In addition, students from some more prominent rural and metropolitan universities also filled in the questionnaire.[2] Students are mainly represented in undivided teacher training courses (20.1%), humanities (15.8%), economics (15%) and medical and health sciences (11.5%). In contrast, a smaller proportion of students in teacher training courses, agricultural sciences, law, IT, natural sciences and social sciences completed the questionnaire. Of the respondents, 62 males and 169 females participated in the survey.

41% of the students' mothers have secondary education, while 36% have tertiary education. 23% of them have primary education. The father of the students has primary or secondary education (37-37%). When we examine the labour market status of the parents, we can see that the parents of the majority of the students have a permanent job (over 80%).

Results

Working during COVID-19

Regarding the financial situation of the students' families, 55% of the students had no change in their family's financial situation due to the epidemic. However, one-third of the respondents (32.3%) were negatively affected. Some students reported a positive change, and nearly one-tenth of students could not assess what change there was in their family's financial situation due to the epidemiological measures. Looking at the own financial situation of the surveyed students, we find that there was no drastic, negative change that affected most students.

Before COVID -19, more than half of the students (56.7%) reported an average financial situation, having everything needed in daily life but not being able to afford higher expenses. More than 5% of students sometimes had more serious financial problems, and 2% had more frequent financial difficulties in their daily lives. The appearance of the coronavirus changed the lives of the students: Almost half of them moved home to their parents and terminated their tenancy or moved out of the dorm. A quarter of them lost their jobs, and 26% of these students had significant problems because they no longer had income from another source.

Most students were unaffected by the epidemiological measures, and we can continue working unchanged or returned to work after a few weeks of downtime. However, in the spring of 2020, the number of students who could not cover their daily expenses doubled. At that point, one-tenth of students were already affected. The proportion of students struggling with day-to-day financial problems remained low. However, their numbers increased as a result of the measures.

During the summer holidays, the frequency of student employment stabilized; more than half of the students worked regularly, and most of them were able to continue their work in the autumn semester. In the fall of 2020, the frequency of work and the number of working hours approached those of the pre-viral period. A similar trend was observed in their financial situation. The number of individuals with frequent or daily financial problems decreased compared to the spring period. It can be hypothesized that the improvement in students' financial situation was aided by their ability to receive various financial aid and scholarships during the semester and earned income. Our hypothesis regarding the employment and financial situation of the students was not proved because we can see from our previous results that the majority of the students were working during the epidemiological situation. They did not have serious financial problems.

[2] Budapest Business School, Budapest University of Technology and Economics, Corvinus University, Debrecen Reformed Theological University, Eszterházy Károly University, Károli Gáspár University of the Reformed Church in Hungary, Hungarian University of Agriculture and Life Sciences (MATE), University of Public Service, University of Pannonia, University of Pécs, Semmelweis University, Széchenyi István University, University of Szeged.

The relationship between the horizontal suitability of work and studies

In the pre-coronavirus period, 57% of respondents had non-study-related work. Only 16% of them had work entirely related to their studies. 21% of students had a job which partly related to their studies. 6% of students did not work during this period.

In the semester of autumn 2020, the number of people doing study-related work increased, with 20% of students had fully study-related work and 14% of them had jobs that are partially matching to their studies. The majority of students (43%) did not have study-related work. 23% of them did not work.

At the time of completing the questionnaire, 30% of students were not working. One-fifth of the students did work entirely related to their studies (14% of them only partially). 37% of students had non-study- related work.

Table 1.*: Relationship between work and study (%) (N=235)*

	pre-coronavirus period	the semester autumn, 2020	January-March, 2021
fully related to their studies	16,2	20	19,6
partly related to their studies	21,3	14,3	13,5
non-study-related work	57	42,6	36,5
do not work	5,5	23	30,4

Source: edited by author

We obtained similar results to previous studies. A quarter of the students performed work that was fully aligned with their studies. While doing work related to their studies, students can gain unique work experience, increase their contact capital, and look for a job in their profession with a more significant advantage after graduation.

We investigated the positions students worked in during their undergraduate years. 16.2% of them worked as interns, private tutors, so these jobs were related to their studies. 19% of the students had a typical student job. *Typical student jobs* were defined as usually temporary, part-time jobs and offered by student job centres. These jobs include call centre and receptionist jobs and hostess, entertainer, receptionist, and ticket office jobs. 14.3% of the students worked in retail, mainly as salesmen, loaders. Also, 14.1% worked in hospitality during the semester as waiters and bartenders. One-tenth of them had administrative jobs, and 8.7% did unskilled and manual labour.

There was no significant change in the job during the coronavirus. Students took up work in the previous areas at a similar rate. However, in the current epidemiological situation, students were also sought new jobs. Based on students' experiences, most employers and student jobcentres were looking for students to check masks and deliver food. Students could also apply for the following jobs: Dispensing and dispensing hand sanitiser, taking body temperature, checking customer numbers in stores, or keeping time zones. These jobs were often advertised as trained workers. However, few of the students did these jobs.

Learning or earning?

An essential question for educational researchers has been what characterizes the relationship between work and learning. On the one hand, how has COVID 19 changed students' attitudes toward learning? Has learning become more important or not? On the other hand, independent of the virus, how does work, work experience influence attitudes towards study? Previous research suggests that work-related decisions significantly influence students' attitudes toward studying (Kocsis & Pusztai 2020). However, there are equivocal research findings in the literature about the influence of work on

a university career. According to some approaches, employment can be a predictor of dropping out and can be interpreted as a risk factor because it hinders the time spent on studies and courses, as well as with students' integration into university life and the development of interactions with faculty and fellow students (Curtis & Shani 2002, Darmody & Smyth 2008, Kovács et al. 2019, McCoy & Smyth 2004). However, according to Tinto (1975), in addition to socio-cultural characteristics, these factors also contribute significantly to the successful graduation of students. In addition, employees can have negative consequences when students work night shifts or in a responsible job. In this case, they are exposed to constant challenges that often lead to a disruption of the work-life balance (Baffoe-Bonnie et al. 2007, Pollard et al., 2013).

We examined how students' attitudes toward work and learning evolved over epidemiology. Based on our results, we can say that 56.1% of students think that work has become much more essential for them due to the epidemiological situation. However, they also think about the importance of learning in a similar proportion. 40.5% of the respondents said that they study more only in the hope of getting a scholarship because it is also an extra income in this precarious situation. We can see that the pursuit of financial security also appears in this form. Achieving a higher undergraduate average is vital because of the higher scholarship. It motivates them to learn rather than acquire knowledge?

Figure 1.: *The relationship between work and learning during the COVID 19 (N=235)*

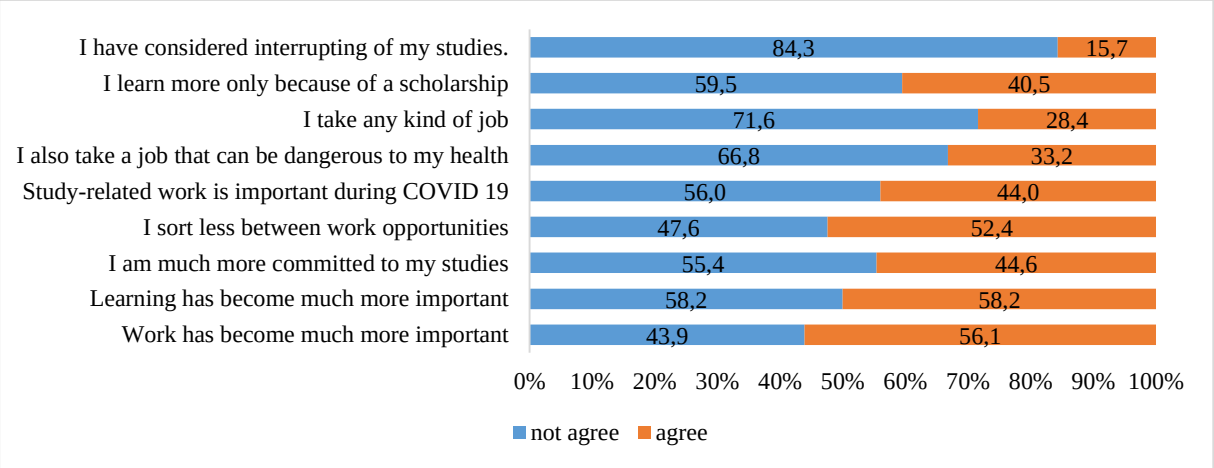

Figure edited by author

However, precisely because of the viral situation, more than one-tenth of the students considered interrupting their studies to work full time and create financial security for themselves. Regardless of COVID-19, 22% of the students still had the idea of interrupting their studies before the pandemic. We examined the reasons they gave for their answers to the open-ended question as follows:

- *"Practical training could not be implemented to a sufficient extent."*
- *"I need a semester abroad to improve my job skills, so I have been thinking about it."*
- *"Because of the fear for my future."*
- *"It was very mentally draining to study with little contact, as the community experience and daily personal contact help me process the material. As a result, I often felt alone."*
- *"It was stressful. I'm an art major, and the lack of contact hours completely took away from the essence of my education. It was awful."*

Although actual interruption of studies affected only a minimal number of students, it is thought-provoking that the idea of interrupting studies came up more than once in one-fifth of the respondents. Notwithstanding, we cannot draw firm conclusions and generalizations from our findings; they do draw attention to the fact that the commitment of institutions, lecturers and the quality of practical training can be decisive factors in interrupting studies in some cases.

Then, we examined the extent to which work experiences influence students' attitudes toward studies, independent of COVID -19 (Figure 2). From our results, it is clear that learning is essential to students regardless of an epidemic. Only 16% indicated that learning is less important to them since they are working. In addition to learning, gaining work experience is also crucial to students, with 19.3% stating that only work related to their studies is practical. However, most students hold the opposite view, meaning that work unrelated to their studies can also be relevant and crucial. Pollard et al. (2013) point out that employment positively impacts their soft skills (teamwork, communication, responsibility, time management, etc.), all skills that students do not acquire or acquire only to a limited extent during higher education.

Figure 2. *Attitudes to learning during student employment (N=235)*

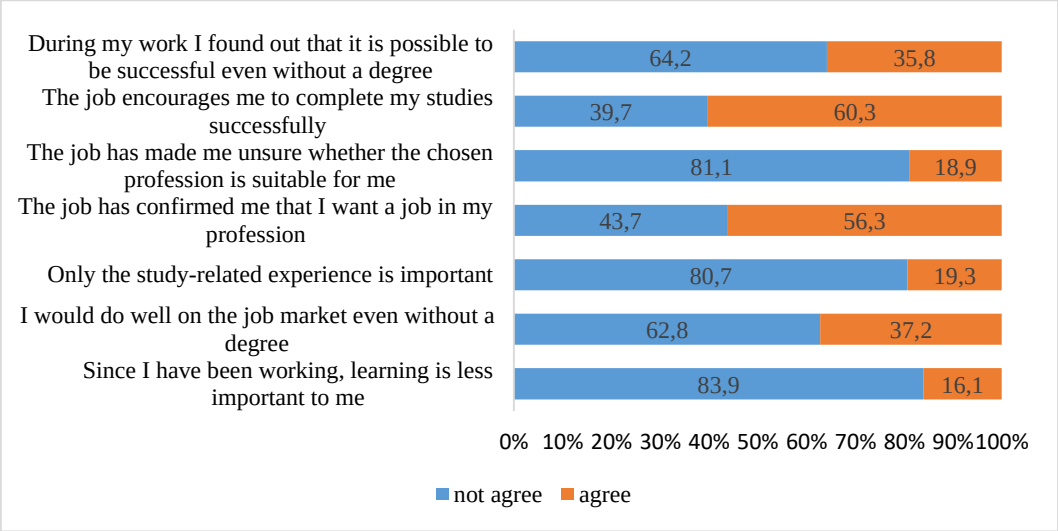

Figure edited by author

A significant problem in Hungarian higher education is that the needs of the labour market are less reflected in the curriculum. The situations in the workplace are far removed from the experience gained in education (Secondary analysis of international research on the labour market status of STEM graduates, Óbuda University 2018). Therefore, it is understandable that the vast majority of students believe that any work experience they can gain is necessary.

The statements about work experience can be divided into two groups. First, the work made the students uncertain whether they had chosen the right profession. They got to know professions in the workplace that confirmed that it is possible to succeed in the labour market even without a degree. The other group consists of statements about experiences that the student work confirmed the students in their desire to work they were also studying at university and encouraged them to complete their university studies as well as possible. We investigated a relationship between the following variables and students' gender, institutional characteristics (field of study, form of education, and funding), and horizontal fit between work and study. According to our results, there is no significant relationship between the gender of students, the form of financing education and the relationship with learning and experience during work.

The cross-tabulation analysis showed a significant relationship between the field of study and the following variables: *"I feel that I can succeed in the job market without a degree; I have been exposed to career paths that have shown me that it is possible to succeed without a degree, and only work experience related to my field of study is useful."* Among the undivided student teachers, the proportion of students who think that it is not true that only study-related experiences are meaningful is overrepresented (p=0.042, adj.res.=2.1).

Furthermore, 54% of undivided teacher students believe that they would succeed in the job market even without a degree. The proportion of these students is also overrepresented. (p=0.047, adj.res.=2.7). In contrast, the proportion of students participating in other teacher training (elementary teachers, special education teachers, kindergarten teachers) who believe they would succeed in the labour market without a degree is underrepresented (p=0.047, adj.res.=-2.5). We also found a significant relationship with the latter two variables for the form of education. For example, 54% of students in undivided education say they would be successful in the job market even without a degree, compared to 32% of BA /BSc students and 30% of MA /MSc. The proportion of those who think so is over-represented among students in undivided education (p=0.011, adj.res.=3). In the current sample, only student teachers and medical students study in undivided education. However, medical and health science students do not think they can succeed in the labour market without a degree.

As a result, we examined the characteristics of undivided teacher-students in terms of the horizontal fit between work and study and the position taken and found thought-provoking results. Namely, only 17% of undivided teacher students worked in a study-related job before COVID -19; these students worked mainly as private teachers, music teachers. Even when filling the questionnaire, only one-fifth of them have a job related to their field of study. Considering only the undivided teacher-student (n = 47), the cross-tabulation analysis shows that the proportion of those whose job was not related to their studies is overrepresented, after which their work experience confirms that it is possible to succeed without studying (p = 0.018, adj.res. = 3). We can see that the majority of these students do not have a study-related job, yet they believe that any work experience can be helpful, and their work confirmed that it is possible to succeed without a degree. We believe that these students are at risk of dropping out or interrupting their studies because they are gaining work experience that could weaken their commitment to their studies.

Following the educational characteristics, we examined whether study-related work and learning showed a significant relationship. The following table does not include the responses of the few students who did not work during this period. Except for two variables, we found a significant relationship between study-related work and relationship to learning (Table 2).

According to our results, the percentage of students who believe that they would be successful in the labour market without a degree is overrepresented among those with a non-study related job. This statement is typical of 44.7% of these students. We obtained similar results when we examined how the experiences and opportunities gained during student work influenced their opinions.

Accordingly, we can say that their experiences confirmed that those who do non-student work during student work could be successful even without a degree. On the other hand, those whose work is closely related to their studies are overrepresented in their case by those who believe that only study-related work is essential; 39.5% of these students think so.

Table 2.: Connection between the importance of learning and study-related work (N=223)

		The relationship between doing paid work and studies				
		always	most of the time	never	Sign.	χ^2
Since I've been working, learning is less important to me	not typical	84,2	79,2	85,6	0,780	1,087
	typical	15,8	20,8	14,4		
I would do well on the job market even without degree	not typical	73,7	68,8	55,3	0,037	8,476
	typical	26,3	31,3	44,7		
Only the study-related experience is important	not typical	60,5	71,4	91	0,001	22,739
	typical	39,5	28,6	9		
The job has confirmed me that I want a job in my profession	not typical	21,6	29,2	56,8	0,001	22,393
	typical	78,4	70,8	43,2		
The job has made me unsure whether the chosen profession is suitable for me	not typical	91,9	78,7	77,1	0,068	7,136
	typical	8,1	21,3	22,9		
The job encourages me to complete my studies successfully	not typical	18,4	34	49,2	0,003	13,915
	typical	81,6	66	50,8		
During my work I found out that it is possible to be successful even without degree	not typical	81,1	72,9	53,8	0,001	16,338
	typical	18,9	27,1	46,2		

** For the underlined figures, the absolute value of the adjusted residuals is above two. Source: edited by author*

Although most of them think that not only these experiences are essential, even though they also have study-related work. Regardless of whether the students' work is closely or partially related to their field of study, we find that the majority of students among them have been encouraged by their student work in their desire to find employment in their profession after graduation. At the same time, this is not typical of 57% of students who do not have a study-related job. Students who have study-related work are encouraged by their work experience to complete their studies as successfully as possible and have been shown that a degree is essential for their future employment.

Summary

Our results made it clear that there were no drastic negative changes in the financial situation and employment of the students. In the first phase of the epidemiological situation, a quarter of the students lost their jobs, and 26% had significant problems because they no longer had income from another source. The majority of the students were not affected by the epidemiological measures. They were able to continue their work unchanged or returned to work after several weeks of downtime. During summer break 2020, the frequency of student employment stabilized; more than half of the students worked regularly, and most of them were able to continue their work in the fall semester. In fall 2020, the frequency of student employment and the number of hours worked approached those of the pre-viral period.

We analyzed the relationship between work and study; our results are similar to previous research. A quarter of students do work that is fully aligned with their studies. Some of the undivided teacher students can be considered at-risk groups. They have gained experience during their employment that has made them insecure about graduating. Our results also highlighted that students who have study-related work are more committed to graduation and less uncertain about finding a job in their chosen profession.

Limitations and conclusion

From our results, it is clear that study-related work is related to successful completion of education, employment plans in the profession. We believe that it would be necessary for students to test and apply their theoretical knowledge in practice. Moreover, during the study-related work, they can gain special professional experience and contacts, which is an advantage in their future employment in the labour market. Although the literature suggests that work not related to studies is less beneficial for students in terms of later payoff (Fényes & Mohácsi 2019), many of the student's skills and abilities develop even during work that is not related to studies. According to previous research (Kovács et al. 2019), the risk of dropping out may increase when non-study related work is associated with factors such as financial difficulties, educational disappointment, or when students believe that their chosen course of study is not marketable or have experienced during employment that obtaining a degree is not essential.

One of the solutions to reduce the negative effect of student employment is to spread dual education. Higher education institutions should increase cooperation with companies and ensure internships in several fields of study. This can ensure that students have study-related work. These internships would allow students to work in conditions where they can gain professional experience and positively impact their engagement and academic performance. Also, higher education institutions should ensure that students can gain experience, competencies and soft skills through their courses. They should allow the acquisition of practical knowledge at the university. It would be necessary to regularly apply various higher education pedagogical methods in courses that support the transition from school to work and entry into the labour market. Gaining work experience can be facilitated in education through the work-integrated learning (WIL) method, which integrates academic and practical knowledge in a chosen work environment. Integrating curriculum requirements and instructional materials with work experience allows students to combine theory and practice in a work environment, deepening students' knowledge and developing their work-related skills.

It would be necessary for the university to play a role in informing students about job opportunities off-campus as well as within the university. In addition, it would be important for students to receive important information about how to maintain a balance between their work and study and their responsibilities. This would help them to be aware of the difficulties and risks of student employment and its benefits and opportunities. The main objective of the work obtained with the help of the university or the work opportunities offered by the institution would be to hire students so that the students work in a familiar environment, in a suitable schedule.

One of the limitations of our research is that when we examined the employment characteristics of students by field of study, we found that the number of items in each field of study is fragmented. Therefore, in this case, we cannot draw firm conclusions about which field of study has the highest student employment rates and a greater propensity to drop out. Our research has not focused on fully identifying epidemic risk groups. From our findings to date, we can see that students with more severe financial problems may constitute an at-risk group. However, we have not examined in more detail how the financial situation and employment opportunities of students who work for a living have changed during the epidemic. Similarly, because of the small number of items, we did not examine in more detail the group of students who lost their jobs as a result of the epidemic and were placed in a difficult financial situation as a result.

With our current research, our primary goal was to examine the extent to which the coronavirus and regulations have changed students' employment opportunities, financial status, and the importance of learning. In addition, what areas of research require further research to explore the connections more deeply? So far, our findings can serve as a starting point for further research on this topic.

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Learning organization – learning school

Results of a Longitudinal Learning Organization Research Project

Introduction

In the present study, we provide insight into the results of our research examining the functioning of schools as a learning organization. The research was carried out between 2015 and 2021 at the Hungarian-Netherlands School of Educational Management of the University of Szeged.[1] The related exploratory work sought to answer the question of what factors may be the most important in the operation of schools that can effectively support student achievement and how these factors change over time.

This is the first paper to report results, based on our longitudinal analyzes, so our primary goal here is to highlight the potential of our models and databases. In the following, we first present the essential features of the research. Then we describe our theoretical models created to grasp the functioning of schools as a learning organization. We then provide an insight into the first longitudinal results of the exploration work, relying primarily on quantitative data. We present the extent to which the factors defined by the theoretical models characterize the range of institutions studied and finally describe how this intensity has changed over the past five years based on the first analyzes.

Research examining schools as a learning organization

At the beginning of the research, our primary goal was to create a model describing the operation of a learning organization, which can be used in practice to improve the efficiency, effectiveness, and competitiveness of schools. In the initial stage of the research, based on literature sources, we outlined an initial model, which we tested, formed, and reinterpreted after two data collection points. Given that our long-term intention was to develop schools within the University's catchment area, the related data collections took place among schools in the Southern Hungary region. In 2015 and 2020, we also carried out data collection, including questionnaires, case studies and workshops validating hypotheses and results. In 2015, data collection was conducted on a representative sample of schools in the region. The criteria for the selection of the sample were the following:

- Schools that consistently perform above average or are in continuous improvement at the National Competency Assessment.
- Schools that excel or perform well in different local or nationwide (mostly EU financed) development programs aimed to improve the quality of learning at schools.

In addition to these, we considered geographic coverage and sought to see all types of school maintainers appear. We combined different data collection tools during both rounds of data collection, and we also linked development elements to the research work. Part of our last activity was closely integrated into our multi-day case studies, which required the simultaneous presence of 2-3 researchers. Such fieldwork was carried out in the first phase of the research (2015) in a total of 6 institutions.[2]

[1] The research was carried out within the framework of the TAMOP-4.1.2.B.2-13 / 1 Program.

[2] During the first data collection, we prepared a separate questionnaire for the deputy head.

During the questionnaire surveys, we asked the heads, deputy heads and teachers at the schools in the region to respond online and we prepared different questionnaires for them. We collected data from 1192 teachers, 119 deputy leaders, and 62 principals of 62 schools during the first data collection. During the second data collection, 986 teachers and 73 leaders returned a questionnaire suitable for analysis. During both data collections, we collected information on individual and organizational background variables, the expected and current state of the organizational characteristics related to the operation of the learning organization, and on the implementation of developmental and experimental activities. Given the specific pandemic context of the second survey, the questionnaire used here also included emergency adaptation and digital switchover questions.[3]

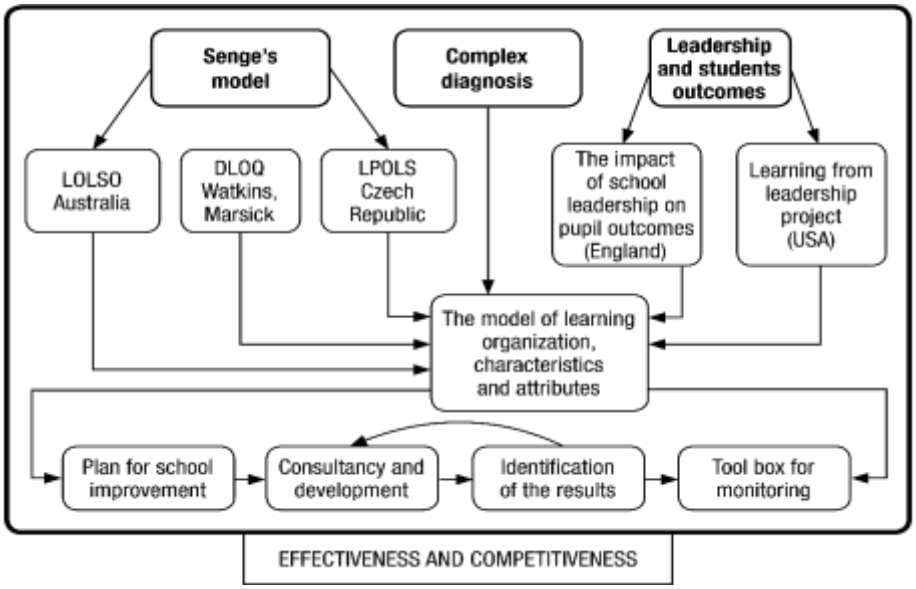
Learning organization models

Our expectations for the model, developed during the research, was to:

- Outline as a theoretical model the organizational characteristics that most support efficient organizational operation and that are specifically valid in a public education environment.
- Support organizational conditions and institutional to be able to orient empiricism based on mixed research methods.
- Provide a basis for the development of organizational diagnoses and strategies,
- as a model that helps organizational development.

In order to develop the model, we explored the theoretical background of learning organizations, and we studied the relevant research. Figure 1 shows what factors were prominent as input for the learning organization when creating the model (Senge, 1990; Silins, Zarins & Mulford, 2002; Watkins & Marsick, 1996; Pol et al, 2012), and what influenced the efficiency of the link between leadership and learning outcomes (Louis et al, 2010; Day et al, 2009). To articulate a precise definition, we made a distinction between the concepts of organizational learning, learning organization and professional learning community. Several of the research projects confirmed that the schools characterized by the attributes of a learning organization tended to react more promptly to challenges; their efficiency increased (Corcoran & Goertz, 1995; Issacson & Bamburg, 1992; Louis, 2006; Silins, Zarins & Mulford, 2002; Strain, 2000; Schechter, 2008). Trust, cooperation and workplace learning became key elements of the organizational culture (Horváth, 2015) and in addition, network operation was considered essential (Hidding & Catterall, 1998; Huber 1991).

Figure 1.: Concept of developing learning organization model for schools



Source: Baráth, 2017

[3] See research reports for more information about our samples and tools: Anka et al, 2016; Fazekas, 2020.

In addition to studying the professional literature, experience had a decisive role in developing the model. This meant a complex organizational diagnosis, which amalgamates the SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis prepared by schools as self-diagnosis, the organizational culture and efficiency analysis built on the Competing Values Framework (Cameron & Quinn, 2011) with the exploration and analysis of the behavioural competencies of the organization's key players (Baráth, 2013). The learning organization profile drawn up during the diagnosis served as the empirical foundation for developing the model (Baráth, 2015).

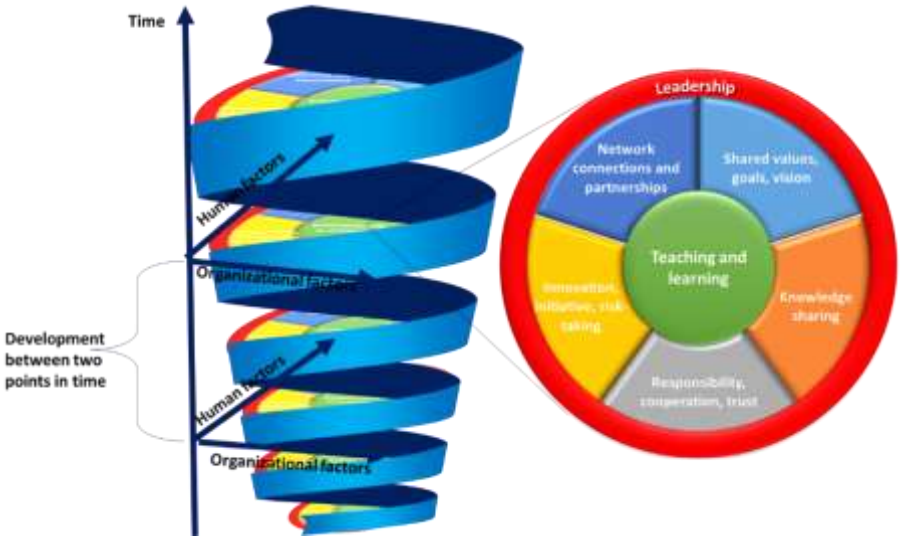
Based on the theoretical framework, we have created our model. The unique feature of this model is that it simultaneously shows the state of the schools' learning organizational operation that can be described at a given moment (synchronous approach) and the changes in the elements of the organizational operation over time (diachronic approach). The synchronous approach of the learning organization model (see the right side of Figure 2) describes the operation of the institution at a given moment along with seven key factors. These factors can be thought of as fundamentally determining the learning organizational nature of institutions. These are:

- Shared values, vision, and goals
- Knowledge sharing within the school
- Responsibility, cooperation, and trust
- Innovation, initiative and risk-taking
- Networking and partnerships
- Leadership supporting staff learning processes
- The development of learning-teaching processes, the management of learning organization problems, and the emergence of innovative classroom solutions.

The operation of the above factors can effectively help or drastically impede positive progress. Although the model displays these seven factors separately, in reality, it is difficult to draw sharp boundaries between them; they form a complex system of effects formed by complex and often difficult-to-sketch mechanisms.

In creating the second perspective (diachronic approach), we started from the premise that the dimensions defined in the first approach change due to evolutionary processes over time, and the individual characteristics of the learning organization become stronger or weaker. The diachronic approach to learning organization operation goes beyond the previous perspective by displaying the time dimension and evolutionary processes. This perspective (see the left side of Figure 2) can be used to capture the relationships, dynamics, and trends related to organizational change.

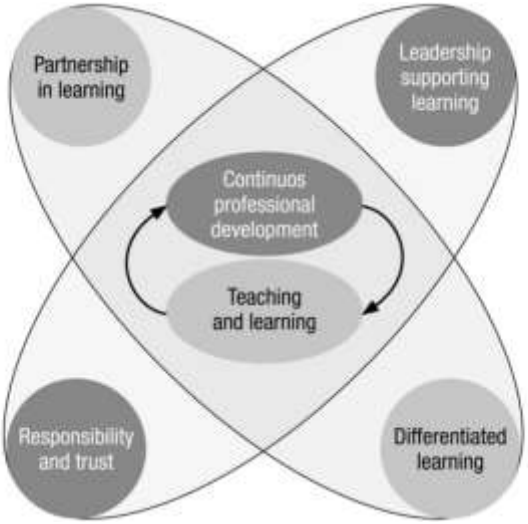
Figure 2: The synchronous and diachronic model of the learning organization



Source: Baráth, 2017

As mentioned earlier, we tested the validity of our model with different data collection procedures and analysis methods. Each of these seemed to justify the prominent role of all factors and their intense temporal formation. Confirmatory factor analysis of a key set of questions in our questionnaire also revealed a new model (Anka et al., 2015). This model shows factors that are particularly important for the functioning of the learning organization in the nuclear structure (see Figure 3). The model played a crucial role in developing the data collection tool used in the second wave of the research. It facilitated the selection of the variables involved in the longitudinal phase.

Figure 3: The validated model of schools as learning organization



Source: Baráth, 2017

Our analysis, based on the second data collection, relied mainly on the diachronic approach shown in Figure 2 (left side). We focused on the renewal of teaching processes and the temporal formation of individual and organizational skills that enable this. Our starting point was that developmental processes could start from any point or level of the learning organization factors. Over time, through the complex system of effects of these factors, an increase in capacity is expected for other elements of the (synchronous) model.

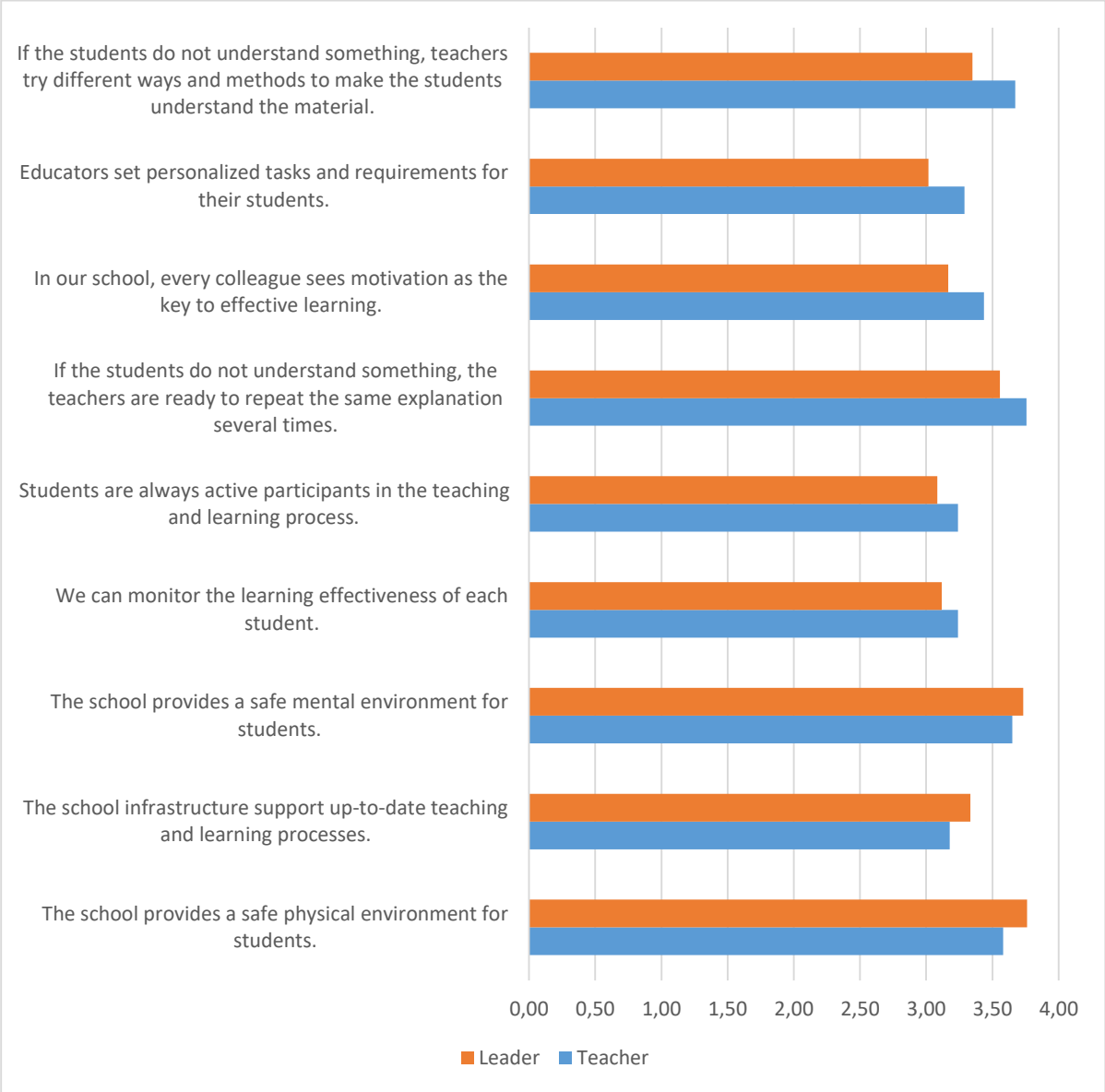
State of model elements among examined schools

Below, we show how intensive the presence of the elements of our model was (from a synchronous approach) among the schools surveyed based on our data collected last year. Our questionnaire contained 63 statements related to the elements of the synchronous approach of the model. Respondents were asked to rate on a scale of one to four how specific a particular statement is to the functioning of their school. In the following, we also describe the average values related to the seven elements of the model based on leader's and teacher's answers. Based on these, we get an idea of the assumed state of the model elements and we can also get to know the related sentence list of our questionnaires that can be used as a diagnostic tool. Although in this article our goal was not to make a statistical comparison of leaders' and teachers' responses, by presenting the two groups' averages we get an idea about the presumed differences between their points of view too. This may provide a strong basis for further statistical analysis of our data.

The first element of our model described the learning-teaching process, which can also be considered as an indicator of the impact of learning organizational features (see 6 related dimensions of our model). In the questionnaire, the statements related to this dimension outlined a picture of classroom processes in line with the learning and teaching paradigms currently adopted. The diagram below (see Figure 4) shows no statements with an aggregate mean value below 3. Based on the aggregate averages (leader average: 3.43; teacher average: 3.45) overall satisfaction with classroom-level

processes can be assumed among the respondent schools. The related items were arranged to determine how much difference could be observed between leaders' and teachers' opinions. The most significant differences were related to students' active classroom participation. For example, at the statement that "If the students do not understand something, teachers try different ways and methods to make the students understand the material." 69% of teachers, while only 35% of leaders marked the "Completely typical" choice.

Figure 4: Averages of variables related to learning and teaching dimension based on teacher and leader databases from the second data gathering

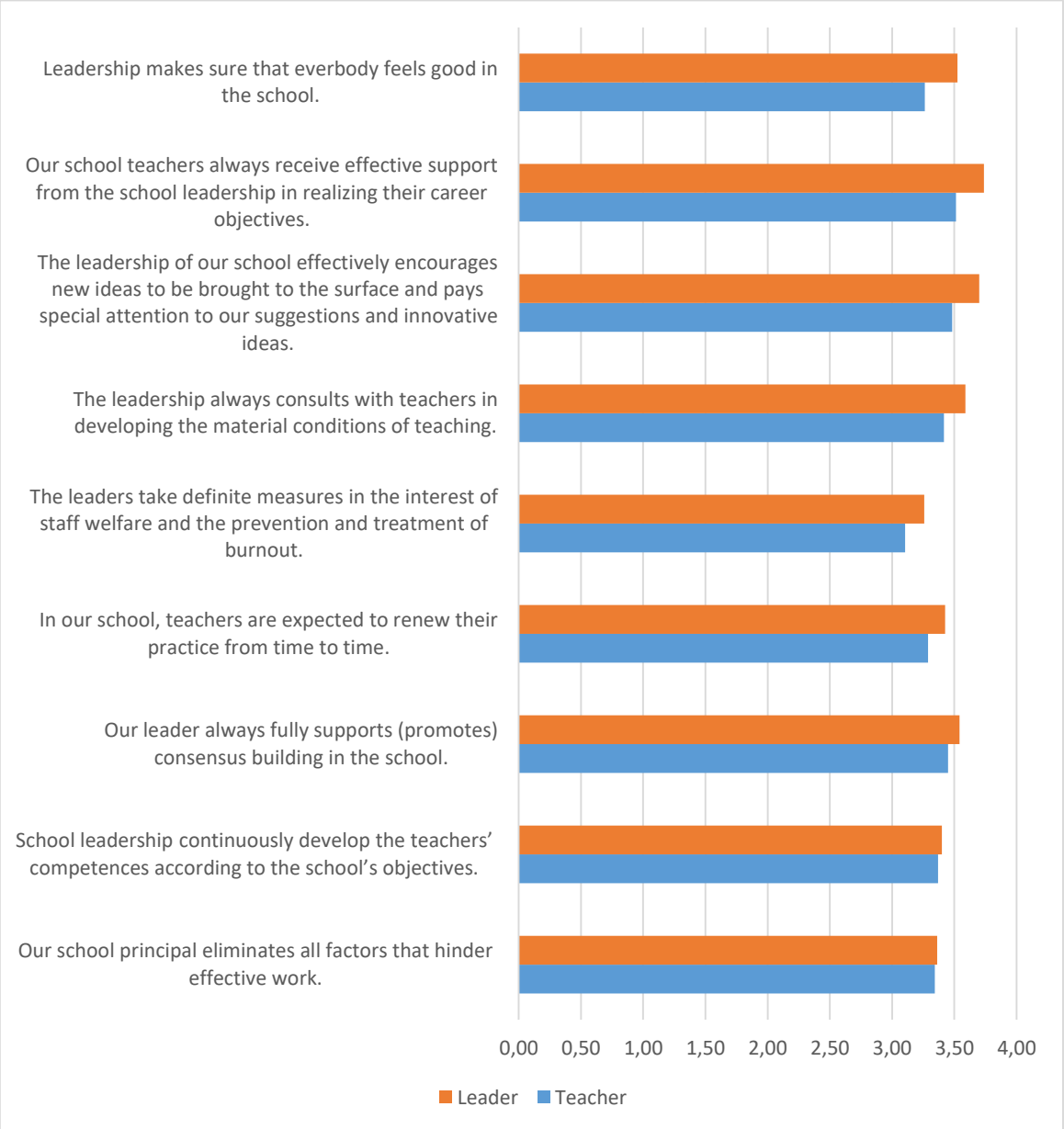


N. Leader= 57-64, N_Teacher= 753-901, Question: Please indicate how specific the following statements are to your institution (1: not at all; 2: rather not typical; 3: more typical; 4: completely typical).

We discuss leadership as the first of the model elements describing the operational features of learning organizations. The related items of the questionnaire were also positive statements, they outlined different dimensions of knowledge-focused leadership. The aggregated averages show that the schools surveyed presumably have already moved toward this type of institution management (leader average: 3.5; teacher average: 3.35), although it should be noted that voluntary involvement in

research is necessarily reflected in these data. The examined population is presumably dominated by schools whose management considers it essential and valuable to participate in a learning organization research and development project. Within this dimension, the most significant difference was in the psychic support of work, the assistance of professional careers of teachers, and the promotion of innovative ideas. At the same time, it is essential to note that the opinions of the respondents regarding the reduction of barriers to work and the development of competencies in line with the goals developed very similarly according to our data (see Figure 5).

Figure 5: Averages of variables related to leadership dimension based on teacher and leader databases from the second data gathering

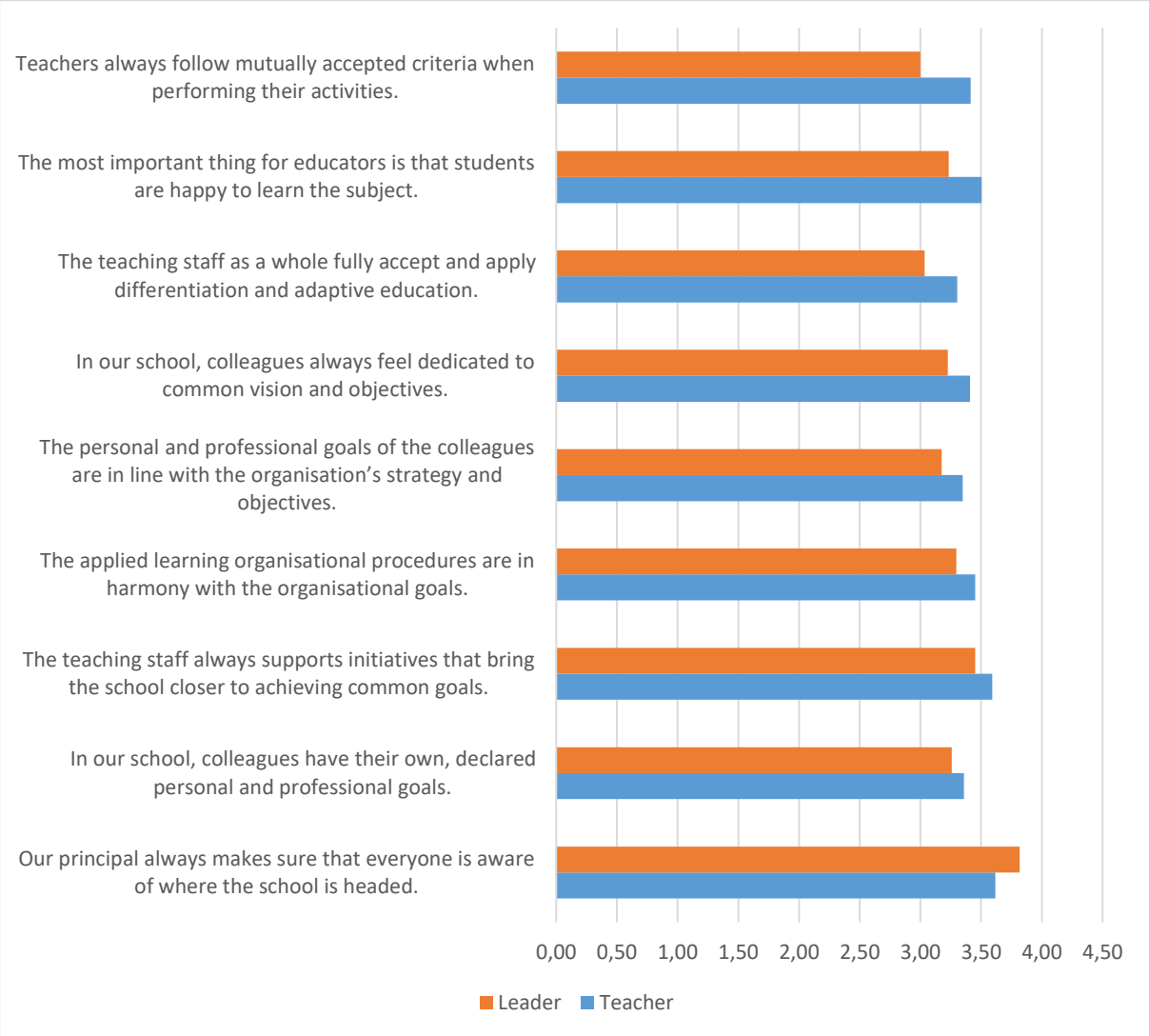


N_Leader = 57-64, N_Teacher = 753-901 Question: Please indicate how specific the following statements are to your institution (1: not at all; 2: rather not typical; 3: more typical; 4: completely typical).

The next element of our model was the dimension of common values, goals and vision; this is the organizational factor that determines whether the school can move in one direction. Our data show that responding teachers were more satisfied with the way common goals appear in everyday school

life (leader average: 3.27; teacher average: 3.44). According to our data, they think that their work is carried out according to commonly agreed criteria, that colleagues are committed to a shared vision, and that a learning organization linked to a modern teaching approach is accepted. For example, with the statement that "Teachers always follow mutually accepted criteria when performing their activities.", 51% of teachers fully agreed (marked "Completely typical"), while only 15.9% of leaders indicated this option. Given that most related statements appeared in the questionnaire regarding colleagues, it is not surprising that teacher responses show a more positive picture than data from their leaders. This is also evidenced by the fact that for the one item where we made the statement about the leader, the ratio is reversed (see Figure 6).

Figure 6: Averages of variables related to common goals and vision dimension based on teacher and leader databases from the second data gathering

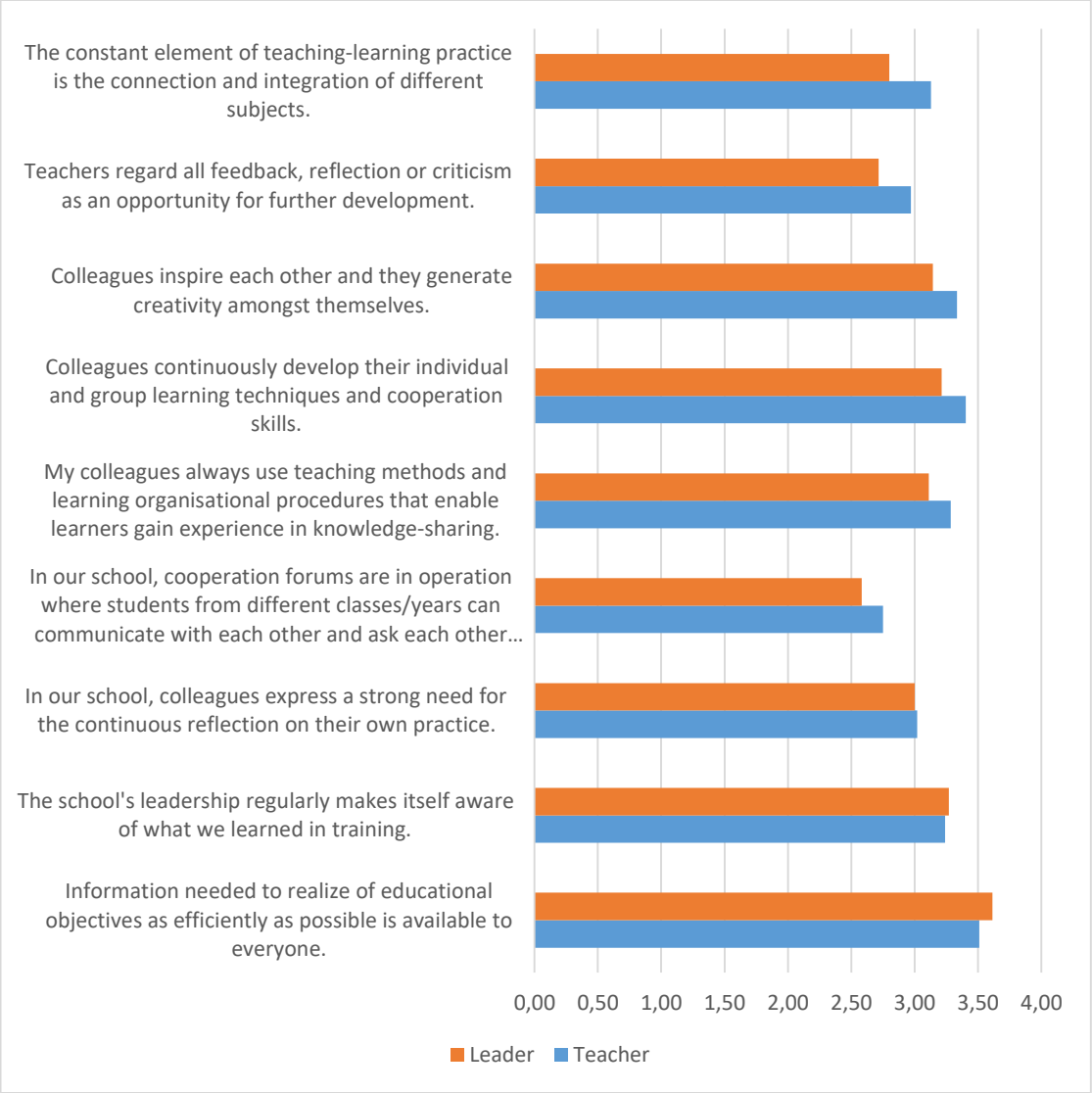


N_Leader = 57-64, N_Teacher = 753-901 Question: Please indicate how specific the following statements are to your institution (1: not at all; 2: rather not typical; 3: more typical; 4: completely typical).

The next area of the model was knowledge sharing. Within this, we focused on reflective teaching practices, cross-curricular topics and activities, motivation and willingness to workplace learning, knowledge sharing between student groups, and efficient information flow (see Figure 7). Lower averages appeared in this area for both teacher and leader responses (leader average: 3.04; teacher average: 3.18). For example, the level of the agreement did not reach the average of 3 in none of the

respondent groups with the statement that "Teachers regard all feedback, reflection or criticism as an opportunity for further development." 24% of teachers and 8% of leaders fully agreed with this statement (marked “Completely typical”).

Figure 7: Averages of variables related to knowledge sharing dimension based on teacher and leader databases from the second data gathering

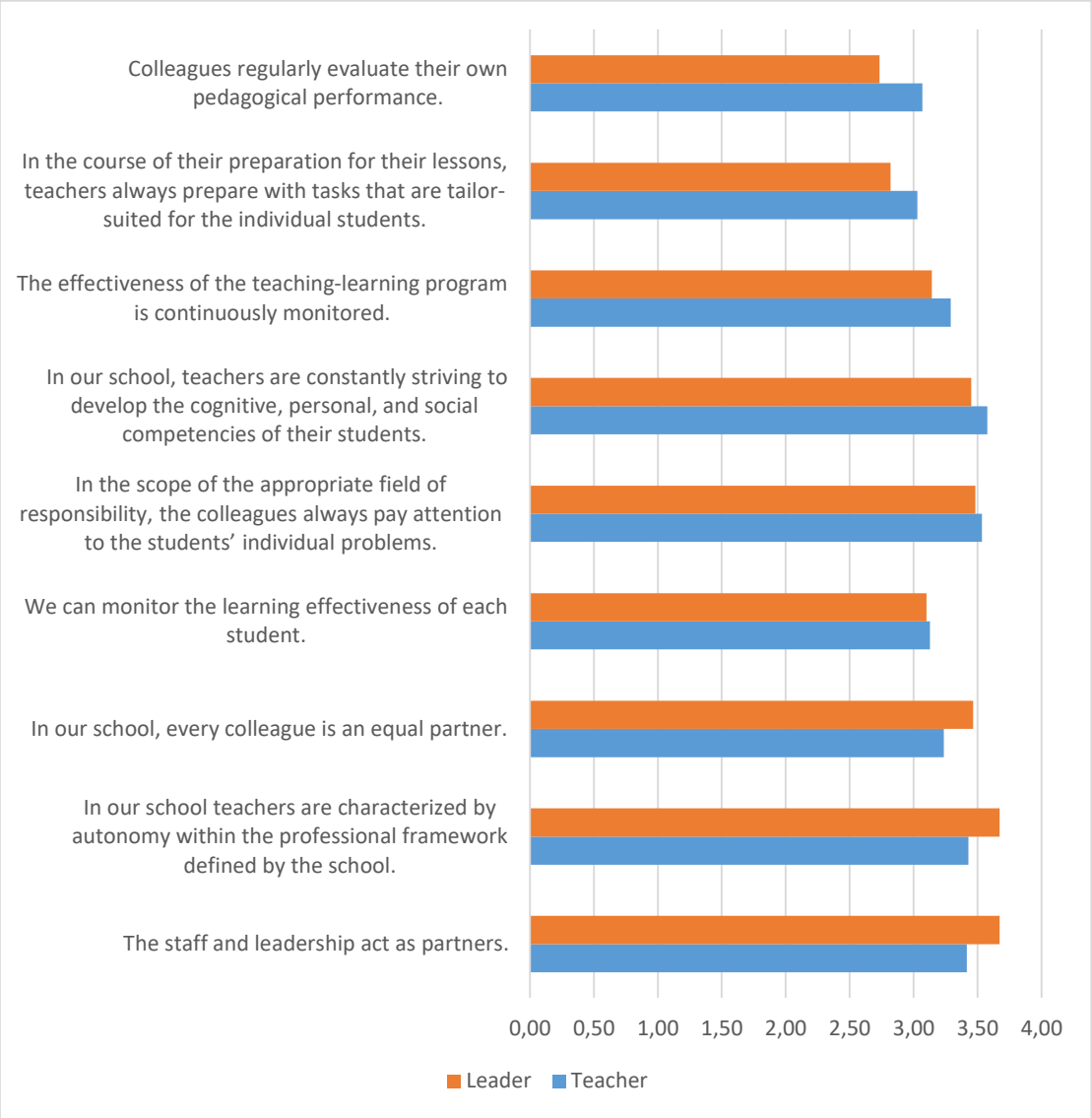


N_Leader = 57-64, N_Teacher = 753-901

Question: Please indicate how specific the following statements are to your institution (1: not at all; 2: rather not typical; 3: more typical; 4: completely typical).

The fifth element of our model measured the atmosphere and the cooperation between employees, as well as the shared responsibility embedded within these. We examined – for example – interpersonal relationships within the school, the autonomy of teachers, monitoring practices, and tracking learning outcomes at the individual level. The aggregate mean values related to this dimension were higher than value 3 at both teacher and leader level (leader average: 3.04; teacher average: 3.18). Our data show that self-evaluating or taking responsibility for students' individual development is less typical among examined institutions. While in the case of the former variable we could see more significant differences between the distribution of leaders’ and teachers’ responses (8% of leaders and 32% of teachers indicated that the corresponding statement is “Completely typical”), in the latter area teachers’ and leaders’ responses are less divergent (Figure 8).

Figure 8. Averages of variables related to responsibility, cooperation, trust dimension based on teacher and leader databases from the second data gathering



N_Leaders = 57-64, N_Teacher = 753-901, Question: Please indicate how specific the following statements are to your institution (1: not at all; 2: rather not typical; 3: more typical; 4: completely typical).

The next dimension focused on teachers' learning within the school and internal knowledge sharing. Related statements revealed sub-areas such as risk-taking, development of pedagogical practice, or adaptation of new technologies. According to our data, this dimension was considered more characteristic than the previous ones by both leaders and teachers (leader average: 3.26; teacher average: 3.43). Among the examined institutions, the most decisive of the listed elements seems to be the striving for the regular renewal of teaching practices, which appears as a common goal on the one hand and as a leadership expectation towards colleagues on the other hand (see Figure 9). 47.5% of leaders and 58% of teachers indicated that they fully agree (marked "Completely typical") with the statement that "In our school, one of the main objectives is to regularly renew our knowledge for continuous improvement.".

Figure 9: Averages of variables related to innovation, initiative, risk-taking dimension based on teacher and leader databases from the second data gathering

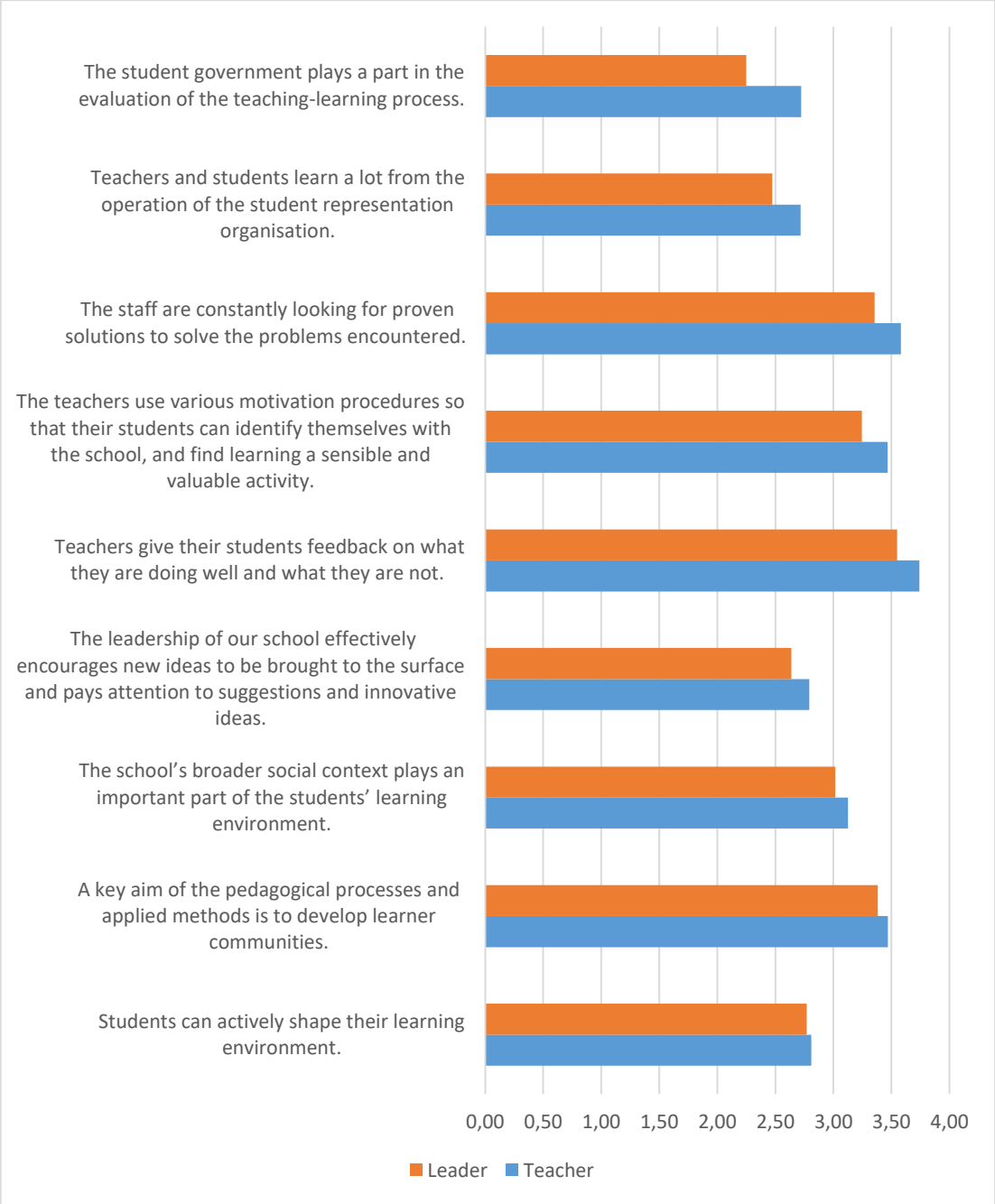
N_Leader = 57-64, N_Teacher = 753-901

Question: Please indicate how specific the following statements are to your institution (1: not at all; 2: rather not typical; 3: more typical; 4: completely typical).

Finally, the last component of our model was the partnership and network relations of the institutions. Following the first research phase results, we focused firmly on the items related to this dimension towards students as advocacy partners. Also, we left in the questionnaire those variables that try to capture the presence of the broader social environment and the search for good practices (also found in partner institutions). Our data suggest that the intensive activity in this area may be the most challenging field for schools and teachers (leader average: 2.96; teacher average: 3.15). After the first analysis of our data, we can assume that the examined institutions are still not characterized by joint work with partners; students rarely find themselves in a partnership position with a higher level of advocacy capacity, although they have a relatively large margin of manoeuvre. With the statement that "The student government plays a part in the evaluation of the teaching-learning process.", 20%

of teachers indicated that they fully agree (marked “Completely typical”). In comparison, only 5% of leaders were of this opinion (see Figure 10).

Figure 10: Averages of variables related to network and partnership dimension based on teacher and leader databases from the second data gathering



N_Leader = 57-64, N_Teacher = 753-901

Question: Please indicate how specific the following statements are to your institution (1: not at all; 2: rather not typical; 3: more typical; 4: completely typical).

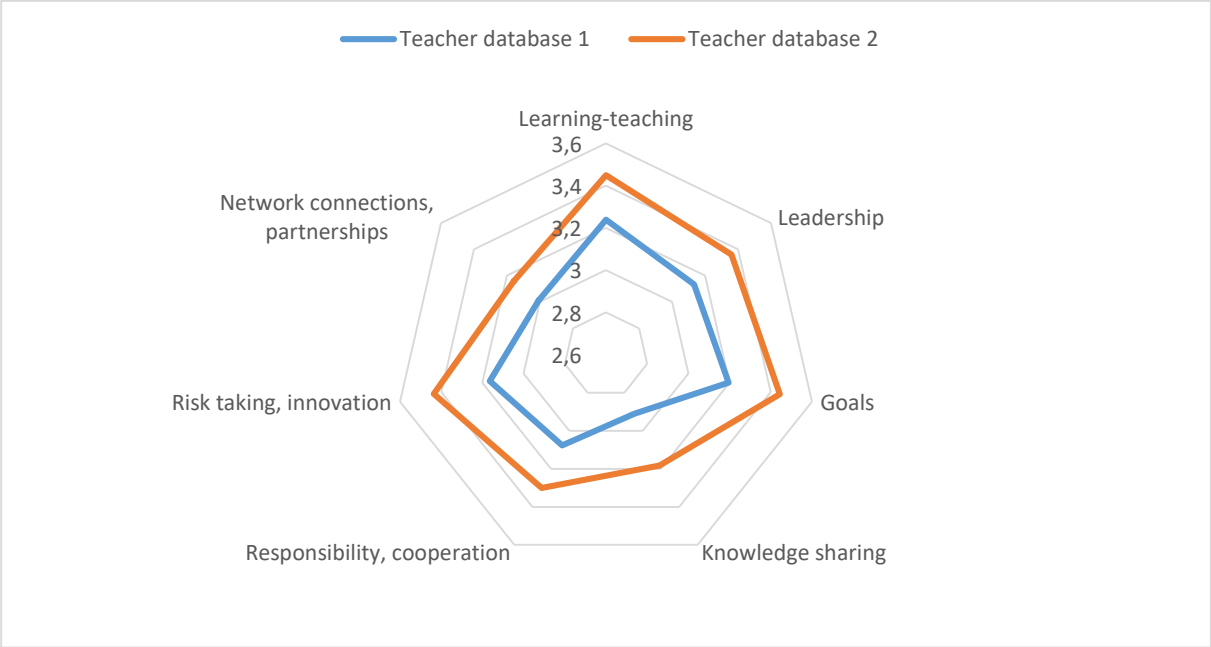
According to the above data, the most minor developed learning organization element among the examined schools was networking and knowledge sharing. Each of the variables presented above was included in the teacher questionnaire of first-round data gathering, while roughly two-thirds were also included in leaders’ first questionnaire. Thus, it became possible to examine the changes in the elements of our theoretical model over the past five years among the institutions examined.

Changes in model elements intensity

In order to examine changes of institutions' learning organizational features, we created composite indicators for each of the above dimensions in both first and second, teacher and leader databases. The composite indexes were based on the average values of the statements related to the specific dimensions (i.e., to the 7 model elements). From the databases of the first surveys, we used for the composite indexes only those indicators that were included in the second surveys too.

At first, we analyzed the differences between the two teacher databases. The primary examination of these data suggests that there was a broadly balanced growth among the examined workplaces according to the 7 organizational features given by our learning organization model. According to our data, the most significant increase occurred in the least advanced "Knowledge sharing" area. Thanks to the composite indexes, we had the opportunity to compare the learning organizational features of respondent teachers' workplaces in the spider-web diagram below (see Figure 11).

Figure 11: Distribution of composite indexes of 7 learning organization dimensions order based on teacher databases from the two data gathering



N_Teacher database 1=997-1132 N_Teacher database 2=753-901

A much more detailed picture of the growth of each dimension is shown when we look at the values of primary variables. Examining the variables showing the most significant displacement, we can see that serious increases can be observed within each dimension of our model. The figure below (see Figure 12) lists the 18 items with the most significant displacement in descending order of rate of increase. Observing the statements, we can see that the primary variables belonging to different groups according to the above categorization appear here. However, it is also clear that it is difficult to determine which dimension a variable is closest to. Thus, for example, the first two statements, which came under the heading of knowledge sharing due to our clustering, also characterize the dimensions of innovation risk-taking and responsibility-cooperation.

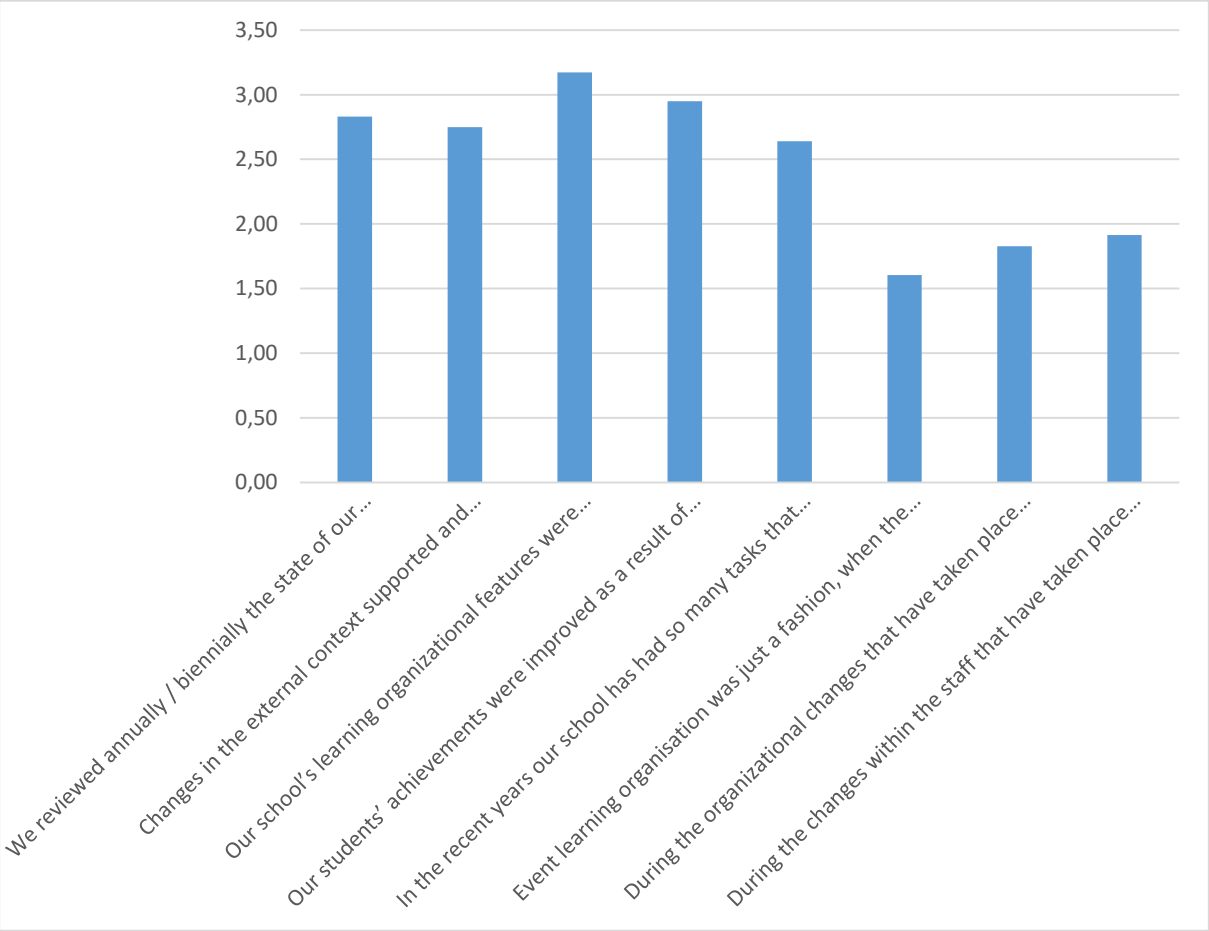
Figure 12: Averages of the variables showing the most significant changes in descending order based on teacher databases from the two data gathering

N_Teacher database 1=997-1132 N_Teacher Database 2=753-901

Although in this paper we aimed to present variables directly related to our learning organization model, it is important to note, that our databases provide an opportunity to capture changes in organizational functioning in other areas too. We may well rely on questions other than the issues presented above, which were included in both of our surveys and explore the specifics of the workplace environment or the organization's effectiveness from different perspectives. In addition, the question blocks of the second data collection that provide information about directly the change process can also lead to important findings. At the end of our study, we give a quick insight into one of these: the diagram below (see Figure 13) shows the average values of a block of questions that explores factors such as strengthening and weakening, conscious monitoring, and impact on the performance

of the learning organizational features. Based on these variables, the institutions are expected to form important groups, on which we can rely further in-depth analysis. For example, organizations whose leader (instead) agreed (56%) and whose leader (somewhat) disagreed (34%) with the statement that "In the recent years our school has had so many tasks that there was no time and energy to deal with learning organizational operation."

Figure 13: Averages of variables related to learning organization operation based on leader database from the second data gathering



N = 58-61

Question asked: Please indicate how typical the following changes and events were for the operation of the institution. It was not characteristic at all (1), It was rather not characteristic (2), It was more characteristic (3), It was completely characteristic (4).

Summary

In this study, we presented the theoretical models that were created during our learning organization research, we described the measured intensity of the model elements in the examined institutions, and we provided insight into our first longitudinal results. Our databases are significantly more prosperous than the variables displayed here, but even this primary insight, revealed several important messages. The primary analyzes presented here illustrate clearly the direction and areas of the changes that have taken place in the last five years in learning organization characteristics among the examined institutions. It is also clear that we can rely well on our synchronous and diachronic model for analyzes focusing on the longitudinal dimension. After the first analysis of the data, it can be said, that the respondent teachers and leaders were typically satisfied with the quality and effectiveness of pedagogical work in the school; the most advanced of the learning organization dimensions were

shared goals and vision, risk-taking and innovation willingness. Somewhat lacking is a sense of responsibility and collaboration, and more significantly, the dimension of knowledge sharing and partnerships. Nevertheless, in the case of all seven model elements, the examined schools (workplaces) indicated a somewhat balanced development; However, the most significant shifts of primary variables also predict that after analysis with advanced statistical methods, newer learning organization model alternatives will emerge.

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György MOLNÁR

Methodological and curriculum development-related innovation options and challenges in education in the aftermath of the pandemic

Introduction

The digital transformation led to radical changes in our lives, including one's attitude to technology and the modification of lifestyles. In contrast, the everyday life of today's youth, known as digital natives, is determined by the Internet and the use of mobile communication devices (Prensky, 2001) Szűts, 2009). Such paradigm shift left its mark on the education sphere since digital devices are increasingly integrated into the teaching process (Molnár.et.al., 2019) (Simonics, 2016). Therefore, an evident change is discernible regarding learning habits as students tend to favour multimodality, individual learning paths, intense use of technology and demand immediate feedback. (Sass – Bodnár, 2014).

Furthermore, the identification of the self and individual goal-setting is defined by effects and impulses received online. These developments impacting the new student generation are justified since itself, along with the labour market, is continuously changing by economic and technological factors (Beetham – Sharpe, 2013). Consequently, a need arises for modified educational content and the acquisition of skills and competencies promoting lifelong learning, a shift of individual perspective and the introduction of new pedagogical practice.

Such phenomena imply increasing demands on pedagogues expected to keep up with the given changes while meeting the requirements posed by the information-based society. Effective teaching and learning require adjusting the learning process to learners' skills while fulfilling the latest professional standards enabling students to acquire relevantly and sound knowledge of long term validity, which can be adapted to the given developments (Köpeczi-Bócz, 2007). Accordingly, the role of teacher training institutions and professionals is essential as they have to prepare pedagogues to cope with the challenges of the 21st century.

Theoretical considerations

Info-communication developments have an increasingly profound and complex impact on higher education. Changes that initially seemed to be mere technical innovations now affect much more than the approaches, formats, and content of the modernization of higher education. The life of universities is being transformed by MOOCs (massive open online courses), OERs (open education resources), and e-learning applications – and not just at a methodological level; the perspectives and operations of these institutions are also changing, and the quality of teaching in higher education is undergoing a renewal (Beetham and Sharpe, 2013) (Benedek et al., 2018) (Benedek et al., 2019). Centres of learning such as the Open University (UK), FernUniversität in Hagen (Germany), and Universitat Oberta de Catalunya (Spain) have boasted successful track records for many decades. It can be said that they now consider online teaching and learning systems, which they operate at the highest levels, to be their main profiles. Internationally prominent traditional universities such as Stanford, Harvard, and MIT have also effected significant changes in recent years. They have made opting for open courses possible for many thousands of students and thus made access to higher education more flexible.

Thanks to ICT tools, modern learning methods have become generic, while network communications have made the social dimension of learning typical (Barber, Donnelly, and Rizvi, 2013) (Szűts, 2018).

Nowadays, significant initiatives – for example, the D-Transform project (Transforming Universities for the Digital Age) within the framework of the EU Erasmus+ Programme – are engaged in analyzing how activities assuming continuous interaction affect learning and the transfer of knowledge in the digital environment. At the level of learning theory, connectivism (Siemens, 2005; Downes, 2007) is playing an increasingly important role, and it is also transforming practice. Even though it has not gone undisputed (Bell, 2011) in the last decade, this theory can be said to have launched significant movements towards innovation. On the other hand, in the strategic thinking of higher education institutions in developed countries, for example, in the US (Allen, Seaman, 2014), there are marked differences in the new educational paradigms emerging in the ICT environment. Between the two extremes of absolute enthusiasm and absolute rejection, it is presumable that multitudinous institutional strategies are taking shape. In our case, we present the new teaching forms of e-learning with ICT tools integrated into educational frameworks and digital curricula in blended-learning programmes of a leading university of technology. Our institution is inherently conservative in the most positive sense (featuring predominantly full-time teaching, learning materials with restricted access, frontal lectures). Thus the new paradigm figuratively clashes with the given traditional and limited institutional profile and character.

New digital tools are appearing with increasing frequency, and they often engender new trends. This section explains how these trends can be recognized and potentially exploited.

People in the 21st century find themselves in a new working environment, and the social and economic networks surrounding individuals are more complicated than ever. Learning theory analysis typically examines the characteristics of social learning and pinpoints where new learning methods and techniques meet, with particular attention to developments in ICT (Orosz, 2021). In such an increasingly rich learning space, understanding how to apply new learning methods consciously and effectively may prove to be an investment that produces an excellent long-term return (Pusztai et al., 2015).

Physical networks (such as the urban environment) and virtual counterparts have changed our lives concerning two critical aspects. First, we are now able to connect and communicate with far more people than previously. This is partly a result of our accelerated lifestyle and partly attributable to the sophisticated hierarchies organized around the various roles we fulfil in life.

A new, virtual dimension is now attached to learning. In this respect, we should note that our multiple connections are now considerably less restricted in terms of time and space alike. In the developed world in particular, once the technical background is available (a smartphone and a broadband Internet connection will suffice), we can now contact anybody anywhere to exchange information (Ujbanyi et al., 2017).

Knowledge has become a dynamic concept, and knowledge acquisition is a process with ever-increasing spatial and temporal dimensions. Thus, on the one hand, education has diversified and is geared to increasingly high levels; on the other hand, in the past hundred years, the time spent in education has almost doubled – from six to eight years to up to twelve or even twelve sixteen years.

Digitalisation-based methodological components in the teaching and learning process

The effectiveness of digital Web 2.0 and cloud-based solutions has been confirmed by several research results, and the relevant professional literature is continuously expanding. Below we provide an overview of the most characteristic developments facilitating open, micro-content based curriculum development efforts.

The globalization of knowledge production resulted in such a high amount of information that could not be handled or managed without digital devices and databases. The users of Web 2.0 are not merely content producers but contribute to an information system characterized by the continuous change of the respective content. Teachers and learners are both parts of this system while performing and sharing their tasks in one location. Freely editable tags help the categorization of the given content

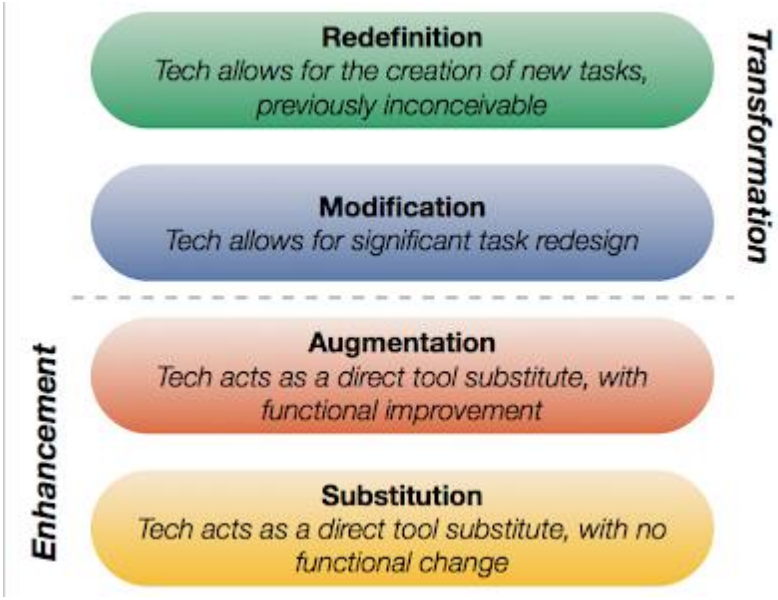
and information. Tags play an important role in providing information not only about the interests of content creators or users but promote connection building among the members of the system.

Another dominant tendency is the higher value assigned to situation-based and experiential learning and the formation of individual routes to information acquisition. These developments are brought on by the emergence of bi-directional web-based communication replacing the previous unidirectional model (Cress – Kimmerle, 2008), resulting in the propagation of writeable and readable materials. Personal Learning Environments (PLE) (Attwell, 2007) play a significant role in individualized knowledge acquisition as they enable users to meet the demands of the information-based society (Castells, 2005) along with the implementation of self-regulating personal learning strategies allowing users to become creative and productive components of the learning process instead of being passive participants (Blees – Rittberger, 2009). All these tendencies outline the three pillars of the Web 2.0 based education system: sharing, cooperation, and the formation of online communities.

Digital technology-based models

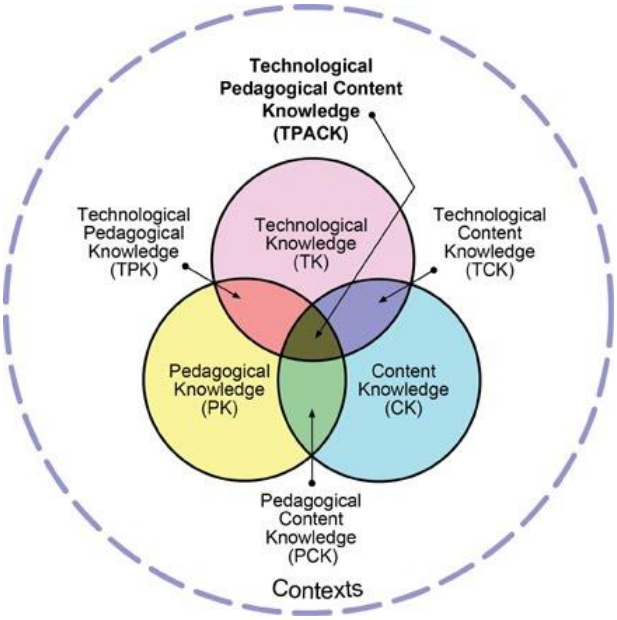
In SAMR (Substitution & Augmentation, Modification & Redefinition) technology, we can think of enriching the learning process through digital technology. The key to using the model is not to think of it as a structural process that must be followed in a restricted way. The aim here is to rethink and redesign traditional ways of learning to provide a richer learning experience that would otherwise be impossible without advanced technology. One can think, for example, of a shared document that is available online 24 hours a day, offering a shared writing and learning experience that would otherwise be impossible. The following figure shows the SAMR model.

Figure 1. SAMR-model, Source: Design for Learning - SAMR & TPACK



The TPACK model provides a so-called framework for productively integrating the appropriate level of teacher knowledge required to use technology in a complex teaching process. Technological knowledge is most effective when it is combined with deep content knowledge and rich pedagogical knowledge.

Figure 2. TPACK-model, Source: Design for Learning - SAMR & TPACK



Research background and conditions

In order to find out about the experiences of our students studying in the digital learning workflow in higher education, we conducted a quantitative online survey in March-April 2021. The online form was sent to the respondents using a snowball sampling procedure, and the contact details of the questionnaire were sent to our active students at the launch of the survey. The online questionnaire was compiled using Google forms and could be completed at https://forms.gle/ViHjHhDvJR6nZqtb9. A total of N=141 respondents completed the survey and provided answers suitable for evaluation. The questionnaire contained a total of 14 items, with nine open and five closed questions. The main focus of our survey was on digital teaching and learning, within which we would like to receive detailed information to help us understand the rapid tasks required by the digital switchover. Of course, despite our simple random sampling, the survey cannot be considered representative, but the results may highlight some significant trends.

The main features of the sample

Of the 141 respondents who could be assessed, 35% (49) were boys, and 65% (92) were girls, all enrolled full-time or part-time at our university. In terms of age, respondents ranged from 19 to 65 years old. In terms of majors, students enrolled in business studies and teacher training responded to our survey.

Research results

Below we briefly summarise the more discursive results obtained from the self-administered questionnaire, illustrated by simple distribution charts, supplemented by cross-tabulation and correlation analysis using multivariate analysis. A brief textual analysis of each set of questions is also presented without claiming completeness.

The first chart shows the distribution of respondents, with 65% of respondents being female and 35% male.

Figure 1. Gender distribution of respondents

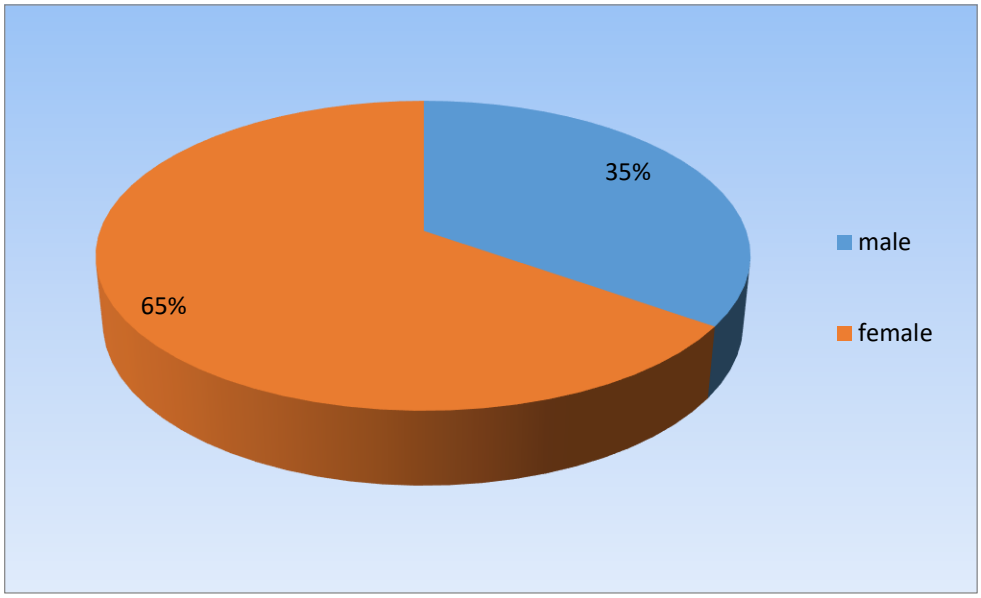
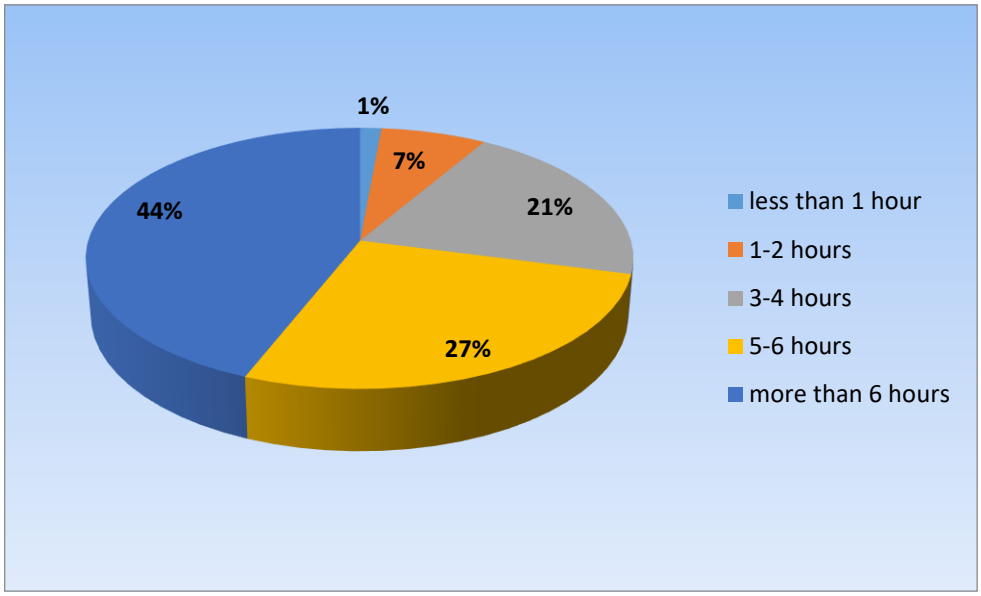


Chart 2 shows the average distribution of respondents' time spent in front of the computer. This shows that 44% of respondents spend more than 6 hours on their computer, 27% spend between 5 and 6 hours, while 21% spend between 3 and 4 hours on their computer. Only 7% of respondents spend 1-2 hours a day on the computer.

Figure 2. Distribution of average time spent in front of the computer



The following chart 3 shows the distribution of the time spent studying per day, with 43% of respondents devoting 1-2 hours to studying in front of the computer, 25% 3-4 hours and 20% less than 1 hour. 9% of respondents said they spend 5-6 hours studying and only 3% said they spend more than 6 hours.

Figure 3. Distribution of time spent studying per day

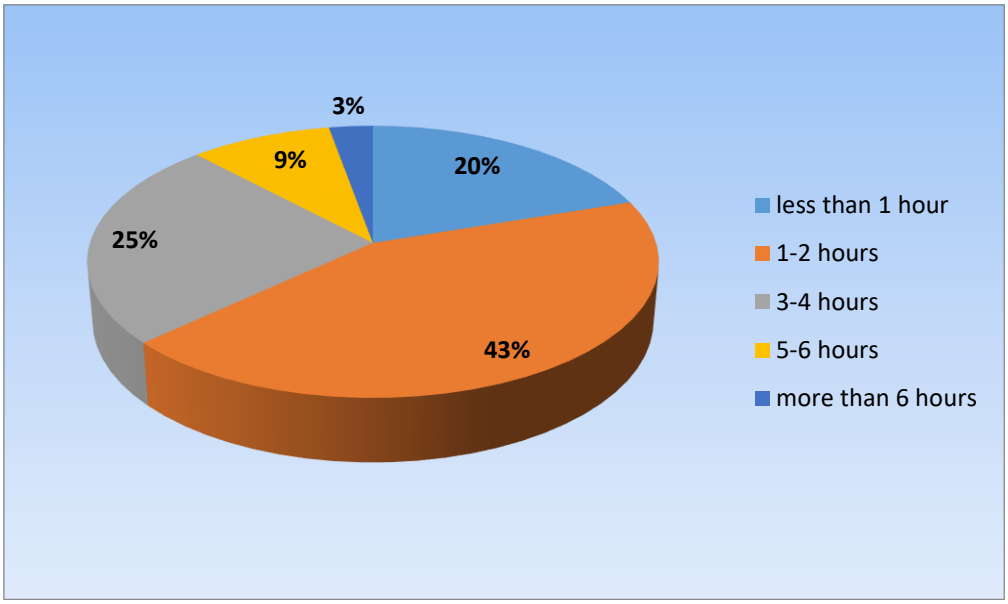


Chart 4 below shows the distribution of preferences for learning from digital devices, with 58% of respondents (82) preferring learning from computers and digital devices. Within this, 16% of respondents (23) were strongly in favour, and only 3% (5) were against.

Figure 4. Distribution of preference for learning from digital devices

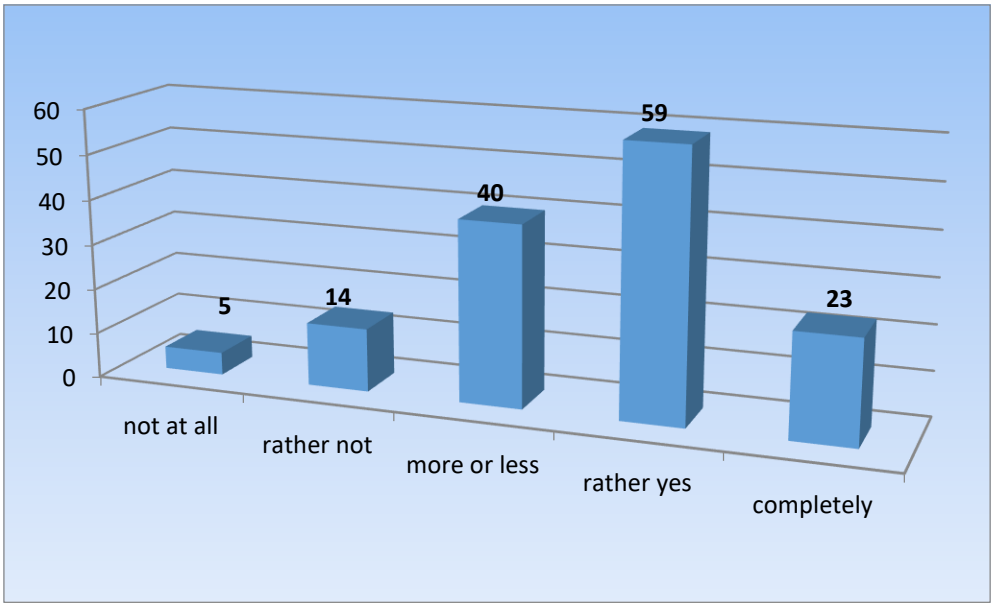
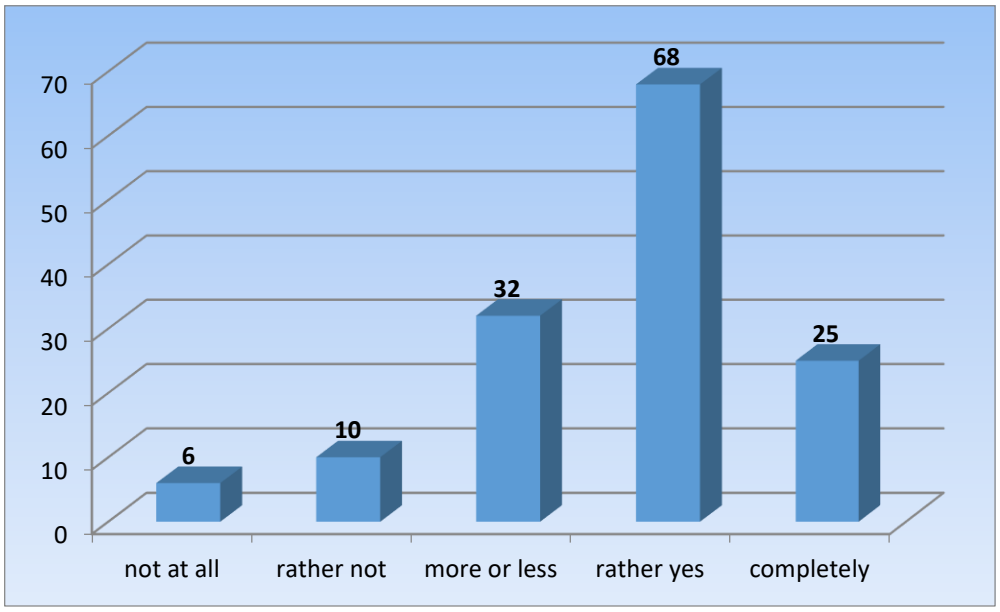


Chart 5 below shows the distribution of the effectiveness of learning from digital devices among respondents. The responses show that 65% of respondents (93) can learn effectively using a computer or digital device. Within this, 17.7% of respondents (25 people) feel that it is fully effective, and only 4% (6 people) were negative about it.

Figure 5. Distribution of effectiveness of learning from digital devices



Students responding to the survey spend 4, 05 hours a day on average in front of the computer or on the mobile phone, and the time spent for learning is 2,32 hours. The respondents included 49 males and 92 females. On a scale of 1 to 5 concerning learning with digital devices, the average value of positive answers was 3,57, while the score allotted to effectiveness was 3,68.

We used the Mann-Whitney probe to discern significant differences among the abovementioned variables. A significant difference can only be discerned in the case of one variable, the preference of learning with digital devices (p=0,005, U= 1632,500), in favour of males. (MR= 83,68, while for females it is MR=64,24).

Figure 6. Statistical tables

Ranks

	Gender	N	Mean Rank	Sum of Ranks
On a scale of 1 to 5 (1 is a dislike, 5 is a preference), how much do you like learning from a digital device?	Male	49	83,68	4100,50
	Female	92	64,24	5910,50
	Total	141		

Test Statistics[a]

	On a scale of 1 to 5 (1 is a dislike, 5 is a preference), how much do you like learning from a digital device?
Mann-Whitney U	1632,500
Wilcoxon W	5910,500
Z	-2,839
Asymp. Sig. (2-tailed)	,005

a. Grouping Variable: Gender

Men spend more time with PC, laptop, or telephone (MR=76,22 and MR=68,22), but the difference is not significant (9=0,239, U=1998). Women, however, allocate more time for learning (MR=74,89 as compared to MR=63,70), but in the case of this variable, the difference is not significant either (p=0,102 and U=1896,500).

Figure 7. Statistical tables

Ranks

	Gender	N	Mean Rank	Sum of Ranks
How much of this can be attributed to the time spent studying each day?	Male	49	63,70	3121,50
	Female	92	74,89	6889,50
	Total	141		

Test Statistics[a]

	How much of this can be attributed to the time spent studying each day?
Mann-Whitney U	1896,500
Wilcoxon W	3121,500
Z	-1,636
Asymp. Sig. (2-tailed)	,102

a. Grouping Variable: Gender

Males consider learning with digital devices more effective (MR=77,70 as to MR=67,43), but again the difference is not significant (p=0,127 compared to U=1925,500).

Figure 8. Statistical tables

Ranks

	Gender	N	Mean Rank	Sum of Ranks
On a scale of 1 to 5 (1 is a dislike, 5 is a preference), how much do you like learning from a digital device?	Male	49	77,70	3807,50
	Female	92	67,43	6203,50
	Total	141		

Test Statistics[a]

	On a scale of 1 to 5 (1 is a dislike, 5 is a preference), how much do you like learning from a digital device?
Mann-Whitney U	1925,500
Wilcoxon W	6203,500
Z	-1,525
Asymp. Sig. (2-tailed)	,127

a. Grouping Variable: Gender

We relied on the Pearson-correlation coefficient to establish correlation among the given variables. First, we examined a potential correlation between the time spent in front of the computer and the respective time allocated for learning. We identified significance (p<0,000) and received the same results and Chi value regarding time spent in front of a computer and preference of learning with digital devices, and the correlation between time spent in front of a computer and the efficiency of learning with digital devices. The respective results confirm that in the case of the students under inquiry, the use of ICT devices has even a direct effect on learning motivation and the outcomes, and a positive correlation can be discerned among the given variables.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	55,326[a]	16	,000
Likelihood Ratio	58,276	16	,000
Linear-by-Linear Association	27,154	1	,000
N of Valid Cases	141		

a. 15 cells (60,0%) have expected count less than 5. The minimum expected count is ,06.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Interval by Interval	Pearson's R	,440	,059	5,783	,000[c]
Ordinal by Ordinal	Spearman Correlation	,415	,072	5,378	,000[c]
N of Valid Cases		141			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Figure 9. Statistical tables

Summary and outlook

Based on our many years of experience and the research we have conducted, we believe that the effectiveness - and goodness if you can call it that - of teaching also depends on teachers knowing when to use digital technology and when to stick to traditional methods. And this knowledge will apply not only to the present but, we argue, to the entire 21st century. The recent pandemic, and the second and third waves of the Syndrome phenomenon, have posed many challenges for all social actors and for those in the education system in particular. Pedagogical and then methodological challenges have replaced the initially technological challenges. All this also required the long-term preservation of crucial competencies, highlighting understanding, patience, resilience, collaborative thinking, working together online, and maintaining a cooperative perspective. At the same time, the learning world of digital education has strengthened and valorized our previous decades of experience in distance learning technologies and methodologies, which we have been able to put to good use during this period.

Furthermore, as many circumstances and phenomena have changed since then, significant improvements have been necessary. The respective developments include interactive exercises, the availability of open and accessible professional learning materials, the emphasis on collaborative activity-based working methods, and interactive e-learning systems and technologies that support complex functions. The large sample of empirical studies briefly presented in this paper has also clearly confirmed the prominent role and importance of digital tools, platforms (Teams, Mentimeter, Redmenta, Discord) and IT equipment (PC and peripherals) and the shift towards the digital world. Our research also showed that there was a significant shift in device and system usage preference towards digital, ICT-based systems, which were used for an average of 4.05 hours per day for some purpose during the period under study, with a clear emphasis on the time spent on learning, which was 2.32 hours per day. From this point of view, innovative, professional initiatives focusing on the development of digital curricula that progressively follow the theoretical framework of e-learning and the expectations of programmed education may be of particular importance. An excellent example of this was the MTA-BME Open Curriculum Development Research Group's developmental effort over several years, which primarily supported students and teachers in vocational education (Benedek et al.,2019) and training, but its recommendations can be taken forward, its basic pillars and tried and tested methods can be adapted for the future.

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Ottilia FÜLÖP – Marcell NAGY

Teaching Mathematics Online with Increased Empathy in the COVID-19 Pandemic

Introduction

"We should remember when things go back to normal, people will not remember the educational content delivered, but they will remember how they felt, how we cared for them, and how we supported them." (Bozkurt & Sharma, 2020).

The COVID-19 pandemic has posed significant challenges for every stakeholder in the higher education ecosystem. Higher education institutions across the world had to close their campuses and reconsider their 2020 spring courses. One of the most challenging problems was to find the most appropriate strategy to move face-to-face university courses online as rapidly and efficiently as possible. The analysis and assessment of different responses of higher education institutes have received tremendous research interest recently. Several studies have been published in the past few months all over the world exploring various instructional strategies for the transition to online learning, including, e.g., India (Shenoy et al., 2020), Georgia (Basilaia and Kvavadze, 2020), Nepal (Thapa et al., 2020), Pakistan (Mahmood, 2020), Portugal (Flores and Gago, 2020), and the Philippines (Cahapay, 2020; Toquero, 2020). Crawford et al. (2020) give a comprehensive overview of how universities responded to the pandemic in 20 countries. Six specific instructional strategies are presented by Bao (2020) to summarize current online teaching experiences. A case study from Germany suggests that most university courses can be rapidly transformed into a digital format (Skulmowski and Rey, 2020). Alqahtani and Rajkhan (2020) identified the critical success factors for e-learning during the pandemic based on interviews with e-learning managers. They found that support from management and increased student awareness are the most influential factors. Mishra et al. (2020) studied the perceptions of teachers and students on online teaching-learning methods. They investigated how educational institutions can effectively transform traditional (offline) education into online education by portraying the example of an Indian university. Zhang et al. (2020) describe the implementation of the Suspending Classes Without Stopping Learning policy launched by the Chinese government, while Demuyakor (2020) analyzes the online education of China from the perspective of international students. Murphy et al. (2020) investigated student perceptions about the transition to virtual classes in the Northeastern United States. Olszewska (2020) surveyed students at different Polish universities, and they found that although students prefer traditional learning, they did not experience any serious issues with online learning during the pandemic. Moreover, the author also emphasizes that particular care should be devoted to first-year students since they must face a double challenge: the transition from secondary school to university and from in-class education to online learning. In another related work, Carrillo and Flores (2020) analyzed 134 empirical studies to provide a review of the literature on online learning and teaching strategies in teacher education.

Qadir and Al-Fuqaha (2020) provide a primer for students to thrive and learn effectively in engineering education during and beyond COVID-19 times. The authors argue that coachability is a key skill, which refers to the ability to seek and accept feedback and act accordingly.

However, only a few studies have focused on online mathematics education in the COVID-19 pandemic. Malizar et al. (2020) analyzed the opinion of secondary school mathematics teachers on e-learning implementation in Indonesia and found that student-level barriers had the highest impact on e-learning. Johns and Mills (2020) investigated the performance of online mathematics tutoring during the pandemic based on the experiences of 28 tutoring centre leaders from the US. The authors recommend tutoring centres to increase flexibility and relieve issues of access by offering both real-

time videoconferencing with shared whiteboards and asynchronous options. Johns and Mills (2020) also emphasize that tutors should be trained to adapt their tutoring style to the new environment.

This paper joins the discussion on the transition to online education by presenting a case study about first-year mathematics education at the Budapest University of Technology and Economics. Although the term, online education" is used with slightly different meanings, in most cases, the term refers to education that is mediated by the Internet (Rapanta et al., 2020). Our approach to online education was to provide real-time online classes together with their recordings and written e-learning materials with worked-out problems and detailed step-by-step explanations.

This paper is organized as follows: in the subsequent two sections, we outline the main steps of the transition to online distance education of a Mathematics 2 course taken by business and economics students, taught by the first author of this paper. We intended to offer our students more than emergency remote teaching (Bozkurt and Sharma, 2020; Hodges et al., 2020). In the fourth section, we review students' feedback on these steps, and where possible, we conclude as the popularity of distance learning is expected to increase in the future (Koksal, 2020). An increasing number of people pursue their studies after obtaining their university degrees to keep up with the rapidly emerging tools and techniques in science and technology. During the implementation of distance learning in the 2020 spring semester, we kept the maximum attention to facilitating students' online learning. The question is, do our students think the same? This emerges from the second half of the article, where we give space to their opinions. We believe that their feedback will assist us in improving online learning.

Important initial steps

The World Health Organization (WHO) declared the new coronavirus (COVID-19) pandemic on March 11, 2020. On the same day, a national emergency was declared in Hungary. University campuses – including the Budapest University of Technology and Economics – were evacuated, and an educational break was ordered for March 12-13, 2020, at several Hungarian universities. The spring break period was brought forward to allocate time to the organization of the transition to online education. Although based on a survey from 29 countries, Izumi et al. (2020) concluded that roughly half of the higher education institutions lacked adequate preparedness for the pandemic, Hungarian universities acted quite quickly, and the transition was relatively smooth.

Subsequently, in the spring semester of the 2019/20 academic year, nine teaching weeks had to be conducted online at our university. In addition, the midterm exams, makeup exams, and final exams were also conducted online using ICT (information and communications technology) tools. First, instructors chose the most appropriate communication channels, online platforms, and appropriate software programs. After that, the most critical task was to communicate with students and comfort them. Namely, we implemented the following measures:

- Following the Quality Matters Emergency Remote Instruction Checklist (Quality Matters, 2020), our top priority was explaining how the small class will be organized. First, a message was sent for the students, in which we invited everyone to join the Microsoft Teams group of the course, and we informed them that all lectures and seminars would be held on Microsoft Teams in real-time, which will be recorded as well.
- The updated Course Requirements were uploaded to the instructor’s website and MS Teams Class materials, which described the online examination procedure and the new dates of the midterms.
- Further worked-out problems were uploaded, and additional free e-learning materials were recommended that were assumed to aid learning from home. Our approach aligns with the recommendations of Johns and Mills (2020) since we offer both synchronous and asynchronous, text-based options to increase flexibility and alleviate access issues.

Solidarity with students

As it is also pointed out by Murphy et al. (2020), students are used to a face-to-face classroom experience; hence they need exceptional instructor support and guidance when shifting to an online learning environment. Therefore, we felt that in these turbulent and demanding times, an essential task of instructors was to assist students and make them feel that the university cares for them. To this end, we took the following steps at our Mathematics 2 course:

- we immediately informed the students about the future form of online education and examinations; moreover we reassured them to avoid uncertainty and distress,
- moreover, we provided instruction on how to install and configure MS Teams platform using their academic account,
- the instructors prepared written lecture and practice materials with plenty of worked-out problems, including much more detailed step-by-step explanations,
- we encouraged students to take advantage of the online office hours, especially before exams,
- the instructors stimulated learning activities by frequent communication (MS Teams chats, conversations before and after classes),
- furthermore, we asked for feedback from students during the academic year, and
- we processed the received opinions and ideas and acted accordingly.

Fig. 1 The distribution of the answers for the question: ”How do you think your grade reflects your true knowledge in mathematics?”.

Results of the survey – the students' feedback

At the end of the spring semester, after the finals period, a survey was sent out to all of the students (269) who took the Mathematics 2 course that covers the following topics: improper integrals, complex numbers, linear algebra, multivariable calculus, sequences, and series. Overall, 124 students completed the survey, and on average, it took them 8 minutes to fill it. All the students participating in the survey consented to the processing and communication of the results.

In the survey, we asked for the students' weighted grade point average (WGPA) in the 2019 fall semester and the 2020 spring semester. The average WGPA of the students in the fall and the spring semesters were 3.68 and 3.94, respectively, i.e., the average WGPA of the students increased; however, finding the reason behind this increment is out of the scope of this work. Note that a five-point grading scale is used in Hungary, where 1 is the failing grade, and five corresponds to excellent.

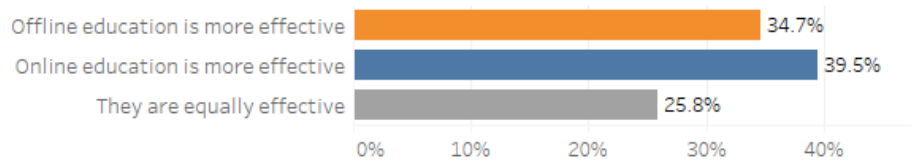
The fact that 95.2% of the students were delighted with the written lecture and practice materials uploaded few days before the lecture shows that the students appreciate learning materials with worked-out problems and much more detailed explanations. Fortunately, many (52%) answered that their exam results matched their math skills; however, slightly more than one-third (38%) of the

students felt that they know more than what is reflected in their grades. The distribution of the answers is depicted in Fig. 1.

The difference between the average grade in Mathematics 1 (taught in the fall semester of 2019) and the average grade in Mathematics 2 is smaller than the deviation of the average WGPAs in these semesters. According to the survey results, the average grade in Mathematics 1 was 3.0, and that of Mathematics 2 was 3.19. In case of the Mathematics 2, the difference between the mean grade of the questionnaire respondents and the mean grade of the entire class was negligible. While the average grade of the respondents was 3.19, the class average was 3.05.

The lecturers remarked that, similarly to previous semesters, the students could pick up those topics more efficiently, not based on the mathematics material of the preceding semester. According to the students' point of view, it is easier to follow and learn those topics, which do not require a deep and lexical knowledge of the course material of the previous semester. However, all the non-trivial concepts are discussed in the current semester. For example, these topics were the theory of complex numbers and linear algebra in the spring semester. The students achieved significantly larger scores (75% on average) on the midterm exam that involved the topics mentioned above than on the final exam (61.8% on average). In order to improve the students' performance, we will collect, summarize, and publish the most important and most frequently used definitions and theorems of the prerequisite courses. For example, we believe that students could pick up the concept of improper integral more efficiently with the help of a brief practical review of the integration rules of single-variable functions, especially the rule of integration by parts and the indefinite integral of rational functions.

Fig. 2.: The distribution of the replies for the question ”What do you think, which form of education is more efficient to learn mathematics?”.

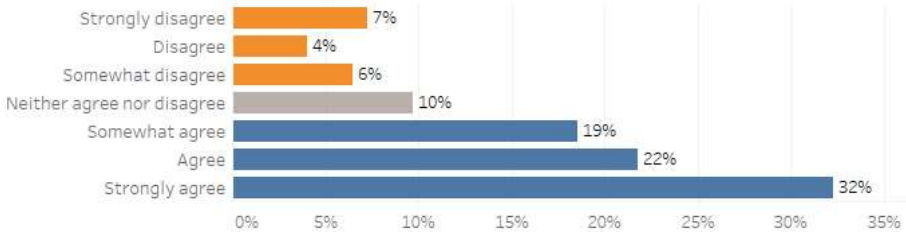


Furthermore, according to Fig. 2, the majority of students (65.3%) replied that the online education of Mathematics 2 was at least as effective as the traditional offline education.

We believe that the MS Teams' interface, especially the chat feature has brought students even closer to the instructor and to each other. Compared to the previous years, we observed that many questions were posed in chat and the comment section that would probably not have been asked personally or in a more formal email. Most of the discussions were open to everyone so other students could also profit from those questions. These functionalities surely contribute to the fact that 43% of the students reported that in online education their relationship with the lecturer can be maintained exactly the same way as in the case of traditional face-to-face education, moreover, 32% of them answered that the contact between the instructor and students was more direct and closer during online distance education than before.

As Fig. 3 suggests, the majority (73%) of students participating in the survey agreed that the two forms of education could be mixed in a non-pandemic era in the future, for example by having two-third of the lectures and seminars offline and the remaining one-third online.

Fig. 3.: The distribution of the answers to the question, whether they agree that the online and offline education forms could be mixed after the pandemic.



Finally, 72% of the students agreed that it is easier to get involved in online education than in the case of offline education because they would not miss classes due to traffic jams, getting up late, etc.

Students also provided some free-form text suggestions regarding our online mathematics teaching. In particular, most of them considered very useful the pre-uploaded written lecture and practice materials with extra explanations, recordings of the lectures and problem-solving classes. Many students suggested keeping the online office hours format in non-pandemic times as well.

The main goal of the questionnaire was to assess the students' opinions and experiences about the transition to online education, but we also inquired about the respondents' socioeconomic status. For example, it turned out that before the pandemic, 31% of the students had a job, and they typically worked 20 hours a week. However, after the outbreak of the COVID-19 pandemic, only 14% of the students had a job, but they typically worked 24 hours a week. Note that it aligns with the fact that Hungary's GDP fell by 13.6% in the second quarter of 2020 compared to the same period of the previous year (Hungary Today, 2020). Fortunately, the lack of a satisfactory Internet connection and an own proper computer was not a problem for the students, making the transition smooth. However, a few students (7%) reported, that the lack of their room and quiet environment made online learning difficult. Hence, due to the pandemic's effects, we suggest being as empathetic towards the students as possible.

Discussion

The spring semester of 2020 has been a big challenge for every stakeholder in higher education as the unexpected outbreak of the COVID-19 pandemic required an immediate transition from face-to-face classes to online education. The dedicated and disciplined work of both students and instructors as needed. It was a cooperative learning process in the spirit of mutually empathetic cooperation. The students were extremely helpful and understanding. However, our experience backed by student feedback suggests that university courses in mathematics can be efficiently transformed into a digital format in weeks. A surprising result is that students felt that communication with the instructor was more direct and closer during online learning than in the previous semester in face-to-face classes with the same instructor. An essential suggestion from the students was to move office hours online after the pandemic as well.

Although the grade distribution of the course does not differ significantly from that of the previous semester, a precise analysis of whether the learning outcomes had been met during the spring semester with the transition to online classes goes beyond the scope of this study. We also did not touch upon how learning mathematics changed with the transition to online education, which we propose for future research.

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Mónika POGÁTSNIK

Dual education: connecting education and the labor market

Introduction

The dual education is a kind of hybrid training: the students are full time students at a Vocational Education or Higher Education Institute and trainee at a company. Domestic and international experience highlights the effectiveness of dual training (Yu, 2012; Melin, 2016; Kovács & Török, 2016; Holik & Pogatsnik, 2016; Kocsis, 2020; Tastanbekova, 2021). Dual training increases professional competences and allows students to convert their theoretical knowledge into practice and enter the labor market as strong contenders. Research findings (Hermann et al, 2016) show that a rigorous selection process of apprentices, well-thought-out vocational education and career planning, integration into the world of work, incentive schemes and corporate social responsibility contribute to effective dual training.

In Vocational Education in Hungary, the dual training place must have a training program for specialized education, which includes the curriculum elements taught by the dual training place and the related practical knowledge, supervised and independent practical tasks, as well as competence and skill development, according to the curriculum of the given profession (Matlne et al, 2020). The dual trainer should plan the path to learning outcomes and help the learner with different solutions in this path. The training program shall specify the rules for the preparation, organization, and delivery of specialized education. The dual training site should also develop assessment and qualification criteria for the assessment and qualification of the trainee.

In the case of organizations providing dual training in VET, the law stipulates the requirement for mandatory practical instructor training and examinations for professionals involved in the training of students, thus helping to achieve efficient, effective, and high-quality training. The full-scale training and examination of the practical instructors is organized by the chamber of commerce. The practical training and examination of the chamber ensures the right to teach the professional qualification. Exemption from passing the Chamber's practical teaching examination shall be granted to a person who holds a master's examination or has a specialized higher education qualification corresponding to the profession undertaken by the dual training place and at least two years of specialized professional experience, or a higher education degree and specialized secondary qualification, and at least five years' professional experience.

Those who choose the dual form ***in Higher Education***, in addition to studying at university or college as full-time students, do regular internships at a company and acquire expertise that meets the needs of the company. A university student in dual education participates in much more internships than a student in a normal, non-dual form. After graduation, they enter the labor market as career starters who are professional with experience and have up-to-date knowledge of the company. Dual education in higher education provides an opportunity for companies to shape the student's knowledge according to their own needs during the university and college years. The companies intend to educate future professionals who will become prepared employees immediately after graduation. This form of training can also moderate recruitment costs.

The participation in dual education at university level is an opportunity for those students, who choose this form of education, it is not compulsory. Higher education dual training is the responsibility of the higher education institution, which organizes and implements the training together with the partners based on a cooperation agreement concluded with professionally qualified companies. In the teaching-learning process, practical trainings increase students' professional competence, knowledge of corporate operations and corporate culture due to their curriculum content, structure, and the number of hours they must spend in companies.

Benefits of the dual training

A competitive economy is based on the competitiveness of economic organizations, companies, and enterprises (Nogueira, 2014). Competitive vocational training and higher education are also essential for this. The economy and vocational training are inseparable, and their performance mutually influences the results of the other sector (Baethge, Wolter, 2015). The same inseparability and interdependence are evident in the dual training itself. This is because dual training can take place through close cooperation between the productive economy and the school system.

The dual training is highly dependent on the places provided by the business community in the context of apprenticeships. In times of economic instability or recession, the number of places on offer may decrease while the demand from students remains unchanged. Students need to find an employer who is willing to provide them with apprenticeship training that requires certain skills. At the same time, they need to prove very quickly that they have the basic behaviors and attitudes expected in the workplace (Modláné, 2015).

Dual training has many benefits for students and companies involved in training. Young people find it easier to get a job because the companies that employ them are contented to see a professional trained in their own needs and who know their own technologies and job expectations. The student can become acquainted with the corporate culture (Jahantab, 2020), be a member of a real workplace team, where they can meet new professional tasks and challenges every day. The company benefits from a dual form of training because they can get a young workforce relatively quickly.

Dual training benefits the learner:

- students socialize in a work environment during their school years,
- their skills will meet the technological challenges of the age and the expectations of the labor market,
- they will be able to develop continuously,
- a higher proportion of employment is expected,
- by practice-oriented quality training, their practical skills increase,
- a competent, and immediately available workforce for companies,
- the apprenticeship contract is a good basis for the employment contract and salary, as well as providing an environment for social status and financial independence.

Dual training benefits the companies:

- ensures the professional needs of the companies,
- reduces training costs, raises the appropriate supply of human resources,
- the student integrates into the company's work culture,
- the student learns the processes, the technology, the staff, the goals,
- it increases motivation and loyalty,
- provides the appropriate level of professional qualifications.

From a European dimension, dual training is also beneficial:

- dual training could be the central pillar of European vocational training systems,
- it is one of the important tools for reducing unemployment,
- it can reduce the gap between education and the world of work,
- vocational learning in the workplace is more efficient and effective, and the professional and skills profile is developed as a result of learning.

The goal is to develop the dual training system.

One way to develop a dual training system is to ***strengthen the role of large companies***. Several large companies recognized the situation that they could only ensure their labor supply continuously if they participated intensively in vocational training. Nowadays, large companies are already involved in

career guidance, trying to address primary school children in cooperation with vocational schools and universities. They join the experience-based shows of professions and participate in the Professions' Night, the Researchers' Night, and the Modern Factories.

The development of dual training has been promoted in Hungary by the government with targeted support in recent years. Non-refundable support in proportion to the number of students trained in dual form can be claimed for large companies for the costs of construction and acquisition of equipment related to the establishment of a workshop. As a result of the program, the commitment of large companies to practical training has significantly developed, their training infrastructure has improved, and the preparedness of human resources for training has improved.

The dual training place is entitled to a tax relief reducing the obligation to contribute to vocational training for the students it employs under the new Vocational Training Act. The amount of the tax credit depends on several factors (e.g., the training takes place under an apprenticeship contract or a vocational training employment contract, what profession the student is studying in). Regarding higher education, it is possible to enforce a vocational training contribution discount for students in dual training.

Most ***SMEs have labor problems***, and they find it difficult to fill vacancies, and have serious shortcomings in their professional skills and competencies in the case of new employees. To improve the situation, more and more SMEs could take part in dual training. SMEs are generally unprepared and reluctant to teach basic professional skills, therefore students should obtain a basic practice at sectoral level in modern school workshops. If the conditions are met, Sector Training Centers (ÁKK) can provide basic training. The special vocational training can be carried out cost-effectively in a group of 8-12 students, under the guidance of a trained specialist. The tools are provided jointly by the vocational training center and the participating companies. Higher education and research and development can also appear in the Hungarian ÁKK system. As a pilot program, the Balatonfüred Knowledge Academy will be established by Budapest University of Technology and Economics, where in cooperation with 12 SMEs operating in the region, with the support of the local government, it will form a training base where different professional courses will take place. Local governments can also play a role in supporting Sector Training Centers (ÁKKs) to contribute to the development of the regional economy by improving the efficiency of dual training. Based on this model, the "Industrial Park" in Veszprém was designed, which could be one of the emerging Sectoral Training Centers. Their aim is to enable VET learners to learn in an infrastructural environment that adapts to the economic challenges of the 21st century, enabling students to master their profession at the highest level and to do so on state-of-the-art technology. The development of the equipment of the existing training center in Zalaegerszeg, with the involvement of SMEs is also a good example, the special cooperation of which is in the Zalaegerszeg test track development program.

In addition to the development of training places, introducing STEM careers and professions to young people is also a key issue. In addition to the ***development of career guidance***, a system of tertiary counseling needs to be developed, which has a key role to play before dual training begins. It is necessary to coordinate the work of the organizations participating in career guidance, to precisely define the tasks and competencies of the actors, and to plan the processes of the career guidance system as a multi-year process. There is a need to launch intensive marketing communication campaigns that can reach the "Z" generation, to appear on channels where Generation "Z" is also present and speak in the style they like and follow.

The current career orientation is "big event" -focused, where the main goal is to present schools and provide information materials. For career-choosing young people belonging to the "Z" generation, these situations are not the most important in choosing the right career. Instead of large career choice events, experiential career counseling is suitable for trying out individual fields / professions should be strengthened. The career orientation period should be rescheduled to more years before the career choice, instead of the last academic year. Opportunities for experiential career counseling include digital creative

workshops, the organization of professional circles for students choosing a career, the organization of thematic summer camps for students, a role model program, the “One Day at Work” program.

Students choosing vocational training should be provided with predictable career opportunities. In the new training structure, all students can move from vocational training to higher education. For the number of talented young people who have acquired a technical qualification, there is a direct path from vocational training institutions to the university, recognizing their previously acquired professional knowledge and considering the results of their professional examination. Those attending the technical school will be much more motivated to complete the 5th professional year. This is important because, 46% of students in vocational high schools currently graduate without a vocational degree.

From September 2021, the technical training with diploma will start, which will open a new path to higher education. Students can obtain a profession and a high school diploma on the basis of a joint, advanced professional program of the cooperating vocational training and higher education institutions, and students can continue their studies at the given specialty university even without admission. The new form of training allows young people to acquire the highest level of expertise, including pre-defined credits, in even a shorter period of time. The program provides an opportunity to harmonize not only secondary and higher education content, but also dual training. Thus, students can also automatically pursue higher dual training at the company where they have previously worked under a vocational training contract. The vocational training system provides a unique opportunity for a young person from the age of 16 to gain an internship in a real corporate environment, to gain their own income and, ultimately, to obtain a higher education degree. For students, diploma technician training means a consciously planned career, predictable job opportunities, and for business organizations it is a more effective tool for recruitment.

This common pathway planning requires higher education institutions and VET institutions to better coordinate their training. There are currently two general problems that present different challenges: One is that for those coming from vocational high schools (especially those who have completed their 5th year), in many cases today part of the university curriculum is in many respects a repetition of what they have learned before, at a slightly higher level, but at the same time the overlapping contents appear scattered, so their crediting and recognition with credit is difficult, in most cases impossible. Therefore, the training contents must be harmonized, the overlaps must be identified, so that those coming from the technical school can be exempted from certain subjects and units during their university studies. The other problem is just the opposite, that is, when the secondary institution is quite different from a university in some fields of study. In connection with this, it is necessary to strive for better cooperation between specialized higher education and secondary education, for the harmonization of the content of trainings and for building on each other. From time to time, teachers from the university must come to the technical schools as guest lecturers. These visits can be lectures and practices promoting higher education training in the given field and the given higher education institution. At the same time, the visits provide an opportunity for university lecturers to get to know the teaching staff, human resources, and infrastructure of the given technical school. In the case of reverse visits, the lecturers at the technical schools get to know the conditions, equipment, and lecturers at the given university.

There is also a need for coordination in the case of dual training: a student starting dual training at secondary level at a given company should have the opportunity to continue at higher education level. This requires further cooperation with the given companies and organizations.

The secret to a good dual training site? Interviews with dual training sites and education institutions

Dual Training at Harman Becker Ltd.

Harman Becker Ltd. has been operating in Székesfehérvár for more than 20 years, they are engaged in the production and development of premium category audio, navigation, and entertainment information systems. They are developing the future of mobile communication technology in several

international locations: from high-end audio systems to complete infotainment stations with navigation, voice control, Internet, e-mail, MP3, TV, DVD, and video functions. They deliver premium products to the largest players in the automotive industry. In Székesfehérvár, they employ more than 2,500 people at two sites.

Harman Becker Ltd. in Székesfehérvár has been successfully training dual students in higher and secondary education since 2015. At that time, there were significant developments at the company with a need for specialists, so they decided that the best solution was to educate their future colleagues. With the increase in the number of students, there was a need to establish a workshop in the Székesfehérvár factory unit, which has been continuously developed and expanded ever since.

At present, a total of sixty-two university students and thirty secondary TVET students participate in HARMAN Hungary's factory units in the secondary and tertiary dual vocational training program. The company needs highly qualified professionals, as they produce high-quality products using advanced technologies, which requires deep theoretical knowledge, as well as automation, pneumatics, IT, and mechanical knowledge. Their main goal is to provide students not only with practical knowledge, but also to provide them with a vision of their future career. Many of the graduating students still work for the company, and several former technical students have continued their studies, and have also participated in dual higher education at Harman Becker Ltd. as university students.

According to Tibor Németh, the workshop manager of Harman Becker Ltd., one of the key elements of a successful dual training is the close relationship with dual students. In the case of outstanding students in dual vocational training, they were given support and motivation to continue their studies in higher education and at the same time to stay with the company as dual students.

It is also very important that the company devotes resources to training. In the opinion of Tibor Németh, it is less functional if, in the case of a company, the HR area handles dual training similarly to the organization of other trainings. The big difference compared to a shorter training is that it is a multi-year long-term process with young students. For many companies, there is still a lack of recognition that the need for good professionals cannot be met immediately, and time and resources need to be invested in this. It is never early enough to start attracting the future workforce, it is worth organizing career presentation programs from the 5th grade of primary school.

Mentors at the company play a key role in Harman’s dual training. The further training of mentors and the development of mentoring competencies are considered very important.

Dual Training at IBM

IBM Client Innovation Centre in Székesfehérvár and Budapest provides IT services, server operation, system management and development, and cloud-based services. IBM has been participating in higher education dual training since 2015, and from the beginning it launched its dual training program in Engineering Informatics BSc in Székesfehérvár and Budapest. 12 people have already graduated in the first two years, 51 people are still in training. The company decided to join the dual training because it wanted to ensure its continuous IT supply. University students, who study with them for 3 and a half years, learn about the company culture, join the IBM framework, and participate in the work of the departments. According to Martina Pergel-Schramek, Skill Development Project Manager in support of IBM, the company's dual training manager, one of the key elements of a well-functioning dual training is strong support from top management.

At the beginning of the dual training in 2015 at IBM, a program was developed in which students were introduced to a new field every six months to gain information and knowledge from as many fields as possible. As a result, they could not commit to any of the areas, they could not get involved in the projects because half a year was not enough to acquire a thorough knowledge of it. In 2019, they decided to redesign, according to which a new program put all students in a specific area. After 2 years it is possible to change areas. They try to tailor the program to students, regularly conducting surveys among participating dual students.

The organization of the semester project work caused difficulties during the Covid pandemic because the planned projects were partly related to onsite work, however, the company's employees, and with them the dual students, have been working in the home office since March 2020. Surprisingly, these first-year students who have begun their dual training in the home office that is the most agile and proactive.

Dual experiences of the István Széchenyi Secondary Technical School

The István Széchenyi Secondary Technical School has many years of experience with industrial internships. For more than 80 years, the school has been training professionals to meet the requirements of the age in the fields of mechanical engineering, electrical industry, and electronics, as well as information technology. The 2020/2021 school year brought radical changes, with the renewal of secondary vocational education. The primary goal of the transformation was to create a high-quality vocational training system that is much more flexible and adaptable to the needs of the labor market.

In the earlier Hungarian vocational training system only the technical grade students had the opportunity to complete an internship in an external industrial environment within the framework of a cooperation agreement or apprenticeship. The 13th and 14th grade students of the István Széchenyi Secondary Technical School were able to complete the mid-year internships at 39 different corporate partners. The companies agreed with the school about the curriculum content as the outcome of the internship was to pass the exam. In the case, when the company selected the students as trainees, post-graduate placement at the same firm was 90-95%. The external internships gave students a greater insight into industrial technologies, manufacturing processes, and the world of work. The companies, after one or two years of acquaintance, were able to select their employees of the future.

According to Lajos Zoltán Horváth, the school principal of the Széchenyi István Technical School, which was a clear negative experience, that the students' 2 company days per week alternated with 3 days of schooling. This, according to most corporate partners, has led to serious problems and even a loss of motivation for the company to get involved in vocational training. The problem was mainly that by the time the student could get involved in a work process, they had to come back to school and the following week the company was in a completely different process, so it was impossible for the student to be involved in certain projects and technologies.

The new Vocational Training Act of 2019 fundamentally changed the possibilities, in a very positive direction. Technical students first participate in a 2-year sectoral basic program at their technical school, during this period they do not go out in a corporate environment. From the grade 11 they must spend a part or all their specialized education in a corporate industrial environment. The alternative option is 1.5-year post-graduate courses, which also starts with sectoral basic education, but lasts only 4 months from September and around the beginning of mid-December students / trainees will appear in the company environment for the duration of their specialized education. In both forms (with and without general knowledge), basic education ends with a basic professional examination, so the company selection process can begin with these results.

The István Széchenyi Secondary Technical School is currently negotiating with 52 companies and holding workshops on the new system, which will start in the 2021/2022 school year, but this first year only affects the participants in the 1,5-year technical training without general knowledge. Based on the preliminary consultations, the companies also need trainers and rooms, laboratories, workshops, as there is not always enough capacity in their corporate environment, so the negotiations also affect these areas. The Vocational Training Act also specifies the in-service training of trainers in a corporate-industrial environment, which will also be provided on this basis.

The training output requirement in the future is based on learning outcomes. This is accompanied by the program curriculum, which mandatorily specifies the total number of professional hours and makes recommendations for subjects from which it is possible to deviate company – specifically, only the total hours are mandatory. As regulators require the company to have a training program, the István Széchenyi Secondary Technical School offered to review the regulatory documents in consultation with their professional staff, identify sector-specific areas that are exclusively school-

based (if any) and which can be acquired at the company. They develop a joint training program with the companies.

In conclusion, the strengthening of project education should also be mentioned. During the projects, they define the activities that the learner should encounter during their training. Students will start the projects in grade 9-10, in their basic professional education section with involving the companies. It allows the companies to have an insight into the skills of the students prior the dual vocational training starts.

Dual experiences of the Óbuda University

Óbuda University is a higher education institution located in Budapest with one faculty in Székesfehérvár. The university provides learning in the fields of engineering, informatics, science, economics, and teacher training. The strategic goal of the Óbuda University is to train professionals with excellent human qualities with immediately usable practical knowledge. As a domestic center of practice-oriented technical training, it pays special attention to the launch and development of dual trainings implemented jointly with economic partners.

In 2015, the dual training in the engineering informatics BSc course started as a pilot project at the Faculty of Engineering of Alba Regia of Óbuda University in Székesfehérvár. In 2021, 212 students participate in dual training, in 10 different undergraduate courses and 7 faculties. In January 2021, the 3rd dual year students have passed the final exam, and they were able to take their dual degree in their hands. There are currently 55 dual partner companies that actively employ dual students.

The dual students similarly to the regular full-time students fulfill academic assignments during the study or academic period for 14 weeks per semester. After this period, they participate in the practical training, lasting for 8 weeks in winter and 16 weeks in summer after each academic term at an enterprise, which has a cooperation contract with the university. During the academic period, if it does not conflict with the education, the student can participate in an on-the-job internship, one day a week.

In the case of dual and traditional students who participated in a 3-year longitudinal study, we examined the correlations between study outcome and placement. To date, 56 graduates have joined the study, of whom 29 (52%) have completed dual engineering and 27 (48%) have completed engineering studies in traditional training. Participants are BSc students in surveying engineering, in mechanical engineering, in engineering informatics, in technical management and in electrical engineering. 46% of the participants in the research graduated from a secondary technical school and 54% from a secondary grammar school.

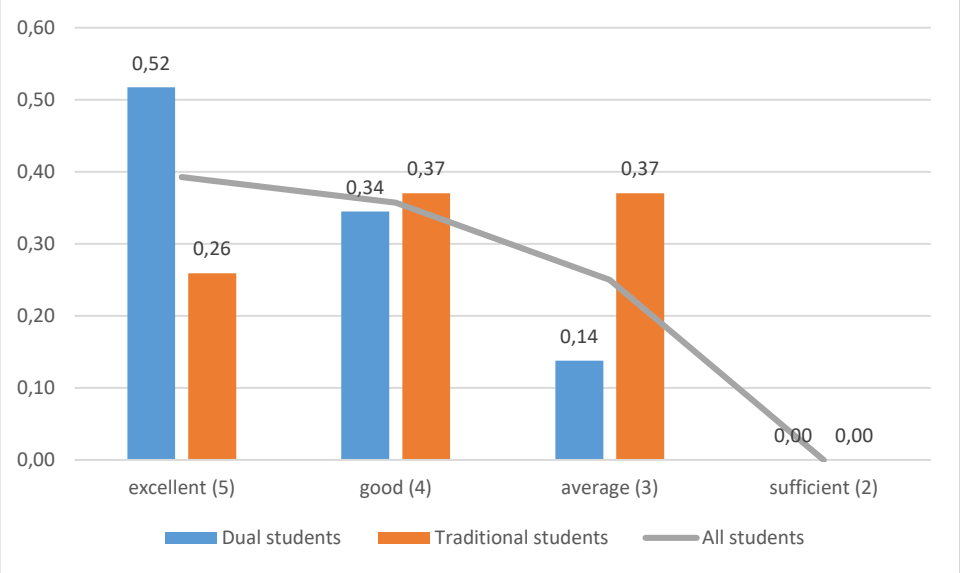
1. Table.: Study time until graduation (number of active semesters / number of students)

SEMESTER	DUAL STUDENTS	TRADITIONAL STUDENTS
7	25	18
8	0	0
9	4	6
10	0	1
11	0	1
12	0	1
Average study period (semester)	7,28	7,89

According to the curriculum, the undergraduate education of the examined BSc students is 7 semesters. Some students are unable to finish their degree requirements by that period, so their training takes longer. As shown in Table 1, there are more students in dual training who graduate on time. One year is the maximum extension that occurred among dual students, while for traditional students, there is also a multi-year extension in some cases. Among the students surveyed, there was no one who took a passive semester during their studies. Dual students are more motivated to graduate on time, not to postpone their studies, and their workplace also encourages them to do so.

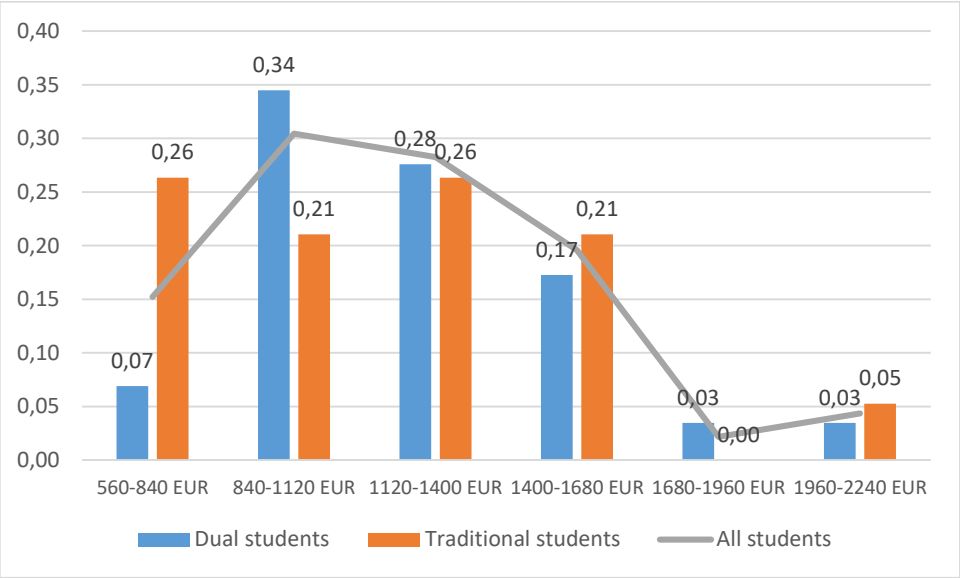
A dual internship that works well provide additional motivation for students during their studies, including completing their training on time.

1. Figure: Relative frequency of the quality of final examination results



There is a significant difference in the results of the final exam between students in dual and traditional training (Figure 1). Dual students graduate with excellent results in the highest proportion, and no one received a moderate or sufficient degree in the sample. Among traditional students, fewer have an excellent diploma, and a higher proportion have passed the final exam with good or average results. The quality of the dissertation plays an important role in this. In the case of dual students, in a real industrial environment, as participants in real industrial projects, much more thoroughly developed excellent works are prepared. In relation to the theoretical part of the final exam, the experience is that those students who have acquired a thorough proficiency in the practical applicability of the theory during their multi-year internship perform better.

2. Figure: Fresh Graduate Salaries (frequency of fresh graduates in each payment band)



The lowest starting salary category has a much higher number of graduates in traditional training (Figure 2). The proportion of dual students is higher in the middle categories. In the exceptionally high starting salary band, there is not much difference between students in dual and traditional education.

If we examine who are those who fall into this outstanding category, they are dual students or traditional students with other types of internships (non-dual training) or part-time jobs in the last period of university.

Based on the 6-year dual training practice of the Óbuda University, it can be said that there are partner organizations where dual training has been successful for years, but there are also those where it works less well. Successful internships are more likely in larger companies, where there is an opportunity to dedicate human resources to dealing with dual students as a corporate coordinator, and students also have a dedicated mentors at the company who is responsible for his or her professional development.

In smaller companies, the dual trainees are managed by the HR department and assigned to one of the company's few senior executives, who often do not have enough time to mentor. Nevertheless, even smaller companies have several success stories, because here a student may get a more serious professional task sooner, which often gives wings to a student of good ability and can be expected as a full-fledged employee already in the last two years of his / her studies.

Conclusion

Dual training is a response to bring school education closer to industrial practice. In the very fast-changing world of the 21st century, students thus have the opportunity to learn about state-of-the-art technologies in a real industrial environment, not only through the previous few weeks of practice, but through their full training. In addition to professional knowledge, on-the-job practice provides an additional opportunity to develop soft skills that are highly valued by employers nowadays. These are skills that can best be developed during activities e.g., communication skills, cooperation skills, networking, etc.

In our study, we set out to find examples of what it takes for a dual training to work well, examples of good dual practice. For the first time, we reviewed the main features, advantages, and difficulties of dual training in the field of vocational and higher education in Hungary. In interviews with corporate and institutional actors in the field, we examined what is the secret of their dual training, which has been operating successfully for years.

As a very important factor for successful dual training was found the high level of commitment of the management, the responsible human resources spent by the companies, the commitment and competence of the mentors. The same two basic elements can be essential for trainers. It is necessary that the appropriate responsible coordinating staff is involved in the process at the education institutions, who liaises with students and companies, helps to develop training plans, is available to both students and companies, and has the necessary information.

A well-functioning dual training is a long-term investment for the companies. Both presented corporate experience in this study supports the finding, it is a good opportunity to attract an experienced, immediately deployable young workforce. Dual students who have already graduated can, through their experience, become corporate mentors for the dual students of the future.

The benefits of dual training have also been reported by educational institutions. Dual students graduated from university with better results and are less characterized by procrastination and extended study time during their studies.

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Judit Takács MÓDNÉ

The importance and development of safety awareness with soft skills in industrial environments

The 21st-century living space

In the 21st century, cyberspace has become our lives' scene. Many people work, study, shop, meet, communicate through the World Wide Web. The range of applications is almost endless. From a very young age, we meet the world wide web, all we must do is turn on the television and watch a movie. In addition, there are other effects of this shift in living space. In the 21st century, the young generation is socialized in cyberspace. It affected and meaningfully changed people's personal and work relationships, the nature of their relationships, and the development of their soft skills.

Companies and individuals may think that they are too small and unlikely to be attacked. They believe their systems are well-armed and well-defended, so they do not expect an attack. Unfortunately, the cases of countless Hungarian factories in recent years also provide enough warning examples to deal with the protection of our systems. Often, IT security incidents are due to the company's infrastructure and operational deficiencies. "Users' security awareness is the first line of defence, not the firewall." It is necessary to take the security awareness attitude of employees. And not only knowledge but compliance with the rules is relevant. It is a great way to reduce potential attacks chances of success. (Bóna, 2020)

Thus, the expectations and needs of the labour market constantly change, with the modified environmental impacts, cybersecurity threats and generational characteristics of employees. (Kollár & Poór, 2018)

In this empirical research, the goals are to apply our knowledge in practice and its relationship correlation. In the hypothesis, the development of soft skills positively affects security awareness and expected competencies in today's job market. Additionally, cybersecurity as a competency has grown into a 21st-century, essential, scalable skill.

The literature review of terms related to safety, security awareness, and soft skills

This paper revises and systematizes the 21st-century skills presented in the introduction and related concepts such as cybersecurity attitude, knowledge and awareness, soft skills by summarizing the relevant literature. The study maps out the connections between each concept according to the current state of the science. Why is it essential to focus on cybersecurity today? What is the exact difference between knowledge and awareness? How can we most places the acquired knowledge at a conscious level? What indicators are available in measuring various soft skills and security awareness attitudes? How can these skills be developed? The author reviewed the following concepts in sync with the research from different approaches and their connections.

The importance of information security and cybersecurity in today's society

The benefit of the online world is that it facilitates the acquisition of data and information (Fregan, Kocsis & Rajnai, 2018). Cloud-based services make data and operations available from anywhere in the world. However, there are many downsides to this, as it carries countless dangers. An inadequately protected set of information circulating online is available to anyone at any time. The focus should be on examining the issue, who seeks and uses them for what purposes.

Cyber awareness, security awareness has developed into an essential and expected attitude since the advent of the digital age. Everyone should treat security awareness behaviour as a priority from an

economic, social, and governmental point of view (Nyikes, 2017). The presence of security awareness is becoming significant in today's world and is, thus, central to higher education (Novák, 2018).

Cybersecurity education focuses on developing online competencies and skills to participate effectively in the online world. It includes all kinds of awareness, knowledge, attitudes, skills, and participation required for a platform in different cyberspace. It requires cooperative consideration of technical and behavioural aspects. (Santhosh & Thiyagu, 2019)

Knowledge and awareness in the light of security

As Freud said, "Consciousness was only the tip of the iceberg, and the underwater part of the iceberg is the centre of gravity from which the motives come." He later thought about this with Jung, and they concluded that "if one becomes more aware of the subsurface layers within oneself, one will fail in lifeless." (Butler-Bowdown, 2007)

When looking at the safety aspect of this statement, it is essential to target this awareness process primarily. In this process, we even aim for a lifelong learning and knowledge acquisition process. In this process, everyone needs to achieve awareness with sufficient motivation, interest, and practice.

"Introduction of new forms of training, including the lifelong learning model; open and online training; education in collaboration with education and business" (Fregan, Kocsis & Rajnai, 2018). Of course, educational institutions also have a fundamental role to play in acquiring knowledge. First, we must consider the peculiarities of the generation and the fact that the Z and alpha generations can already be considered a kind of digital native. Then we have to deal with the appropriate training from primary school onwards, as with the continuous development of technology, knowledge changes.

According to some studies, the lack of knowledge is not the problem, but they are not applied or realized in real life (Szarvák & Póser, 2020). According to other studies, a survey in Hungary (managers with more than 400 employees) shows that very few have sufficient information security awareness and knowledge (Kollár & Poór, 2019).

As prevention is paramount in terms of security awareness, as it is in all areas of life (health, protection of our homes, transport), "in terms of cybersecurity, the security awareness of the individual must be increased to prevent avoidable incidents." (Nyikes, 2017)

Security awareness and soft skills in today's job market

Daniel Goleman (1995) "What do employers want?" based on its survey (involving 120 companies), they were asked to list the qualities that make their best employees stand out. Based on the results, the world of work and expectations have changed. It is no longer the professional knowledge, the practice that may be the quotient of the individual's intelligence is decisive, but the individual's soft skills have come to the fore. Goleman's list was "listening and communication skills, the ability to adapt to change and overcome difficulties, confidence, motivation, career-building intent, cooperation and conflict management skills, participatory or leadership ambitions.". (Butler-Bowdown, 2007)

21st-century labour market expectations and knowledge of available workers do not match. There is a significant gap between expectations and the knowledge generated during their training (Fregan, Kocsis & Rhine, 2018). This finding can be further extended to, for example, cybersecurity competencies due to the generational characteristics mentioned in the previous points and the shift of the world of work to cyberspace. The human factor and the social engineering that focuses on it remain a critical area in information security. Generation Z workers have a different set of values, working differently. Their experience has shown that the rules are more difficult to be tolerated and hard to integrate. They are predominantly striving for self-realization. It makes it hard to work in a team and to put the interests of companies first. Its positive fact is that "because they know and use the latest digital devices, techniques, applications and services with confidence, they do not have any difficulty in teleworking, in understanding teleworking processes, in actively participating in them" (Kollár & Poór, 2018).

Despite the age of digital indigenousness, "our security awareness and defence reflexes have not yet developed as they have ensured man's survival for thousands of years in physical space, evolutionary development." (Nyikes, 2017)

"Many people are looking for protection against threats in more advanced technical solutions. The more alarms we have, the more secure we feel." (Butler-Bowdown, 2007). This view focuses specifically on external security tools, technology control. There is no need for employee training, awareness, continuous control, or the application of the limitations achieved by technology.

According to the other point of view, "even the application of the most effective defence technology is not worth much if people do not act consciously and do it to a high degree." (Nyikes 2017). The most effective protection technique is prevention. As we know, human is the weakest link in this process. The employee must have appropriate professional knowledge, be trained, be motivated, and be able to develop his or her skills and be able to put the knowledge into practice. In addition, the development of safety awareness is determined not only by expertise and learning but also by motivation, emotions, behaviour, culture, interest (Szarvák & Póser, 2020). With this knowledge, the question arises that if we combine security awareness with appropriate security skills, complemented by relevant security skills, can we help to get the right cybersecurity competencies?

The purpose of the research, research questions, and research method

After reviewing the literature, the 21st-century employers' experience has examined in practice what skills they need, what methods they used to measure the skills inspected, and whether they pay due attention to their development. The research aims to map industry participants' significant expectations and needs, with a particular focus on soft skills and safety awareness. Through the research questions, what methods companies used to develop their employees' skills have been surveyed. The acquired/used knowledge measures, awareness, and the best measuring practices were reviewed. Furthermore, the research looks for the relationship between how the development of individual skills affects the development of cybersecurity competencies. There is a connection between the development of awareness and the development of different skills.

These responses were compared to examine how well companies can apply the practical, innovative methods suggested by the experts. After these, the main question is to what extent can public and higher education support the needs of the labour market by developing students' skills based on their experience? The following research questions and topics were formulated:

- What cybersecurity knowledge, skills, soft skills should a 21st-century employee have at your company? Can you list the most relevant skills you need?
- What do you think are the primary skills to be developed among recent graduates and young workers?
- Are there relevant work areas and workgroups in terms of information security risk at your company? How is it different for these groups to develop safety awareness skills, and how are the expectations for employee skills divergent?
- How significant are the expectations related to information security and cybersecurity awareness at the company?
- How is safety awareness measured and maintained? How do they ensure and compensate for the lack of skills and knowledge?
- How often is training used to develop safety awareness? What type of surveys do they prefer? (Online, personal training or online tests)
- What soft skills can help develop a safety awareness attitude and be effective? Do they also pay attention to developing these soft skills?

In this research, a mixed-type, empirical, qualitative research method over personal interviews was used among the Dual Partner Companies of the Alba Regia Faculty of Engineering of the University of

Óbuda. There are many advantages of structured and in-depth interviews. For example, we can collect comparable answers during the conversation with a predefined set of questions. Furthermore, it helps to express a free opinion while raising new directions concerning the research topic.

This research is a pre-survey, preliminary exploration. Nevertheless, the result contributes to the solution of a practice-oriented problem aimed at a productive method of developing safety awareness and increasing the efficiency of measurement by integrating it into the educational process. Educational processes need to change, as they need to follow 21st-century industrial soft skill expectations and the particularities of Z (current workers) and Alpha (future workers) young people.

Participants in the study

Based on the literature research, a significant proportion of corporate participants are under-informed about the new information security challenges. All companies have data protection and information security regulations. These are usually checked once a year in the form of a test, but each participant usually experiences assessment forms as a necessary inconvenience. Respectively, employers interpret it as an obligatory element, which is enough to tick and do, so they do not focus the development just on its performance. "The increasing number of hacker attacks on companies indicates that information security needs significantly more and more serious than before.". (Kollár & Poór, 2018)

The sampling took place at eight multinational companies participating in the dual training of the University of Óbuda. They have been employing dual students for years, so they are experienced in the new generation of workers. Therefore, they already have enough experience with young workers who are still in or just out of the education system. Respondents requested their anonymity for security reasons, so the study refers to them as A1 ... A8. At some companies, it had the opportunity to ask several experts on the research topic. During the conversations, besides the general security measures of the companies, their information security and cybersecurity training and measurements were examined. The multinational companies surveyed belong to different industrial sectors. For each company, the issue of cybersecurity has become a part of their lives. It has been amplified and made necessary not only by digital development but also by the pandemic.

Introduction of research results

Interviews have surveyed with various executives or professionals who care about security processes at companies. During the discussions, valuable feedback, thought-provoking information was gathered, which will also facilitate further research. The results of the answers to the questions presented in the previous chapter are presented below.

The expectations of 21st-century employers in terms of safety awareness and soft skills

The cybersecurity knowledge, skills and soft skills of the interviewed companies show a rather diverse picture in the practice of 21st-century employees. Let us look at information security expectations first. Because of security risks, in many cases, it is not left to the individual (excluding the human factor) to protect. Usually, a special department deals with managing security rules, detecting and resolving problems. They keep the level of safety awareness up to date with various pieces of training, strongly tied policy and occasional newsletters, and communication. As a result, there is a lower level of safety awareness than direct workers. It is also significant to them, as they operate electronic equipment. Typically, indirect workers have higher expectations of the necessary safety awareness.

Overall, every layer of employees should have a minimal safety awareness attitude. The expectations are consistent with the nature of the work. Then the question is, what counts as minimal knowledge of the security subject? The basic requirements listed were compliance, adaptability, considered correspondence, proper management of each website, sufficient passwords complexity, secure

handling of credit card transactions and other confidential data protection. Of course, these do not exhaust all possible hazards and the minimum protection measures when looking at the individual level of responsibility.

The general knowledge and soft skills expected were very consistent based on the answers. Proper professional knowledge, IQ and EQ are essential. Be flexible and compliant with the employee. Follow the principle of lifelong learning, have the right learning skills, interested in learning continuously and develop, have the right intrinsic motivation. Several respondents gave priority to the base competencies, have digital competencies, be able to count, read and interpret texts correctly, not only in their native language but in at least one foreign language.

There is more and more project work at companies. Employees necessary needs are capable of Teamwork, collaboration skills, conflict management skills and stress tolerance. Employers expect employees to be proactive. It would be helpful for employees to recognize the potential of situations and not just follow simple instructions. Employees need to be creative enough, and they need critical thinking and problem-solving skills. Communication and presentation are also necessary skills. Adequate flexibility and professionalism are also important.

Table 1.: A summary of the situation of the skills and knowledge required

Expected skills and knowledge	Lack of skills and knowledge
critical, **logical thinking and problem-solving skills**	logical thinking and problem-solving skills
learning skills, intrinsic motivation and desire for development	learning skills
communication and presentation skills	communication and presentation skills
teamwork and cooperation	teamwork
compliance and accountability	compliance and accountability
flexibility and creativity	
stress tolerance and management	stressmanagement
count, read and understand text, **foreign language and digital skills**	foreign language and digital skills
professional experience, knowledge	professional experience, knowledge

After evaluating the lack of skills, this indicates previously listed skills are problematic for employers. Most of the young people who come to them have only partial or no skills at the level that companies expected. Some examples are shared from the interviews below.

- "*Just to give a few examples of the skills of young workers, for example, they cannot write an appropriate style of email or present their work to the team.*" (Interviewee A2)
- "*Professional shortage, universities do not teach professional things at the right level to be able to work with fresh workers right away. At least 3-4 months of training is required after admission.*" (A4 interviewee)

- "*Adherence to basic rules at work is problematic. (such as ignoring the leave request process, avoiding the entry system, or not using it, respecting breaks and working hours) Following the rules and taking responsibility seems to be lacking.*" (A5 interviewee)
- "*They cannot think logically, they have a hard time seeing the connections. They cannot work in a team. Overall, the expected soft skills based on experience are not adequate*." (A6 interviewee)
- "*Perhaps the biggest problem is communication, more specifically the lack of proper communication. Or to use the acquired knowledge in a good place and form.*" (A8 interviewee)

Many can acquire basic skills independently, but some students find it quite complicated to do it alone. Dual training provides plenty of help in bridging the gap in this regard. Students can drop off their mentors during their studies, learn the importance of relevant soft skills, and develop them either alone or with help. (Pogatsnik, 2019)

Areas with high information security need and expectation at the companies surveyed

The interviewed companies listed the relevant work areas and workgroups in terms of information security risk. All respondents highlighted administrative positions, HR, and Finance departments. The IT department is essential everywhere, as they create and operate various protection and security systems. In addition, some companies have a specialized training department that tries to maintain employee awareness and achieve skills development through different repetitive training.

"*There is a department in the company where employees can only enter the workspace with special privileges. These extra privileges are only temporary. They repeatedly renew if the job requires it.*" (A4 interviewee)

Some priority departments have high expectations for employees. Especially in places where employees deal with sensitive data, product prices, product drawings. The following conclusions can be drawn from the responses. First, employers know there is sensitive data. Second, they know that external control does not protect everything, but employee safety awareness is not advanced enough.

"*I would like to highlight the IT sector in the company: it is not enough to create OS layer security or use filesystem-based protection. Nevertheless, if we go even deeper into security levels, a network firewall should protect company data. From an IT point of view, the expectations of individual employers towards employees could be higher.*" (A7 interviewee)

Examining the answers received, the answer to the following question was very thought-provoking. How significant are the expectations related to information security and cybersecurity awareness at the company? The safety awareness expectation is not substantial in practice for companies. Employers seem to be distrustful or pay little attention to employee development. They try to ignore the human factor, and they want to prevent possible attacks with external restrictions.

Tools and methods for measuring safety awareness in companies

To fill and measure the necessary skills gaps, companies hold annual pieces of training for employees. The training is usually online, which in many cases cannot be linked to internal motivation but rather to an external, necessary element of the work process. The training ends with a test, usually in an online form.

There is also ad-hoc information or post-incident information and communication from the company. However, these do not happen everywhere and with unpredictable frequency.

"*If someone does not reach the minimum level, they take part in another training right away, so they have to repeat it until they reach it.*" (A6 interviewee)

Some companies also use knowledge transfer meetings led by IT security. In these discussions, the workers concerned are well informed and given examples of certain shortcomings and how to deal with them.

The tests are easy to perform, the shared content (text, video) is not complicated, anybody can solve it even without serious attention, the minimum level is easy to accomplish.

There are several suggestions and ideas on how to make this process more efficient.

"*They could supplement the tests with possibly hidden questions from which to deduce how the worker would react in a given situation. The employers could check the level of safety awareness skills with questions examining social engineering aspects. Nevertheless, at present, the company is characterized only by simple training and a traditional test.*" (A3 interviewee)

Everywhere they apply a survey of all employees about their skills when entering and hiring a company. These are more about personality, professional issues, and possibly with little security awareness. To increase safety awareness, only annual pieces of training and tests are currently available to the respondent. According to them, this is not enough and is ineffective. Manual workers are usually subject to a paper-based test and personal training, referring to different skill levels and needs.

Soft skills that can help to acquire and apply safety awareness skills more effectively

The research looked for the answers with the interviewees about what kind of soft skills could support the development and maintenance of the security awareness attitude.

"*Discipline, compliance, sobriety, empathy (understanding the company's interests and goals), loyalty can support the development of a security awareness attitude.*" (A4 interviewee)

Many respondents highlighted the ability to work with the team and self-knowledge. After all, if the worker knows himself to enough degree, knows how reliable knowledge reacts to dangerous situations, he can easily prevent them. There are other benefits of self-knowledge. Furthermore, better human knowledge supports several necessary, expected skills like cooperation, communication, conflict management. In many cases, the mistakes of internal workers cause the incidents. If workers have deep human knowledge, they can take preventive action and avoid attacks easily.

Caution, analytical vision, and a high degree of compliance are significant. Companies have security regulations, but their workers do not comply with them.

The study examined whether companies pay attention to the expected soft skills development listed in the previous sections.

Unfortunately, at present, "*the development of these listed missing skills is left to the workers. They need to learn independently, based on articles, based on individual practices. Alternatively, if we have the option in the form of online training.*" (A7 interviewee)

Representatives of the company gave only a few positive answers about the development opportunities. "Some leadership skills development, conflict management skills development, or teamwork training has been launched." (A5 interviewee) The reason why is no more, not revealed. It may be of a financial origin, or its culture has not yet developed in companies. These attitudes need to change, skills need to be developed, and education needs to prepare future employees for these needs.

Sharing good practices, good experiences that are effective in maintaining awareness

The leaders of the companies had some ideas, suggestions, good practices that can be useful in the future to acquire the appropriate level of safety awareness and necessary skills.

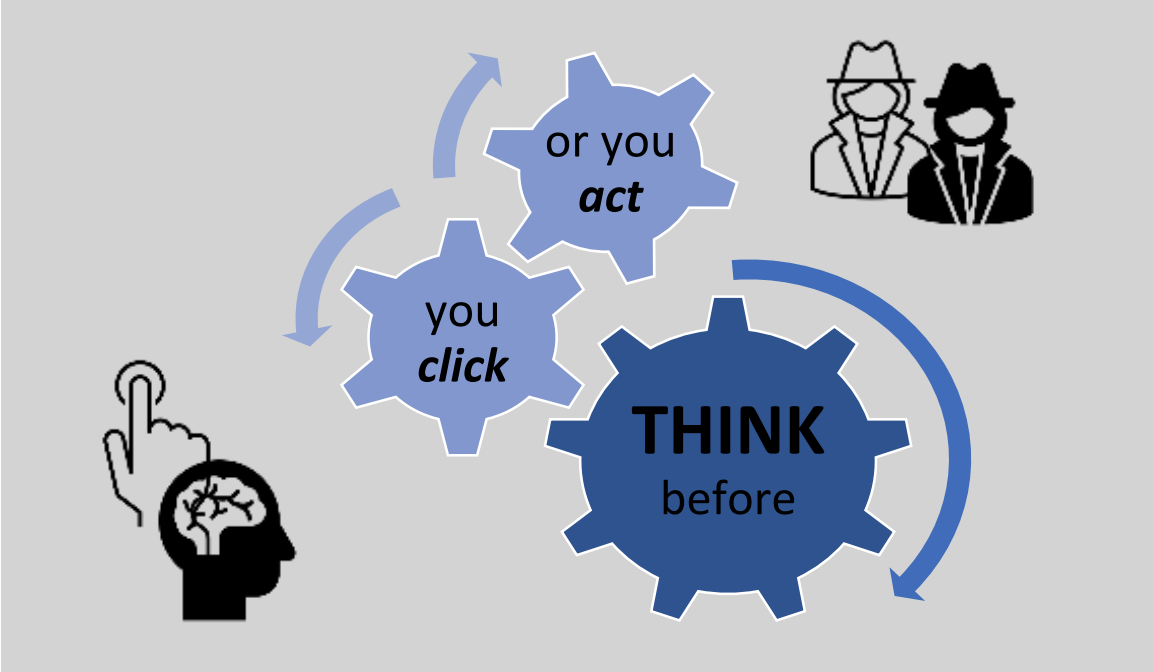
Employees who have access to sensitive data at work would require serious monitoring upon hiring. The job interview usually includes professional questions and IQ-related questions with logic and foreign language tests. Greater attention should be paid to tests of soft skills and personality traits in multiple jobs, complemented by cybersecurity competencies. It is needed mainly in jobs with sensitive data, but the study found the non-existence of hardly any jobs where this would not be emphatically important. It is consequently easier to assess and predict the employee's response to future critical situations. Employers should examine stress tolerance, collaboration, and conflict management skills. These surveys should be repeated not only at the time of admission but at intervals. Depending on the result, obtain developer training. Self-knowledge tests could be solved periodically, in a developmental way, and evaluated with the help of a professional. However, it would result in many lost working time and more resources that are not available for many corporations. Companies would need effective methods that are not currently available or do not work effectively.

"*The cybersecurity expectation must work top to bottom. In cybersecurity, we need to define what value means to the company. "Threats to corporate values need to be considered. They have to identify the manner of threats and the people involved. Communication has a big role to play within companies. Every employee needs to be constantly aware of what attacks to expect. Companies could build development training on knowledge and communication. Of course, a lot depends on attitude. Above all, control is needful to play a supervisory role.*" (A3 interviewee)

In addition to critical and analytical thinking, employers need to explain to their employees the importance of social engineering in today's world.

"*The motto of our company is also the motto of the press release issued by The European Union Agency for Cybersecurity (ENISA), slightly rewritten: "**Think before you click - or you act**"* (A7 interviewee)

Figure 1.*:* "Think before you click - or you act" - to be followed by everyone



It should be the motto for summarizing the results. 21st-century companies and the education system do not pay enough attention to the human aspect of the necessary security threats and the required soft skills development. We know and are aware of many dangers, but knowledge is unfortunately not enough in today's digital world. Unfortunately, the knowledge and skills required, plenty of workers fall short of expectations, if not decades. Regulations are often not read. Even if they read it, they do not follow. There is a clear need to introduce reforms in education, training, development, and testing that are more effective in supporting the interests of companies.

Summary, conclusion, and future work

Considering the expectations of the 21st century, the skills and competencies of the previous years are no longer enough. Therefore, thousands of research, results and suggestions have been made on the topic in recent years.

Unfortunately, in practice, this issue is still problematic from a human point of view. Isn't it because of the proper methods? Because of inadequate motivation? Not good measuring tools? Why can't companies appropriately protect their data with advanced IT backing? Many questions remain unanswered.

Till technology is evolving, people are changing, our tools and methods are becoming obsolete. In the future, the community will need new, strong competencies. Security awareness should not be a necessary lousy task in the workflow. Security topics will be a routine task in which it is in the interest of all parties to strengthen the line of defence. As participants have changed, technology is constantly evolving, cyberspace has become commonplace, so this will require a focus on new methods to help strengthen cyber competence in the future.

Cyber competence can replace digital competence, which requires more complex and diverse skills and attitudes. In addition, another correlation can be seen in this process. The lack of soft skills, not only as a lack of relevant competencies in employment but also in terms of the role of human factors, can in many cases increase information security risk factors in cyberspace.

In addition to external control methods, prevention has a significant role to play in increasing efficiency. These, in turn, need to be rethought in the light of the specificities of the new generation. New methods, a new motivational system and proper communication are necessary. It is relevant to make employees interested in the present and the future. Facilitating this is the future task of education and companies. Educational institutions can prepare forthcoming employees by imparting the proper knowledge and strengthening students' skills. Companies can keep the skills they need up to date with suitable methods.

All industry organizations need to pay close attention to the importance of protection when designing new systems. The designing process requires IT professionals with appropriate cybersecurity skills. Education must also play a dominant role in this. Collaboration between business leaders, industry, professionals, employers, employees, and education needs to be even closer. They can identify and serve extreme rapidly changing needs.

Companies need to build a new kind of protection system to support the protection of cloud-based workflows. Security technology is paramount in any new system design, as there is no longer any data that would not be uploaded to the World Wide Web in some form at all times. They have to develop new training methods and systems considering different skills, ages and generational characteristics. The technique of measuring competence and improving a safety awareness attitude needs to be changed.

The future directions of the research are to support these methods and measurement tools. It requires a deeper examination of current techniques, measurement tools and their effects on workers. Special attention will be paid to examining the motivational routines of the Z and Alpha generations in the future. A reform of the methods used in the industry could be proposed.

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Continuous Professional Development for Teacher Educator Development in Myanmar Education Colleges

Introduction

The Republic of the Union of Myanmar (formerly known as Burma), which borders Thailand, Laos, Bangladesh, China and India, is the largest country in south-east Asia. According to the 2014 Census, the population of Myanmar is approximately 54 million. It is an ethnically and linguistically diverse nation with over 135 ethnic groups since it comprises seven States and eight Regions. It gained Independence from Britain in 1948 and was administered by the military from 1962 until 2011.

There was political change in Myanmar, a transition from military administration to democracy in 2010. Political change impacts various sectors such as economic, education and health. For example, the budget for education increases from 0.69 per cent to 8.4 per cent of GDP between 2011 and 2020. As a result of increased expenditure on education, education reforms can be conducted following the Comprehensive Education Sector Review (CESR). The coup in Myanmar changed the country's politics once more on February 1, 2021. The National Unity Government (NUG) was also formed by the ousted National League for Democracy (NLD) politicians, activists, and representatives from several ethnic minority groups. This transition will have an unpredictable impact on Myanmar's education reforms, including higher and basic education.

Looking back to the history of Education in Myanmar, it can be divided into four periods: before Independence, after Independence, under Military Rule and during the democratic transition (Lwin, 2000). This paper reports how teacher education cooperates with the basic education in curriculum reform within the democratic period. It provides an overview of teacher education, basic education, curriculum reforms in Myanmar, and teacher education's role in the curriculum reform of basic education.

Teacher Education in Myanmar

Before Independence, it can be suggested that there is pre-service teacher training. Yangon University, which was founded in 1920, provided a teaching diploma for high school teachers. A faculty of education was set up in Yangon University in 1922, and the first teacher training college was in 1931 (Lall, M. 2020). However, Myanmar lacked a coherent teacher education policy before the 2012 education reforms. As a result, there was no pre-service or in-service teacher education structure and no professional standards for the many education stakeholders to meet. During the British independence period, there was no document about teacher education. Therefore, it can be said that there was no teacher training at the start of the military rule. There was no pre-service training and little investment in education between 1978/9 and 1997/8. As a result, new teachers were required to have a bachelor's degree, but no prior teaching experience or training was required (UNESCO, 2016).

According to Lwin (2000), a lack of qualified teachers impacts the quality of instruction. People who have just passed the Basic Education High School examinations are authorized to teach primary grades in some regions where there are few university graduates. These novice teachers join the classroom with no prior teaching experience. After several years of teaching, some teachers get training. The regime introduced pre-service and in-service teacher training after years of neglecting the teaching profession. According to a JICA report, pre-service teacher training ceased in 1971. However, it was reinstated in 1998 when five teacher training colleges (TTCs) and 14 teacher training schools (TTS) were upgraded to education colleges (JICA, 2013). As a result, the system overhauled today has remained untouched for the past 20 years.

At the time of writing, Teacher education in Myanmar is delivered through three types of institutions under the supervision of the Ministry of Education. Two Universities of Education (UoE) provide a five-year degree (B.Ed.) qualifying teachers to teach secondary school. These were upgraded from Institutes of Education (IoEs) in early 2015 in keeping with international trends. The fifth-year was recently added to include a year of research. In addition, the one University of Development of National Races (UDNR) provides free teacher training specifically to ethnic minorities.

There are 25 Education Colleges which provides diploma-level course known as D.TED course and Pre-service Primary Teaching Training (PPTT) course to produce qualified teachers to teach in primary and middle schools. Student teachers must have graduated with matriculation from upper secondary school to join a two-year D.TED course. This course allows teachers to teach at the middle school level, although they will start as primary assistant teachers when they graduate. Primary Teaching Training (PPTT) course, which takes four months, is provided for graduates to become primary teachers. These were also upgraded into education degree colleges in the 2020-2021 academic year, which provides the four-year courses for either BA (Education) or BSc (Education). However, it remains unclear to distinguish between the Art stream and the Science stream. Under this system, if teachers wanted to become secondary school teachers or move on to administrative posts in education, they needed a Bachelor of Education degree that could be acquired at the University of Education in Yangon or Sagaing, for those in Lower and Upper Myanmar, respectively (Lall, 2020).

In addition to these institutions, other organizations support teacher education. The *Education Thematic Working Group (ETWG)* has established a sub-group in Myanmar known as the Teacher Education Working Group (MTEWG). It was formed on May 3 2013, with the lead from UNICEF and support from the British Council in response to the needs of teachers in Myanmar. The Monastic Education Development Group (MEG) was established in 2011 to improve monastic education quality. One of its missions is to support teacher education, one of the monastic networks' primary tasks. Teachers in monastic schools are taught as trainers, who then train the teachers in their school, and then the teachers in the associated schools, according to the cascading technique of a variety of training providers.

Basic Education System in Myanmar

Lwin (2000) reported the education of Myanmar within the historical context. Before Independence, there were three types of school in Burma:

- Vernacular School in which the medium of instruction was Burmese or one of the recognized indigenous languages;
- Anglo-Vernacular School in which English was taught as a second language and the media of instruction were English and Burmese or one of the recognized indigenous languages;
- English School in which the medium of instruction was English, with Burmese as the second language.

After Independence, the organization of the school system in the new education plan was a 5-3-3 system that consisted of:

- Nursery School for children;
- Primary School for children;
- Middle School for children;
- High School including Agriculture and Technical High Schools for children and;
- Vocational and Technical Institutes and universities for young people.

In 1964, the system of education was reorganized under military rule. The structure of the 'New System of Education' comprised: (a) Basic Education; (b) Technical, Agricultural and Vocational Education; and (c) Higher education. In the Basic Education, school structure was changed from a 5-3-3 to a 5-4-2 system that consisted of Primary School, Middle School and High School. Kindergarten (KG) was

renamed Grade 1 in this system, and since then, KG has been used for severe teaching and learning rather than singing and playing, as is the case in most other countries. Even though the pupils are only five years old, the former Standard 1 syllabus is taught in KG. Therefore, it is possible to say that academic standards in Myanmar are a year ahead of the internationally recognized age norm (Soe, et al.; 2017, Htet, 2020).

By the Thirty-Year Long-Term Education Development Plan (FY2001-02 – FY 2030-31), the most significant education reform during the wave of democratization has been the alteration of the basic education structure**.** The former education structure (5-4-2) (grades 1 to 5 for primary level, grades 6 to 9 for lower secondary level, and grades 10 to 11 for upper secondary level) was modified into the KG+ 12 (5-4-3) structure in order to adhere to the basic education structure of other ASEAN countries. Thus, kindergarten, five years of primary schooling, four years of lower secondary schooling, and three years of upper secondary schooling make up the new basic education system KG+12 (5-4-3). The new KG class for five-year-olds began in the 2015-2016 academic year, with a new curriculum.

Education reform: curriculum reform

As the education system was changed to meet international standards, basic education and teacher education curriculum were upgraded. However, before the National Education Law was set up, there was no curriculum framework in primary education and teacher education.

In the previous education of Myanmar that has progressed from the old monastic education to the current modern education, there has never been a curriculum framework. However, syllabi, textbooks, teacher's guides with different teaching methods and various assessment forms were designed and used. Therefore, the Myanmar Ministry of Education is now implementing the educational reforms by setting the curriculum framework with the direction of the National Education Law (Soe, et al.; 2017, Htet, 2020)**.** In the National Education Law, chapter 1, section 2 (n), *curriculum framework* is defined as "the systematic written programs for all fields in formal and non-formal education, which are designed to achieve educational objectives and which include learning outcomes, contents, instructional methods and evaluation".

Basic Education Curriculum Framework

According to the Myanmar National Curriculum Framework (Ministry of Education, 2015), writing and implementing a curriculum framework for primary education mainly focuses on achieving basic education aims and thirteen guiding principles to realize these aims. The aims of the basic education curriculum are as follows:

After the completion of basic education, students will be able to:

- attend the school until the completion of basic education;
- develop "union spirit" and appreciate, maintain, and disseminate languages and pieces of literature, cultures, arts and traditional customs of all national groups;
- become good citizens with well-developed five strengths, including critical thinking skills, communication skills and social skills;
- apply they are civic and democratic in daily lives and abide by laws;
- be competent for Myanmar language, which is the official language of the Republic of the Union of Myanmar, and develop their skills in respective ethnic language and English;
- develop foundational knowledge and skills for higher learning and technical and vocational educations;
- develop sound body and sportsmanship through participation in physical education activities and school health activities, and apply health knowledge in daily lives;
- appreciate and maintain the natural environment and materialize its sustainability;
- become global citizens with awareness and appreciation of human diversity and abilities to practice basic knowledge of peace in their daily lives;
- take pride in being a citizen of the Union of Myanmar.

Basic education curriculum is vital for children and youth in any country because it meets their physical, intellectual, linguistic, emotional, and social needs. As a result, the primary goal of basic education curriculum reform is to establish a new curriculum that focuses on crucial 21st-century knowledge and abilities and attempts to address the shortcomings and flaws of the previous curriculum (Htet, 2020).

In May 2015, a series of curriculum frameworks were approved for the four levels of basic education (pre-primary, called kindergarten, primary, middle and high school). This provides an important foundational document outlining the expected learning objectives and outcomes for Basic Education. For each level, the frameworks describe the aims, curriculum structure, the inclusion of local curricula, the age-appropriate teaching and learning approaches, and the relevant types of assessment (UNESCO, 2016).

According to the age and developmental stage of kindergarten students, the curriculum structure consists of six learning areas: (1) Wellbeing, (2) Moral, Social, and Emotional Development, (3) Communication, (4) Recognition of the Arts and Creativity, (5) Exploring Mathematics, and (6) Knowledge and Understanding of the World. The new kindergarten curriculum differs from the previous subject-based curriculum. It will ensure that kindergarteners comprehend the entire universe and how to behave appropriately in society through a teaching strategy that incorporates music, dance, poems, games, and storytelling. This is the most effective technique to make learning more pleasurable for these young children. Learning areas which are (1) Myanmar, (2) English, (3) Mathematics, (4) Science, (5) Social Studies, (6) Physical Education, (7) Life Skills, (8) Moral and Civics, (9) Aesthetics (Music & Art), and (10) Local Curriculum make up the primary school curriculum. The middle school curriculum is divided into eleven learning areas, which are compulsory for all learners. These areas are (1) Myanmar, (2) English, (3) Mathematics, (4) Science, (5) Social Study (Geography), (6) Social Study (History), (7) Physical Education, (7) Life Skills, (8) Moral and Civics, (9) Aesthetics (Music & Art), and (10) Local Curriculum. There are two streams of twelve study areas at the high school level. Science and Art are the two streams from which students can select. The high school Science Stream curriculum includes 11 areas of study that all students must complete and three art-based social studies courses from which students can choose one. These learning areas are (1) Myanmar, (2) English, (3) Mathematics, (4) Physics, (5) Chemistry, (6) Biology, (7) Physical Education, (8) Life Skills, (9) Moral and Civics, (10) Aesthetics (Music and Art), (11) Local Curriculum and (12) one elective from Social Studies (Geography), Social Studies (History), and Social Studies (Economics). On the other hand, the high school Art Stream comprises 11 learning areas plus two science-based subjects and Optional Myanmar, of which the students can select one. These areas are (1) Myanmar, (2) English, (3) Business Mathematics, (4) Social Studies (Geography), (5) Social Studies (History), (6) Social Studies (Economics), (7) Physical Education, (8) Life Skills, (9) Moral and Civics, (10) Aesthetics (Music and Art), (11) Local Curriculum and (12) one elective from Physics (Integrated Physics and Chemistry), Biology (Integrated Biology and Chemistry) and Optional Myanmar. 21st Century Skills for the job opportunity and personal development are specifically organized to be taught with some contents depending on the locality, according to the new curriculum.

Teacher Education Curriculum Framework

Although a few modifications were introduced in the Education College Curriculum in the last 18 years, it dated back to 1998 because the fundamentals of structure, content and delivery model remain in place (Lall, 2020). There were a variety of reasons to make the teacher education curriculum framework update. Firstly, it needs to be relevant to the structure of a four-year education degree college. The second one is that it needs to align directly to the basic education curriculum framework and reflect the exact expectations, subject areas and methodologies. Basic education teachers are now required to undertake pre-service and in-service training to familiarize themselves with new curricula and teaching methodology. Lall, M. (2020) described that the teacher education curriculum requires new content to link with the new basic education curriculum. A new curriculum for four-year degree colleges is being developed by technical experts, including education colleges' teacher educators, and coordinated through UNESCO's 'Strengthening Pre-Service Teacher Education.

Teacher Competency Standards Framework (TCSF) forms the basis for all teacher education across the different institutions, qualifications and stages (both pre-service and in-service). The framework should be used as the basis of the curriculum framework as it provides a clear description of the learning outcomes of a teacher-training course. It should be used to inform the design of the content structure, the methodologies and most importantly, how the student teachers are assessed (UNESCO, 2016). Therefore, upgrading the teacher education curriculum framework was based on **t**he Teacher Competency Standards Framework, which comprises four domains:

- professional knowledge and understanding;
- professional skills and practices;
- professional values and dispositions;
- professional growth and development (Dabrowski and Spink, 2020).

The first-year curriculum was introduced in December 2019. The next-year curricula are still in the process, and it takes more time than planned because of the pandemic.

Role of Teacher Education in implementation of Basic Education curriculum

In implementing the new basic education curriculum, teachers cooperate with basic education departments and the JICA CREATE project. Education degree colleges are responsible for the primary and middle curriculum of basic education. At the same time, the Yangon University of Education (YUOE) and the Sagaing University of Education (SUOE) have the responsibility to implement the upper secondary curriculum.

In preparation for the introduction of the new curriculum (KG, Grade1, Grade 2, Grade 3 and Grade 6), the Ministry of Education conducted workshops and training for teacher trainers from education colleges and education officers from townships, districts and states/ regions, as well as ministerial officials from the concerned departments at the central level. Following this, nationwide in-service teacher training and pre-service teacher training were conducted to introduce the new curriculum. Teacher trainers facilitated in-service teacher training for teachers, including all primary and middle teachers from all schools, including monastic schools, private schools, and other schools that used the government curriculum (JICA, 2017a). In pre-service teacher training, student teachers attending the D.TED course and Pre-service Primary Teaching Training (PPTT) course in the education colleges.

Concerning the training for the high school new curriculum, there is no valid information, documents and practices. It is not implemented in the basic education schools at the time of writing because of the pandemic. Therefore, there is still weakness regarding the training for the new curriculum of basic education. The JICA report states that teachers have encountered several challenges in implementing the new curriculum. These included insufficient time to prepare the lessons, teaching subjects they had no training in – such as performing arts, especially playing the flute and singing songs in front of their students, and visual arts 'because teachers by themselves are sometimes poor in drawing and painting'.

According to the Oxford Policy Management (OPM) team, teachers are concerned because they do not believe they have the pedagogical abilities to implement the new method. Teachers claimed that the training sessions were too short and did not help them teach the new topic or educate in a more child-centred approach, mainly when they had a big class size (OPM, 2019). They required further training in order to teach the new curriculum courses effectively. Due to a lack of familiarity with the new method, they could not conduct classroom assessments on individual learners. 'Trained skills and experiences for Grade 3 and Grade 6 teachers are confined to two-week assignment/project work; thus, teachers cannot apply them effectively in classroom practices.

Following the coup, the military regime attempted to reopen schools closed due to the outbreak of the Coronavirus epidemic. On May 5, under the direction of the State Administration Council (SAC), the Ministry of Education reopened final-year, master's, and PhD courses in higher education. On June 1, all basic education schools were ordered to reopen. Generally, all teacher training institutions across the country reopen with half of the teacher trainers and half of the student teachers attending the schools

because another half are participating in the Civil Disobedience Movement. Basic Education Schools are likewise plagued by a shortage of teachers. Because of the third wave of the pandemic, basic education institutions were reopened after a few weeks. Currently, no new curriculum is implemented in junta-controlled schools. The National Unity Government has prepared a parallel basic education system for students who boycott junta-controlled schools. The NUG's Ministry of Education announced that a new curriculum that supports federal democracy is being planned. However, in the current political climate, the constraints of implementing a new curriculum in basic education are considerable.

Conclusion

During democracy, the Ministry of Education Myanmar, is doing education reforms by implementing curriculum reform in both teacher education and basic education. Although teacher education, including three institutions, cooperates with basic education in the implementation of the new curriculum, it found that there are still few weaknesses in the implementation of the new curriculum of basic education. Soe et al. (2017) recommended that the new curriculum will fulfil local needs and circumstances and discourage the practice of rote-learning, and will ensure that students grow as independent thinkers with their sense of creativity. Whether the new curriculum in basic education can be implemented remains in question in this political situation. For the future generations of Myanmar students, humanitarian aid from the international community should continue to support curriculum improvements.

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Mónika POGÁTSNIK – Judit Takács MÓDNÉ

OPENSEL Project

To establish new open, online courses to develop social emotional skills, in cooperation for innovation and the exchange of good practices

Presentation of an international initiative

Project participants are the Óbuda University (Hungary), the Képes Alapítvány (Hungary), the Malta College of Arts, Science & Technology (MCAST) (Malta), the Vista College (The Netherlands).

As machines can perform an increasing range and variety of tasks, individuals will need to develop the skills that humans excel at, such as social-emotional skills or creativity. While the importance of social-emotional skills will increase in the future job market, they are highly valued by employers at present, too. Motivation to perform, good communications skills, the ability to work in a team, flexibility/adaptability are frequently mentioned among the required skills of the optimal applicant. However, except for jobs requiring a high level of specific technical knowledge, employers often focus more on cheerful attitudes and soft skills as they treat these skills as less trainable. They also have less capacity to develop these skills in their employers.

In the framework of our innovative OPENSEL project, partners from Hungary, the Netherlands, and Malta collaborate to create three Massive Open Online Courses (MOOC) for higher education students developing social-emotional skills that are highly relevant for employability: presentation skills, teamwork skills, stress management skills.

The presentation skills development MOOC (IO1) will cover topics such as: creating a presentation about a topic, including ways of creating an interesting, convincing script about the topic, structuring and designing slides, interacting with the audience, delivery of presentations of different lengths, and presenting oneself during job interviews.

The teamwork skills development MOOC (IO2) will cover topics such as: listening to the other person and taking the other's perspective, communicating effectively/assertively, ability to adhere to group norms/rules, conflict resolution techniques and approaches.

The stress management skills development MOOC (IO3) will cover topics such as

- recognizing own emotions and beliefs/interpretations,
- recognizing own needs and motivations,
- identifying and modifying maladaptive thinking patterns,
- techniques for managing stress and building resilience.

Our target groups are higher education teachers, trainers, mentors, and their students. We also make the courses available for secondary school students (through ROC), companies, and interested other parties. Anyone can join the courses free of charge if they register with them during the registration period.

The project is innovative, as there are no similar MOOCs available for either the students of the participating partners. Furthermore, there are no similar complex online courses in these fields that are offered free of charge to the public. Compared to existing MOOCs/online courses (in other topics)

offered by the partners, instead of the standards practice of recording lectures and turn them into video lessons, we will create many short videos that are specifically designed to illustrate different aspects of the selected topics. They will include dialogues between trainers about the essential issues, interviews with experts on the topics, visual demonstrations, and role-plays, which increases students' engagement and competence development.

The project fulfils real needs in both the training field and the industry. By the soft skills training, the training portfolio of the partners will expand, the students will get useful and valuable knowledge, and the companies will have employees with broader competencies.

These competencies can be applied in the corporate environment and – such as stress management – to ensure a better balance between working and family life. The long-term impact of the development is that the curricula developed in the project will form an integral part of education at all levels. It will also contribute to the better employability of the students.

Benefits of the objectives

All three training courses will expand the general portfolio of all the participating partners' institutions, leading to students getting more useful and valuable knowledge and prospective companies having employees with broader competencies. These competencies can be applied both in the corporate environment as a unit and amongst employees in achieving a better balance between working and family life.

The long-term impact is that curricula developed in this project will eventually become an integral part of the education system at all levels. It will then contribute to better employability chances for students.

In a labour market that is continuously changing, growing and developing, these 'soft skills are vital requisites for companies to compete holistically. Employers frequently list 'teamwork, collaboration, and communication skills as highly valuable yet hard-to-find qualities in potential new hires. That is the reason why training in such skillsets requires professional training, consistency, and supervision.

Besides the desk research, this project is carrying out a 'Needs Analysis' in the participating countries to determine how representatives of companies in Hungary, Malta and the Netherlands value all three soft skills. Based on the interviews, companies in each country highly valued these skills and assessed their presence/absence during job interviews.

An excellent solution to achieving long-term employment is to find a balance between employer needs and the cognitive skills to be developed so that productivity can grow in parallel with organizational growth and the process of personal development. Thus, employers providing training focusing on competencies specific to the organization's immediate needs will fail in the long run if cognitive skills are ignored. At the same time, cognitive skills need to be accompanied by social and emotional skills to achieve and promote holistic positive life outcomes.

It has been reported that many students lack specific social, emotional, and moral skills, and therefore struggle to cope in a range of day-to-day situations, including work placements outside of school (Education Counsel, 2011; OECD, 2009). Our interviewees further reported a lack of training options in all three participating countries; none of the participating organizations offers these courses online, which are widely available for students.

The aims of each curriculum

The results of the survey of companies showed that freshly graduated students struggle with a lack of self-esteem. They undersell their knowledge/skills. They feel anxiety when they must talk in front of many other people. They lack knowledge and confidence in many essential areas, such as the lack of a clear message, the lack of clear structure in the presentation, the lack of preparation, the ability to summarize clearly and briefly, the ability to understand how concepts are linked together. Students are afraid to make mistakes, so they need to learn and practice to make different types and lengths of

presentations clearly and engagingly, they need to learn and practice reducing anxiety before and during lectures, they need to learn how to connect with the audience, get to know self-presentation strategies that are essential to making a good impression in job interviews.

The goal of the first course is to learn how to create a ***presentation*** about a topic, how to tell a story (ways of creating an interesting, convincing script about a topic), how to use text and graphs to put through ideas in an easy-to-follow, transparent way, what to pay attention to when creating a pitch (2-5 minutes), a 15-minute presentation or a 1-hour presentation, how to interact with the audience during the presentation and through the questions and answers period (including how to deal with fear and anxiety).

During ***the second course***, the focus is on ***Teamwork*** in terms of work and business, but the knowledge participants will gain by the end of the course will help become a better team member in any organization. Companies have started to look at Teamwork from a different perspective. The reason for this shift in the mindset is that today's companies would like to operate their businesses in the most efficient way, which leads back to the Team's original idea. However, a lot more can be achieved with the combined effort of people working as a cohesive group. The more participants understand how teams operate, the more likely they will be able to work in their Team that is beneficial for themselves and their Team.

In ***the third course***, the goal is to show how to manage the symptoms of acute and chronic stress by selecting the situations we face, making our evaluations, and increasing our resources to cope. Most people cannot cope with their stress correctly or deal with it sufficiently. Not all stress is bad. It can help to adapt to the environment and meet and overcome challenges. Problems arise when a person is overwhelmed by it or when stress becomes chronic. On the one hand, situations differ based on the challenges they generate for us.

On the other hand, different people react to the same event differently. Therefore, the strategies of stress management vary from person to person based on the individual's stressors. Various stress management techniques can implement to handle the stress effectively. Some approaches address stress physically and psychologically and help to develop the skill of resilience.

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OPENSEL

István SIMONICS

Vocational Training Pedagogical Scientific Publications

The first issue of *Vocational Training Pedagogical Scientific Publications* (*Szakképzés-Pedagógiai Tudományos Közlemények*) edited by András Benedek has been published. Budapest University of Technology and Economics Faculty of Economic and Social Sciences Technological Pedagogy Department has a new initiative. The aim of publishing the new series of professional books is to give possibilities to authors to present research results that can raise other professionals' interests, excite discussions or induce further research activities. There are four main topics:

- Analyses of Vocational Training History
- Theory and Methodology
- Teacher Training
- Studies of students' research

The authors could submit their papers from the Carpathian Basin's institutions. The foreword was written by Professor Peter Tóth, the head of the Department of Technical Education. He described the aims and gave an excellent historical background of vocational training. He introduced the authors and summarized their works. Finally, he thanks Professor András Benedek for giving the idea of publishing this new series of professional books on vocational training and congratulating him on his 70 year birthday.

In the first chapter, **Analyses of Vocational Training History,** we can read three studies. It is interesting how the first two authors divided the history of Vocational training into two eras.

***Zoltán Sturcz**, in 'From Eötvös József's Leading Idea to the First Institution of Vocational Teacher Training (1848-1870)',* traced back into 1848, when József Eötvös during his ministerial years had made a short study about the formation of teacher training construction and the professional system. Historical events did not make it possible for his thoughts to be materialized. However, during József Eötvös's second ministerial period in 1869, a successful preparation led to the opening of an institute where vocational teacher training could be launched involving Budapest University of Technology.

***András Benedek**'s study, 'Stages of Vocational Training Development in Hungary (1870-2020)',* in connection with the 150th anniversary of vocational teacher training, undertakes to review the development stages of the Hungarian vocational training system. Professor András Benedek divided these 150 years into four stages:

- The beginning of the establishment of complex institutions (1870-1918)
- Trauma and revitalization (1919-1938)
- Moving away from tradition (1945-1990)
- Dealing with transformational dilemmas (1990-2020)

The author emphasized the roles and impacts of Vocational Training Laws (1993, 2011) and the establishment of the National Qualification System. The study ends with how the new strategical Vocational Training Law (2019) inspires the coming changes. It will give a challenge to next-generation researchers to analyze the results.

Monika Pogátsnik, in *'Developing 21st Century Skills in Engineering Education'*, writes about the 21st-century labour market changes requiring a shift from a one-track, one-way career model. It is no longer enough to have professional knowledge; transversal skills are crucial in career building and good employability. The author's comprehensive literature review reveals several employability skills that recent graduates need to enter the labour market. In addition, she presented the tool system of competence measurement developed at Óbuda University and the first results of the measurements performed with it.

In the second chapter, **Theory and Methodology**, there are five studies. In ***Péter Tóth****'s 'Fundamentals of Visual Cognition from the Perspective of Engineering Pedagogy'*, according to Rudolf Arnheim, when we perceive an object, "With an invisible finger we move through the space around us, go out to the distant places where things are found, touch them, catch them, scan their surfaces, trace their borders, explore their texture." (Arnheim, 1960, p28). Professor Péter Tóth stated that vision is an active exploration aimed at grasping the essential parts while ignoring the details. In the study, concepts such as shape form and structure and their main features are interpreted from the technical representations' point of view. In the second part, the issues of form analyses and design are illustrated from a methodological point of view, with many examples.

The following two papers were submitted from János Selye University, Slovakia. In *'Analyses of Physics and Chemistry Tasks Assessing Scientific thinking' by* ***Zoltán Fehér, Ladislav Jaruska*** *and* ***Katarina Szarka***, the authors dealt with the presentation of Physics and Chemistry tests and the evaluation of the preliminary survey. They examined the validity and reliability of the tests and analyzed the effectiveness of the tasks according to scientific skills.

Barnabás Vajda *wrote 'History Didactic and Research of History Books'*; the primary purpose of his history textbook research is to provide a scientific basis for better history textbooks. The author argued that for any textbook researcher who consistently applies the History Didactic point of view, the concept of 'content' does not merely involve the descriptive text. Nevertheless, the didactical apparatus has to be involved as well.

In ***Alice Bredács****'s 'What is Positive Pedagogy, an Educational, Methodical Collection or a Pedagogical System?'*, besides the transfer studies, the new trends initiate to develop both the researches and innovations to present the aspect and the modelling of the system. Within this framework, we can discover and examine the results that indicate the development and further innovation of the content and methodology of musical education. The author presented best practices from the Department of Special Talents at the University of Pécs Faculty of Art and Music.

According to ***Boglárka Tóth,*** in *'What are the Criteria for Good Children's Book Illustrations Based on Parents' Opinions?'*, to communicate at the appropriate level, the signs and symbols used in written and pictorial language must correspond to the children's intellectual and emotional characteristics. The authors and illustrators of storybooks try to take it into account in their works. The author of the paper surveyed parents and presented the results. She summarised the features of good illustrations and how they can support the emotional development of children.

The third chapter is **Teacher Training**, which contains three studies. ***Anetta Bacsa-Bán,*** in *'Alternative ways to Overcome Teacher Shortages'*, describes that the Hungarian education system is fighting with a structural teacher shortage, as there are fewer and fewer teachers with sufficient qualifications, and the number of applicants for teacher training has steadily decreased in the recent years. In order to address teacher shortages, many countries are trying to make it easier to enter the profession also for those whose previous experience comes from an area outside education. The author presented international best practices that could give solutions to overcome teacher shortages.

'The Pedagogical Practice of the Three-colour-Quiz Worksheet as a Formative Assessment Tool in Teacher Education' study *by* ***Katarina Szarka*** *and* ***György Juhász*** focuses on the formative assessment and its pedagogical practice. The authors characterized the aspects of formative assessment and its importance. They presented an excellent pedagogical practice of the selected formative assessment strategy.

***Judit Vereckei**'s 'Dynamics of changes in our Education System in the Light of Institutional Leadership Tasks, Selection and Training'* paper tried to track the changes in the education system and to explore the impacts of changes in the selection and training of the leaders of educational institutions. The author selected the 1993-2013 period because then the selection, tasks and authority of leaders were on a high level, and the accredited leader training was established. The conclusion of the study is: When the dynamics of changes in the education system strengthen – like in 1993 and nowadays –, the importance of institutional leaders' training increases; however, it can be valuable if we define the development trends.

The fourth chapter, **Studies of students' research**, consists of five studies. ***Péter Tóth** and **Kinga Horváth**'s 'Examination of the Thinking Ability of Pedagogical Students at János Selye University*, is a study of inductive, and in particular abstract reasoning pervasive very extensive literature. However, putting these competencies into the context of dropout research is less typical. Therefore, the authors put the focus of the research directly on this area. The main objective was to analyze the components of abstract reasoning in terms of students who had achieved good results, and the overall sample and its connection to time were also examined. The authors stated that the time spent on the solution, the division, the course and parents' highest education could form three well-separable groups in the whole sample. In contrast, among the best-performing students, only two distinct groups could be classified.

*According to 'Using Linguistic Mathematical Test to Evaluate Freshmen' by **Tibor Oláh, Szabolcs Berezvai, Bence Sipos*** and ***Brigitta Szilágyi***, there is a possibility to formulate multiple goals when students entering university education are tested. One of these may be whether the student has the knowledge required to complete a particular course. If not, we can recommend unsuccessful performers special catch-up courses to prevent them from falling out. The authors presented a complex test, which was completed by the few hundreds of first-year students. The proposed test included linguistic and mathematical questions, served as the basis for exploring the relationships between linguistic and mathematical cognition as well.

***Agáta Csehiova** and **Katalin Nagy Kanczné**'s* study, *"Degree of Experience Seeking" the Results and Edification of the Research in Teacher Education*, is part of the research conducted among students at János Selye University. The authors concluded that teacher candidates need influences in addition to acquiring academic knowledge, which strengthens their self-esteem, increases their ability to cope successfully, and positively influence their commitment to the teaching profession.

*According to 'University Students and Sustainability Pilot Study among the Pedagogical Students of Selye University by **Sarolta Darvay, Melinda Nagy, Éva Tar Tóth, Iveta Szenczi*** and ***Pál Balázs***, the main task of teacher training is to form health- and environment-conscious behaviour, as well as behaviour that recognizes current environmental problems. The authors conducted research based on a questionnaire assessing environmental awareness. Comparing the research results at the beginning and the end of teacher training, authors could receive an adequate picture of the effectiveness of the change of attitude and behaviour formation among the students during the university years.

Gábor Mácsár writes in *'Dropout Context Problem of Life-Goal and Motoric Ability Investigation among Law Enforcement Students'* that dropout is a real problem for Law Enforcement students in university training. The author surveyed the National University of Public Service in 2018. Every first-grade student had completed a comprehensive test. The evaluation of the results led to general conclusions.

These 16 studies have met the expectations of the series of professional books: Vocational Training Pedagogical Scientific Publications. Therefore, the readers can look forward to the following publication.