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Who is more eager to use Gamification in Economic Disciplines? Comparison of Students and Educators

Nikolina Dečman, Ana Rep
The University of Zagreb, Faculty of Economics and Business, Croatia
Marion Titgemeyer
The University of Applied Science Osnabrück, Lingen Campus, Faculty of Management, Technology and Culture, Germany

Abstract

Background: In this paper, the focus is on the application of digital and mobile technologies as supporting tools for the implementation of gamification in the field of education of future economists. **Objectives:** The paper's main objective is to explore whether educators and students are motivated and willing to apply additional technologies as main gamification components in their work and education. Moreover, the paper aims to assess how their more comprehensive application affects the quality of teaching, work flexibility, new learning opportunities, and outcomes. **Methods/Approach:** The survey method was used to collect answers from educators and students primarily interested in accounting, finance, trade and tourism from higher and secondary education institutions in Croatia, Poland, Serbia and Germany. Afterwards, the responses were compared using statistical methods. **Results:** Research results confirm that educators and students are willing to use gamification in teaching. Still, they also expressed the need for better administrative support in using particular e-learning tools. Surprisingly, educators are more eager to use gamification in their work than students. **Conclusions:** The study's general conclusion is that educators and students are both aware of the advantages of using e-learning tools provided through digital and mobile technologies and are eager to implement more gamification in the teaching process. However, continuous education in applying new digital technologies is needed on both sides.

Keywords: Gamification; digital technologies; mobile technologies; teaching process; students; educators; secondary education; higher education; economic disciplines

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Introduction

It is an indisputable fact that the teaching process needs to be regularly innovated, updated and made more accessible and acceptable to the students for whom they are intended, which means keeping up with modern teaching methods and technology development. According to Qureshi et al. (2021, p. 35), "consistent development and technology enlargement create space for the digital transformation of education." Nowadays, it is often emphasized that educators should use different teaching methods and approaches that will enable the active participation of students in the teaching process with strong motivation and engagement in their learning (Kiryakova, 2014). In this context, new innovative teaching methods that educators can apply in the teaching process, such as gamification, flipped learning, project-based learning, role-based learning, non-formal education, learning by doing and others, stand out. In recent years, particular emphasis has been placed on applying gamification at different levels of education, from primary, secondary, and higher to adult education. Rabah et al. (2018, p. 2) define gamification in education as the "use of game design elements in the teaching to support the acquisition of course-specific learning objectives." There are many different positive effects of the application of gamification in education, such as increasing student motivation and achievement in the classroom (Stott et al., 2013), optimizing students learning (Smiderle et al., 2020), enhancing learners' engagement and improving learning outcomes (Nah et al., 2014) as well as improving teaching and learning environments (Parra-Gonzalez et al., 2021). Moreover, the gamification of the teaching process can foster innovation in education and make them sustainable (Llorens-Largo et al., 2016).

Although the use of gamification in education is not a new concept, according to DeBurr (2013), it dates back to the 1980s, its wider use has only intensified in recent years, and its popularity is constantly growing (Majuri et al., 2018). According to bibliographic research (Swacha, 2021), there has been a continuous growth of publications in the field of gamification in education in the last seven years, with the USA, Spain, the UK and Germany leading in the number of surveys on this topic. In addition to education, gamification is widely applicable in business, marketing, corporate management, fitness, wellness, health and ecology (Rabah et al., 2018; Dicheva et al., 2015). Dicheva et al.'s (2015) study shows that the early adopters of gamification in education are mostly computer science/IT educators. It is worth noting that, with the emergence of new technologies and ubiquitous digitalization, the trend of gamification in education and learning is even more pronounced.

Namely, it is known that the application of gamification in teaching is possible with and without the use of digital technologies. In this paper, the focus is on the application of digital and mobile technologies as supporting tools for the implementation of gamification in the field of education of future economists. Therefore, the paper's main objective is to explore whether educators and students in faculties of economics and secondary economic schools are motivated and willing to apply different digital tools to the teaching process. This survey aims to assess how their wider application affects the quality of teaching, flexibility in work, new learning opportunities, and learning outcomes. Since gamification can be implemented through digital or mobile technologies, it is necessary to distinguish these terms. It can be said that digital technologies are a broader concept than mobile technologies where Stegmann (2020, in Sailer et al., 2021, p. 4) defines digital technologies as "computer-based technologies that present domain-general and domain-specific content and/or allow for interaction with or about the content and support educators and/or students during that interaction". On the other hand, mobile technologies are

"any kind of Internet or communication service or electronic device (smartphones, tablets, laptops and similar) that supports educators and students in learning activity" (Davison et al., 2015, p. 35).

The research on the attitudes of the respondents about the application of more digital tools in the education processes was conducted on a sample of educators and students of economic faculties and secondary economic schools, i.e. partner institutions implementing the DIGI4Teach Erasmus+ project of strategic partnership as well as other associated partners from partner countries of Croatia, Poland, Serbia and Germany. In this paper, "educators" refers to both secondary school educators and university educators, while "students" refers to secondary school students and university students unless otherwise stated. The research was developed using the questionnaire and was conducted between November 2021 and January 2022. For this paper, questions regarding the impact of simulation games on improving the teaching process's outcomes have been analyzed to see whether educators and students are ready to apply gamification for educational purposes. To respond to the set goals of this research, four research questions (RQs) were set:

- *RQ1: Are the attitudes of educators and students about the introduction of more digital tools into the teaching process different?*
- *RQ2: Whether the perception of educators and students regarding the impact of simulation games on improving the outcome of the teaching process differs?*
- *RQ3: Whether both educators and students think that multimedia materials (audio and video materials, games, etc.), which can be used in e-learning, make the learning process more fun?*
- *RQ4: Does educators' perception of the necessity for greater administrative support they need while using e-learning tools in the teaching process differ from the perception of students' need for such support?*

The paper is structured through six main chapters. After the introduction, the concept of game-based learning was defined, and the advantages and disadvantages of applying digital technologies in the teaching process were presented and discussed. After that, the methodology and the most significant descriptive and inferential statistics results were presented. Finally, in the discussion section, the results and expectations of the authors regarding all the research questions were analyzed.

To get acquainted with the key terminology, the nature of the problem and the current state of knowledge, below is a theoretical framework that explains the motives of the research as well as the gap in the existing literature of the research on this topic.

Background

"Gamify your life!" (Strahringer et al., 2017). This sounds simple but requires a deeper look. The term gamification is used in various contexts these days. For example, customers can collect points at the supermarket, hotel customers can submit ratings, or students can learn by taking quizzes. Game mechanisms are used in corporate information systems and education at schools and universities. In particular, leader boards, progress indicators, and rewards are designed to increase motivation. This raises the question of suitable tools and applications, the right approach, and the effects that actually arise. The game itself and the resulting benefits have to be considered (Strahringer et al., 2017). To deal with the topic in a well-founded manner, the following definitions of the relevant terms are necessary.

Game-based learning

The heart of game-based learning is the learning of knowledge based on a game. This general definition covers many day-to-day situations. It makes no statement about the form of the game, the type of relevant knowledge, the framework conditions, or the target group. The game choice is based on the desired outcomes (Feil et al., 2005; Teuteberg et al., 2017). A wide variety of games is possible. Strategic games, for example, could teach how to use resources efficiently. Role-playing games train certain behaviours. Action games, on the other hand, improve motor skills. An important element of any game is the social sub-action among the participants (Teuteberg et al., 2017).

Board game simulations and digital game-based learning can be distinguished as game-based learning. The board game simulations are simple haptic games that are not digital. They can help to learn basic knowledge for a topic. In contrast, digital game-based learning refers to a learning process using digital players (Breuer et al., 2010; Teuteberg et al., 2017). A common feature with board game simulations is the possibility of rule-based management and control of participants' actions and interactions. However, in digital game-based learning, there are more decision parameters and interactions among the parameters than in board game simulations. This results in greater complexity. In addition, various digital components serve as support. For example, audio-visual effects are important to stimulate more attention and willingness to continue playing. Another difference is that digital games can be stored. Furthermore, active networking with other players is possible (Teuteberg et al., 2017).

Serious games are to be distinguished from game-based learning, and these represent a variant of game-based learning. Here, games serve as an instrument for imparting knowledge and supporting learning (Abt, 1987). Serious games are software-based games that simulate reality with audio-visual support. They stimulate various instincts in the players, and certain tasks can be mastered effectively and efficiently. In distinction to this, entertainment games have a different approach: Problem-solving and learning are not the top priority in entertainment games (Susi et al., 2007; Teuteberg et al., 2017).

Areas of application of serious games are especially schools and universities. Serious games make it easier to learn new lessons and consolidate already learned knowledge (Liarokapis et al., 2010). Serious games are used, for example, in training doctors, who can learn to perform successful operations in a virtual operating room, and the focus is on learning the procedures (Sabri et al., 2010). For a detailed discussion of serious games, see Teuteberg et al. (2017).

Business games are widely used in education and business. They represent an application of serious games and serve for training, further education, and evaluation (Greco et al., 2013). Business games have been continuously developed since the 1950s (Teuteberg et al., 2017). For details, see Teuteberg et al. (2017). Unquestionably, simulation games for managers play a "significant role in the education of future business professionals because, through analytical methods and their logic, they prepare them for decision-making in the real business world" (Pejić Bach et al., 2017).

Gamification

A uniform definition of the term gamification does not yet exist. The prevailing opinion in the literature (e.g., evaluation of 119 papers by Caponetto et al., 2014) describes gamification as using game elements in non-game contexts. However, the potential of gamification goes further than this definition, and gamification makes it possible to increase learners' motivation and participation in learning processes (Stieglitz, 2015).

Elements considered here include points, leaderboards, contests, virtual currencies, awards, and notifications with feedback (Fischer et al., 2017, citing further papers).

Gamification has been known since the 1980s. At that time, computer games were analyzed to gain insights into how learning processes could be improved. Gamification applications target the human play instinct. The focus is on elements that can also be found in computer games. The aim is to increase concentration and commitment to a task (Deterding et al., 2011; Anderson et al., 2012). This leads to better learning outcomes and increased motivation. The task could be solved more successfully (Huotari et al., 2012).

Due to growing digitalization and the widespread use of mobile devices nowadays, the possibilities have become more extensive. Gamification applications serve, for example, to acquire knowledge in education, influence employee behaviour, and interact with customers. It is easy to activate a large number of people and let them, for example, compete against each other to improve their performance. Achievements can thus be compared (Teuteberg et al., 2017).

It is important to note that serious games aim to impart knowledge and learn about systems' interactions, and they help to experience and simulate reality via games. Gamification applications, on the other hand, serve to explain, learn, and influence social behaviour (Herranz et al., 2013). This is achieved using elements also applied in serious games (Perrotta et al., 2013; Teuteberg et al., 2017).

Gamification at secondary schools and universities

Progressive digitization and changes in job requirements have an important impact on teaching at schools and universities. New dynamics and trends have emerged, one of which is gamification in teaching. Evaluations show that in 2010, almost no scientific papers were published on this topic. A few years later, there are already thousands of papers in Google Scholar and Scopus (Hamari et al., 2014). Gamification will probably not be a short-term trend but an integral part of educational practice in schools and universities (Fischer et al., 2017).

Gamification at schools and universities focuses on students' behaviour in the learning process, especially the search for solutions, communicating with other students, and presenting the results. For example, points, badges, leaderboards, levels, and ranks act as game elements (Fischer et al., 2017).

Certain game mechanics are the basis of the games, i.e., mechanics through which individual needs are addressed, and motives are activated. The Octalysis Framework includes an overview of game mechanics that serve as core drives. According to Chou (2014), these include:

- "epic meaning and calling
- development and accomplishment
- empowerment of creativity and feedback
- social influence and relatedness
- ownership and possession
- scarcity and impatience
- unpredictability and curiosity
- loss and avoidance."

There are important aspects of the design of gamification applications. Design must be based on pedagogical principles. Furthermore, learning objectives have to be defined. The prerequisites for this are the four freedoms of play. For details on the core drives and the four freedoms of play, see Chou (2014); Fischer et al. (2017).

It is important to consider that student motivation is not only increased through scoring systems, levels, and rankings. Rather, an open student-centred culture of learning and teaching is required (Fischer et al., 2017).

Comparison of Gamification and game-based learning

Sometimes gamification and game-based learning are confused because there are some similarities. However, important differences also exist. Table 1 compares the terms gamification and game-based learning.

Table 1
Comparison of Game-based Learning and Gamification

Point of Comparison	Gamification	Game-based learning
Concept and Characteristics	• adding game elements to a non-game situation • users get a reward for certain behaviours • attract and hold the student's attention • combining fun and learning • increase student motivation through challenges and rewards • the active role of the student • continuous feedback from the system	• knowledge transfer with the support through learning games • improve learning • games have defined learning objectives • combining fun and learning • increase student motivation through challenges and rewards • the active role of the student • continuous feedback from the system
Elements/Design	• e.g. progress bars, points lists, levels, badge-system • intrinsically rewards	• e.g. simulations, quizzes
Benefits	• better learning experience • better learning environment • instant feedback • prompting behavioural change • can be applied to most learning needs	• improves strategic thinking and problem-solving • increases the memory capacity • computer fluency, simulation fluency • develops hand-eye coordination • skill-building (e.g. map reading)
Key Question	Is it effective? (business: Does it improve profits?)	Is it effective?
Examples	• Starbucks: Reward App • Microsoft: Ribbon Hero • Moodle: LevelUp!, Stash	• SimCity • World of Warcraft • Minecraft

Source: Al-Azawi et al. (2016); Becker (2022); RUBeL (2022)

General attitudes about digital technologies in education

The advantages and disadvantages of digital technologies, gamification and game-based learning in teaching at schools and universities have been widely discussed in the literature. Although motivation and participation can be increased through the use, major challenges arise for educators, students, and administrators (Fischer et al., 2017). These will be discussed below.

Advantages of the application of digital technologies in the teaching process

The use of digital technologies in the teaching process includes some advantages, which are now considered. The advantages are dependent on the concept used. Not all of the advantages mentioned have empirical evidence yet; some of them follow plausibility considerations.

- Fun learning and more motivation for students: Digital technologies can increase the fun of learning. More fun in learning often leads to a higher level of personal engagement and increases attention. The learning content can thus be internalized more effectively (RUBeL, 2022). Even a "flow" is often created while playing, and the "flow" can increase concentration and motivation. This effect also supports knowledge transfer (Eckardt et al., 2017).
- Immediate feedback: Gamification applications often give the student immediate feedback. So, he learns from his actions. This also applies to small learning units for which the student receives immediate feedback (RUBeL, 2022). This allows him to correct his actions to complete the whole task and achieve it faster and with better results.
- Improved learning experiences: The student perceives his learning success more positively, and Digital applications encourage him to continue learning (RUBeL, 2022) without the need for the educator to motivate him repeatedly. Furthermore, the student can compare his results with those of his "competitors" and thus better assess himself.
- Self-directed learning: Gamification applications allows the division of complex learning objectives into small learning units. The student can complete these at his own pace. Repetitions are also possible (RUBeL, 2022). Higher-performing students can move ahead more quickly, while lower-performing students repeat tasks multiple times. Partial successes already achieved maintain and increase their motivation (RUBeL, 2022). The student becomes more independent from the educator and the lessons.
- More and/or new fun and motivation for educators: New opportunities open up for educators. They can get more and/or new motivation by using digital technologies. Those who have been teaching the same subject for a long time and are experiencing signs of fatigue and boredom especially benefit from this. They get a reason to question and improve their long-standing teaching - especially if they have already exhausted the possibilities of traditional teaching. Students benefit from this.
- Motivation cycle: Due to the increased motivation and concentration of students, their higher willingness to discuss and their increased interest, positive effects may arise for educators. They are more motivated, enjoy teaching more (or again), improve their concepts further and then pass this on to the students. A cycle of increased motivation is created: students – educators – students – and so on.
- Better compatibility of studies and other commitments/activities: Using digital technologies creates more flexibility and brings new learning opportunities. Depending on the concept, the student can learn (partially) independently of course times. Moreover, easy access to information and the non-existence of fixed terms for learning makes studying more compatible with other commitments (Požgaj et al., 2007). This applies, for example, to students who have care responsibilities for other people – such as their children. In addition, students who have to work for a living in addition to their studies can better

combine these jobs with their studies. Hobbies, sports at a professional level or voluntary work also become compatible with studies.

- Support for students with disabilities and restricted mobility: Digital technologies can help people with disabilities in their studies and provide additional support. Their chances of successfully mastering the course content depend on the concept. Also, it is recognized as an advantage for students with restricted mobility (Požgaj et al., 2007).
- Active participation of all students, even in large groups: Digital technologies enable all students to participate – even in large groups. All students can be included using digital tools and contribute solutions and answers. Assuming anonymity, even shy or lower-performing students are encouraged to participate. Successes can make them more confident so that in other learning situations (e.g. smaller groups), they dare to speak up and advance the course with their answers.
- Stimulation of teamwork: Gamification applications can encourage students to work together. This can also be a requirement in gamification applications. Teamwork improves students' social skills (RUBeL, 2022).
- Important preparation for later professional life: Nowadays, almost no profession is still unaffected by digitization. Companies expect graduates to be able to handle digital technologies. Therefore, using digital technologies at school and university is important preparation for later professional life.
- Easier and faster revision of teaching materials: Educators can often update their teaching materials more easily and quickly using digital tools. This makes it easier for them to keep teaching up to date.

Disadvantages of the application of digital technologies in the teaching process

The following list contains the most important disadvantages of digital technologies in teaching. Like the advantages, the disadvantages also depend on the concept used. Empirical studies prove some disadvantages; others are based on plausibility considerations. Where possible, solutions are presented to reduce or prevent the disadvantages.

- Student heterogeneity in digital and technical knowledge and talent: Students have different starting points and diverse conditions. Students generally interested in the technology may already have been working with digital tools and games in their free time for years. For others, however, familiarisation is a major obstacle that distracts them from learning. You need a lot of time to learn the technical basics. Traditional lessons would be easier for them and would lead to faster success. Even if they are at the same level of knowledge as technically gifted or have prior knowledge, they achieve poorer results because of the technical hurdle. Thus, digital technologies skew outcomes and grades. It would be helpful to offer additional courses to learn how to use digital technologies. However, it should be considered that this represents an additional time burden for the participants.
- Student heterogeneity in financial capabilities: Another important aspect is the financial possibilities. They determine the technical equipment of the students. Students who have an extensive financial budget can buy state-of-the-art high-end equipment. On the other hand, poorer students often own outdated and slow devices. In addition, there may be students who cannot afford a device. The same applies to a fast Internet connection. If gamification applications include a fast result input, this can disadvantage the poorer-equipped students.

They feel unfairly treated and can become demotivated, even though their performance is just as good as the performance of others.
Result: Students have different prerequisites influencing their learning success when using gamification applications. Examples of this are different technical equipment, various level of knowledge and different preferences in learning or gaming styles. Therefore, students' individual prerequisites and expectations must be considered in planning (Fischer et al., 2017). Funds from the school or university that support poorer students with money or loaners may be of help.

- Need for financial, technical and administrative support for educators: Educators also need support from the school or university. For one thing, they need to be funded for state-of-the-art technology. Further, they need advanced training and administrative support in using e-learning tools and creating educational materials by programmers and multimedia experts.
- Need for financial support for schools and universities: A crucial prerequisite for using digital technologies is the financial budget of schools and universities. In addition to digital devices for educators (and maybe students), modern infrastructure is required. Without a fast-wireless network in the school or university, most digital applications will not work. The costs of initial installation and regular maintenance must be considered.
- Distraction from learning: Challenges can arise when the focus is not on the pedagogical and educational objectives but on the game itself. It is, therefore, important to focus on the learning content when using gamification applications. Otherwise, the game may strongly distract from learning (Fischer et al., 2017).
- Interference and clutter: Many concepts involve bringing mobile devices into the classroom. This can create interference, causing students to disrupt each other's learning. In these cases, the educator has to create a silent working atmosphere. All this causes distraction and loss of time. One way to avoid this is to introduce rules when using digital technologies. This gives students a fixed framework.
- Gamification often turns fellow students into competitors: Schools and universities attach importance to acquiring social skills, including the ability to work in a team. In gamification applications, however, students often become competitors. There are winners and losers. In some cases, performance is displayed on score lists, and this can cause negative effects on lower-performing students and create a defensive attitude and demotivation. However, this can be avoided by, for example, anonymized score lists. Further, applications based on student collaboration or group work can be preferred.
- Data protection and personal rights: When using gamification applications, it should be considered that digital traces are created. These are, for example, status displays or score lists, and they can violate the students' data protection and personal rights. Careful handling of personal data is, therefore, an indispensable prerequisite. Students have also become increasingly sensitive recently (Fischer et al., 2017).

Interim conclusion

Gamification has become increasingly important in schools and universities since the 1980s. The increasing digitization and the spread of mobile devices drive this development, and the pandemic has boosted further. Increased gamification of academic education can be expected in the future. Gamification makes it possible to increase learners' motivation and participation in learning processes (Stieglitz, 2015).

It is important to note that gamification applications have to be designed in such a way that they increase student motivation and participation.
Furthermore, cultural differences must be considered in the design. Empirical studies are very important (Fischer et al., 2017). The results of the present study of the project "Challenges and practices of teaching economic disciplines in the era of digitalization – DIGI4Teach" can also contribute to this.

Methodology

Considering that the questionnaire research should yield the most relevant results in examining respondents' opinions, a questionnaire survey was conducted for this paper. The DIGI4Teach project participants have set a questionnaire based on several similar studies (Požgaj et al., 2007; Babić, 2011; Ferrari, 2013; Žuvić et al., 2016; Elsalem et al., 2021; Nikolopoulou et al., 2021; Sáiz-Manzanares et al., 2021), adding their relevant questions. The questionnaire was divided into five sections for educators and six for students. It started with the demographic characteristics of the respondents. The second section was about the respondents' self-assessment of digital competencies, the third was about digital tools and general attitudes about digital and mobile technologies, the fourth was about e-learning quality, and the last was about e-exams. In addition, students had one more section regarding the influence of acquired knowledge, skills and qualifications through formal education on developing creative businesses, entrepreneurial ideas and/or starting digital ventures in the future. For this paper, in addition to the questions from the first session, the following questions were analyzed: (1) the need for introducing more digital tools into the teaching process, (2) the evaluation of using multimedia materials in e-learning in the context of the learning process, (3) the assessment of the impact of simulation games on improving the outcome of the teaching process and (4) the need for more administrative support when using technologies in the teaching process.

The research sample covered university professors and students from economic universities and faculties and teachers and students from economic secondary schools. In the following text, the term educator will be used for both university professors and secondary school teachers and term student for both university and secondary school students. Since Croatia, Poland, Serbia, and Germany have been involved in the DIGI4Teach project, the research was conducted in these countries. It has included primarily the University of Zagreb – Faculty of Economics and Business, Cracow University of Economics, University of Belgrade – Faculty of Economics, Osnabrück University of Applied Sciences, 1st, 2nd and 3rd School of Economics from Zagreb, and School of Economics, Trade and Hospitality from Samobor, Croatia, but also other universities, faculties and economic secondary schools from the mentioned countries. The research was conducted from November 2021 until January 2022 for students and from December 2021 until January 2022 for educators. The questionnaires were emailed to educators and distributed through the classes to students using digital teaching platforms or emails. During this period, 2,474 responses from students and 424 from educators were collected.

Demographic questions referred to the institution/country, main interest area, and years of employment/study. All the questions were closed-ended questions set as multiple-choice questions where the respondents could choose one answer. Table 2 gives an overview of respondents' demographic characteristics. The distribution of the countries in which most respondents work does not differ from the order of the institutions most students attend. Most of the respondents, regarding educators, are interested in trade, followed by accounting and finance, tourism, and other areas. Most educators of those who responded from Croatia and Serbia are primarily

interested in accounting, from Poland in trade, and from Germany in accounting and finance.

On the other hand, most students are interested in finance, followed by trade, accounting, tourism, and other areas. In addition, those from Croatia are primarily interested in tourism, from Poland in trade, and those from Serbia and Germany in finance. Educators who responded mainly teach from 16 to 25 years, while most students who responded attend the third year/class of the faculty/secondary school.

Table 2
Demographic Characteristics of the Respondents' Distribution

Characteristic	Number of respondents	Structure by countries in %			
		Croatia	Poland	Serbia	Germany
Educators					
Major of study					
Accounting	82	20.2	13.9	22.4	40.0
Finance	82	12.7	27.7	16.3	40.0
Trade	98	9.8	48.9	12.2	13.3
Tourism	50	18.5	9.5	4.1	6.7
Other	111	38.7	0.0	44.9	0.0
Years of teaching					
up to 5 years	66	22.0	8.0	10.2	46.7
6 – 15 years	134	41.0	20.4	31.6	26.7
16 – 25 years	144	26.6	48.9	28.6	20.0
over 25 years	79	10.4	22.6	29.6	6.7
Students					
Major of study					
Accounting	489	21.3	18.0	18.5	13.3
Finance	627	19.6	25.2	41.0	42.2
Trade	521	17.0	32.2	14.4	28.9
Tourism	382	25.3	3.4	6.3	4.4
Other	455	16.6	21.2	19.9	11.1
Class/year					
1st year	535	15.9	33.0	22.0	4.4
2nd year	637	34.0	13.0	22.9	13.3
3rd year	747	23.0	43.5	26.6	66.7
4th year	425	23.2	2.6	24.3	2.2
5th year	130	3.9	7.9	4.2	13.3

Source: Authors' work

Table 3
Statements employed to answer the RQs

Statements	Code	Likert scale	
		1	5
I believe that it is necessary to introduce more digital tools into the teaching process.	Q1	I completely disagree	I completely agree
Assess the impact of simulation games, as a form of e-learning, on improving the outcome of the teaching process.	Q2	Insignificant impact	Extremely strong impact
Evaluate the degree of advantages and disadvantages of e-learning through the following statement: Multimedia materials (audio and video materials, games, etc.) that can be used in e-learning make the learning process more fun.	Q3	I completely disagree	I completely agree
Providing better administrative support to educators/students using e-learning tools is necessary.	Q4	I completely disagree	I completely agree

Source: Authors' work

Statements employed to answer the RQs were set in the form of the Likert scale questions with five levels of answers. The authors used statements presented in Table 3, with an explanation of the Likert scale's lowest and highest values.

Initially, descriptive statistics were run to present overall results regarding the respondents' attitudes. To answer the RQs set in the introduction, a statistical test of means, the z-test, was employed. For each sample in each of the four testings, the variances of samples were calculated. After that, the authors ran the two-tailed z-test for each RQ, comparing the attitudes of students and educators.

Results

Descriptive Statistics

Before testing the statistical significance between sample means differences, the descriptive statistics values were calculated and analyzed (Table 4).

Table 4
Descriptive Statistics of the Responses

Statement	Respondents	Mean	Mode	St. Dev.
Q1	Educators	3,85	5	1,102
	Students	3,79	5	1,240
Q2	Educators	3,78	4	1,069
	Students	3,64	5	1,234
Q3	Educators	3,54	3	1,020
	Students	3,28	3	1,261
Q4	Educators	4,27	5	0,907
	Students	4,05	5	1,123

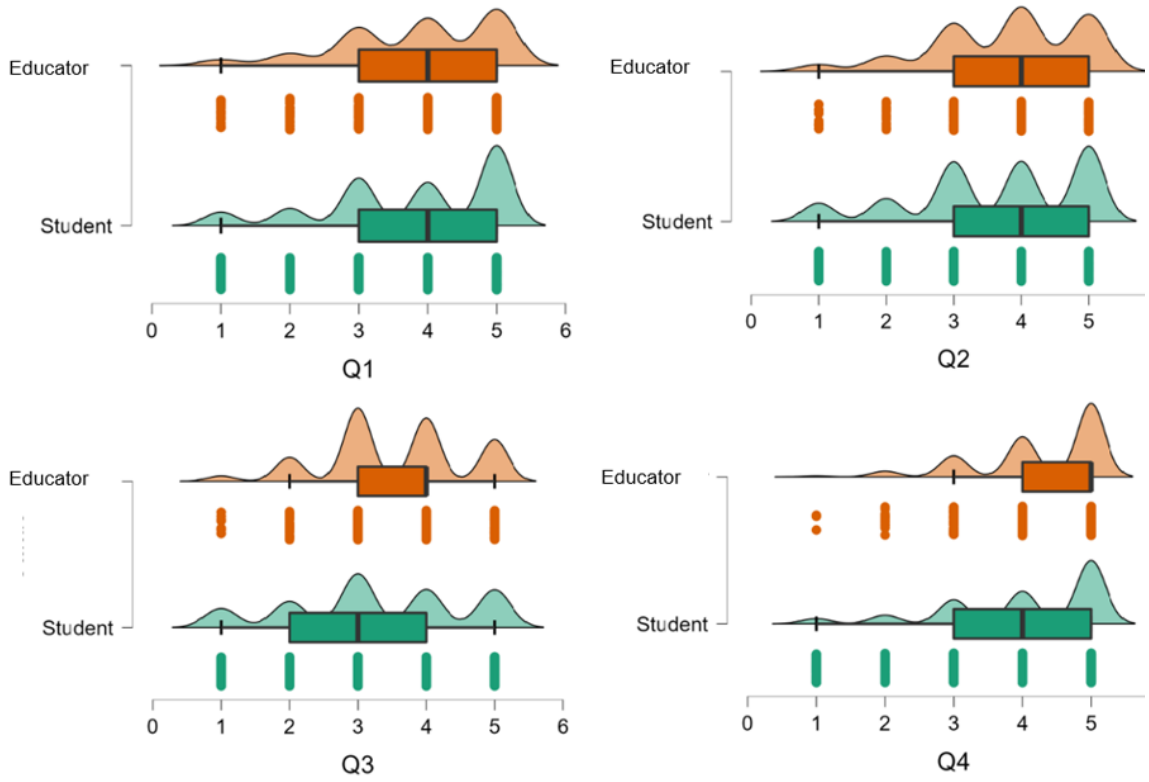
Source: Authors' work

According to the results presented in Table 4, it can be observed that the mean values of educator responses for all four statements are higher than the students' mean values per each statement. By observing mean values, one could conclude that educators are more willing to introduce more digital tools into the teaching process compared to students, that educators believe that the impact of simulation games on improving the outcome of the teaching process is major, that educators think that multimedia materials (audio and video materials, games, etc.), which can be used in e-learning, make the learning process more fun, and that educators are more aware of the need for additional administrative and infrastructure support, compared to students attitudes. On the other hand, mode values refute some of these conclusions based on the mean values. For instance, most educators and students said that they completely agree that they believe it is necessary to introduce more digital tools into the teaching process and that providing better administrative support is necessary when using e-learning tools. Also, most educators and students cannot decide whether it is an advantage or disadvantage that multimedia materials (audio and video materials, games, etc.), which can be used in e-learning, can make the learning process more fun.

Contrary to the mean values, most educators assessed the major impact (4 on a scale of 5) of simulation games, as a form of e-learning, on improving the outcome of the teaching process. In contrast, most students assessed the extremely strong impact (5 on a scale of 5), although the mean value was lower than that of educators. Standard deviation values confirm these differences because all of them are higher than 1 (on a scale of 5). The only one that differs and is below zero is the standard

deviation for the mean value of educators' responses to the question regarding the necessity for more administrative support, which also has the highest mean value among analyzed responses. To answer the RQs the two-tailed z-test for each RQ was conducted. Figure 1 compares the variable distributions according to the educators and students.

Figure 1
The comparison of the variable distributions according to the educators and students



Source: Authors' work

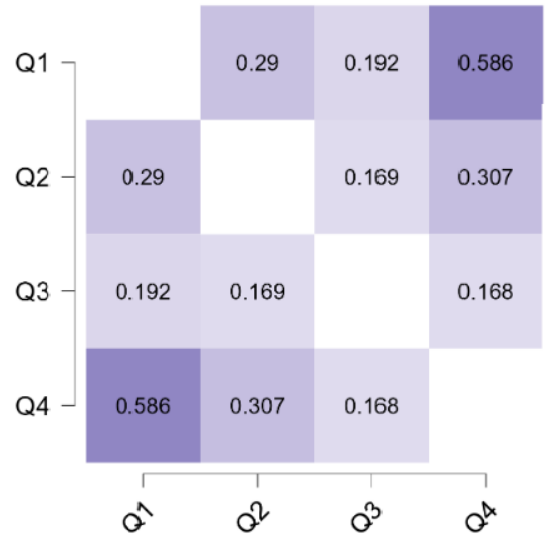
Table 5 presents Spearman's rho correlation analysis of the observed variables related to digitalization, while Figure 2 shows the matrix graph of the same analysis. The strongest correlation (54.3%) is between the statements Q1 (I believe that it is necessary to introduce more digital tools into the teaching process) and Q4 (Providing better administrative support to educators/students in using e-learning tools is necessary), indicating that the digital tools could be more implemented in case of stronger administrative support. Both students and educators would likely prefer the e-learning mode of using digital tools and gamification over on-site.

Table 5
Spearman's rho correlation analysis of the observed variables related to the digitalization

	Q1	Q2	Q3	Q4
1. Q1	1.000			
2. Q2	0.290**	1.000		
3. Q3	0.192**	0.169**	1.000	
4. Q4	0.586**	0.307**	0.168**	1.000

Note: ** statistically significant at 1%
Source: Authors' work

Figure 2
Matrix graph of the Spearman's rho correlation analysis of the observed variables related to digitalization



Source: Authors' work

Comparison of students and educators

The statistical software EViews was used to calculate the results based on which the authors made the conclusions with a significance level of 95%. As explained in the methodology, the two-tail z-test was employed.

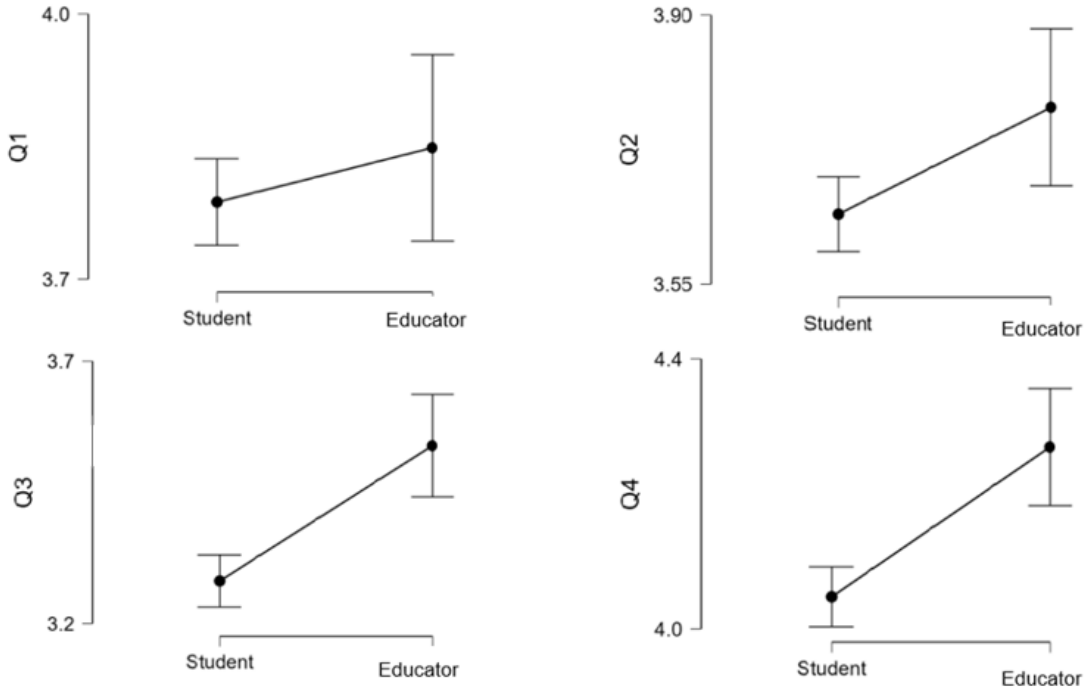
In the first RQ, the authors wanted to answer whether there is a difference between the attitudes of educators and students about the introduction of more digital tools into the teaching process. In addition, in the second RQ, the authors wanted to answer whether the perception of educators and students regarding the impact of simulation games on improving the outcome of the teaching process differs. Afterwards, in the third RQ, the authors wanted to answer whether educators and students think that multimedia materials (audio and video materials, games, etc.), which can be used in e-learning, make learning more fun. Finally, in the fourth RQ, the authors wanted to answer whether educators' perception of the necessity for greater administrative support while using e-learning tools in the teaching process differs from the perception of students' need for such support. The results are presented in Table 6. Figure 3 presents the interaction plots of the variables for educators and students, with a 95% error margin.

Table 6
Z-test Results

	Q1		Q2		Q3		Q4	
	Edu.	Stu.	Edu.	Stu.	Edu.	Stu.	Edu.	Stu.
Mean	3,849	3,787	3,780	3,641	3,539	3,281	4,270	4,048
Known Variance	1,214	1,538	1,143	1,523	1,041	1,589	0,823	1,262
Observations	423	2,474	423	2,474	2,474	423	423	2,474
z	1.038		2.414		4.626		4.476	
p-value	0.299		0.016*		<0.001**		<0.001**	
z Critical	1.96		1.96		1.96		1.96	

*Note: * statistically significant at 5%; ** 1%*
Source: Authors' work

Figure 3
The interaction plots of the variables for educators and students, with the 95% error margin



Source: Authors' work

Observing the results, we can see they differ between the RQs. For the first RQ, the empirical z-score is lower than the critical z-score (1.038 < 1.96), while the p-value is 0.299. Accordingly, it can be concluded that there is no difference between the attitudes of educators and students about introducing more digital tools into the teaching process. Both educators and students, on average, agree that more digital tools should be introduced into the teaching process. Such results go in favour of implementing more gamification in the teaching process.

Regarding the results for the second RQ, the empirical z-score is higher than the critical z-score (2.414 > 1.96), while the p-value is 0.016, which is lower than 0.05. Based on the results, it can be concluded that there is a statistically significant difference with a nce level of 95%. In other words, t eption of educators and students regarding the impact of simulation games on improving the outcome of the teaching process statistically significantly differs with a confidence level of 95%.

Finally, the results for the third and fourth RQs show that the empirical z-score is higher than the critical z-score (4.626 > 1.96; 4.476 > 1.96), while the p-values are less than 0.001. It brings to the conclusion that the attitudes of educators and students regarding making the learning process more fun by using multimedia materials (audio and video materials, games, etc.) statistically significantly differ with a confidence level of 95%. Besides, the attitudes of educators and students statistically significantly differ regarding the necessity of providing better administrative support in using e-learning tools. The same result came after testing both questions at a significance level of 0.01 or, in other words, with a confidence level of 99%.

Discussion

Adapting the teaching process by applying a more interactive approach, e.g. by implementing gamification, requires a personal engagement of educators and students and the support of the administrative staff and infrastructure. A survey has been conducted to evaluate the need and willingness of educators and students to implement more digital tools and gamification into the teaching process. The authors set several research questions and tested them using statistical techniques. To begin with, the authors have assumed that it is important to research the respondents' views on the necessity of introducing more digital tools into the teaching process. After analyzing the answers from educators and students, it was concluded that both educators and students have positive views on introducing more digital tools into the teaching process, and their opinions do not differ significantly. However, educators have more preferences regarding it. Afterwards, it was assumed that it is important to check their perception of simulation games' impact on improving the teaching process's outcome. Analyzing the results, the authors found a statistically significant difference between their answers, where educators perceived a greater impact of simulation games on improving the outcome of the teaching process. Furthermore, research results showed that the attitude of educators and students regarding making the learning process more fun by using multimedia materials (audio and video materials, games, etc.) statistically significantly differs where, again, educators perceive a more significant impact. Finally, as expected, educators showed they need a higher level of administrative support when they use e-learning tools in the teaching process compared to students' needs for such support.

The presented research results slightly exceeded the authors' expectations since educators showed enthusiasm for introducing more gamification supported by the use of digital tools into the teaching process. This can be seen from the perspective of their increased self-confidence after using various digital tools during the COVID-19 pandemic and lockdowns when they performed their lectures in a hybrid mode or even entirely online. They have learned how to use additional digital tools to motivate and encourage students to learn, while, from the students' perspective who were listening to lectures from several educators, who probably used different digital tools, it could be concluded that they encountered too many new digital tools in a short time, which caused them difficulties in navigating and using them. In addition, students were forced to listen to lectures from their homes, which was unfamiliar to them and probably caused an additional overload. Furthermore, implementing more digital tools and gamification in teaching requires administrative and infrastructure support. In that context, educators and students expressed needing better administrative support while using e-learning tools. In addition, the mean values for that question for both groups of respondents resulted in the highest values, which means there was a lack of administrative support during the COVID-19 pandemic since everything had been changing rapidly. Existing capacities were not sufficient to cover all the not expected needs that occurred. Finally, the general conclusion is that educators and students are willing to introduce gamification supported by the use of digital technologies into the teaching process with additional administrative support and adequate infrastructure in educational institutions.

Conclusion

Continuous and up-to-date monitoring of modern teaching methods and development of technological achievements is a necessary prerequisite for sustainable education, which means innovating, updating and adapting the

teaching process to the requirements of the profession, end-users and technology, regardless of the education level. This study considered the application of digital and mobile technologies as supporting tools for implementing gamification in the field of education of future economists, as well as their willingness and readiness for the wider application of digitalized technologies in the teaching process. The research was conducted on a sample of educators and students of economic faculties/universities and secondary economic schools in four countries (Croatia, Poland, Serbia and Germany), primarily interested in accounting, finance, trade and tourism.

Results show that educators and students are willing to have more digital tools introduced in the teaching process. Also, the results confirm that educators are aware of students' motivation to use digital tools more in the teaching process since they are of thinking that simulation games have a moderate to a significant impact on improving the outcome of the teaching process and agree that multimedia materials would make the learning process more fun. The previously mentioned results are consistent with the results of the study by Buzzard et al. (2011) and confirm that both educators and students are eager to teach/learn with the support of various digital technologies. Furthermore, this research recognized the importance of infrastructural and administrative support in implementing gamification and digital tools in the educational process, as in previous studies (Dicheva et al., 2015; Rabah et al., 2018). Regarding infrastructural and administrative support, the results indicate a higher awareness of educators' need for support.

Scientific research should be considered in light of some limitations, so this study is no exception. This study refers only to economics, while further studies could also cover other areas. In addition, considering the uneven distribution of responses between some countries, it is impossible to generalize the conclusions. To address the challenges in existing research, further research studies could include more countries with different levels of digitalization. Also, the results would possibly differ if the two levels of education (higher and secondary education) were considered separately.

Finally, it should be noted that the results of this study confirm that the most relevant stakeholders, educators and students, are willing to introduce gamification supported by digital and mobile technologies into the teaching process with additional administrative support from their educational institutions.

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About the authors

Nikolina Dečman, PhD is an Associate Professor at the Faculty of Economics and Business, University of Zagreb, Department of Accounting. She received recognition from the Croatian Association of Accountants and Financial Experts for her postgraduate thesis and doctoral dissertation. She teaches various accounting courses, and her main research interests are accounting for SMEs, financial and non-financial reporting, and financial statement analysis. Currently, she is a Project Manager of the DIGI4Teach project co-funded by the Erasmus+ program of the EU, a member of the Judging Committee of the National Competition of Vocational School Students - WorldSkills Croatia 2022 for the discipline of Accounting, a lecturer in professional training for Certified Internal Auditors and an Editorial Board Member of the Proceedings of the Conference "Internal Audit and Control". She has been actively engaged in several scientific and professional projects (Ministry of Science, Education and Sports, Croatian Science Foundation, UNIZG, Polish National Agency for Academic Exchange). The author can be contacted at **ndecman@efzg.hr**.

Ana Rep, PhD is a Post-Doctoral Researcher and Teacher at the Department of Accounting, Faculty of Economics and Business, the University of Zagreb, where she teaches four accounting courses. She received a PhD in Accounting at the FEB UNIZG with the dissertation thesis "Impact of Disclosure Requirements Changes on the Improvement of Financial Reporting Model, " awarded by the Croatian Association of Accountants and Financial Experts. She was also educated in Strengthening the Fundamental Teaching Competencies of Higher Education Teachers, Preparation and Implementation of the EU Co-Funding Projects, and Internal Audit in the Field of the Real Sector. Her main research interests include accounting for SMEs, accounting information systems, and financial and non-financial reporting. She has been actively engaged in several scientific and professional projects co-funded by the Erasmus+ programme, Croatian Science Foundation, Polish National Agency for Academic Exchange, and UNIZG. The author can be contacted at **arep@efzg.hr**.

Marion Titgemeyer, PhD, is a Professor of Business Administration, in particular Corporate Accounting, Auditing and Taxation, at the Faculty of Management, Culture and Technology at Osnabrück University of Applied Sciences, Germany. She teaches mainly International Taxation, Auditing, Tax issues for SMEs, International Accounting, Operations Audit, Business Valuation, Managerial Finance, and Entrepreneurship. In cooperation with companies, she supervises business projects through which students are trained application-oriented. Her main research interests are taxation, auditing, accounting, and entrepreneurship. She regularly publishes papers in professional journals. She is also a permanent commentator in income tax commentary. The author can be contacted at **m.titgemeyer@hs-osnabrueck.de**.