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Research highlights. The core results, findings or conclusions of the paper are emphasized in 2-4 bullet points (max. 150 characters per bullet point including spaces). The highlights are submitted as a text into the submission form in the editorial system.

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Papers must be closely scrutinized for typographical and grammatical errors. If English is not author's first language then the paper should be proof-read by a native English-speaking person, preferably one with experience of writing for academic use. Spelling should follow the Oxford English Dictionary.
Tables, graphs and illustrations should be drawn using a suitable drawing package. Colour may be used. Place all diagrams and tables where you wish them to appear in the paper. Ensure your diagrams fit within the margins and are resizable without distortion.

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Following Editorial recommendation, papers are submitted to a double-blind peer review process before publication. Commentary by reviewers will be summarized and sent by email to authors, who can choose to revise their papers in line with these remarks. Re-submitted papers should be accompanied by the description of the changes and other responses to reviewers' comments (see above), so that the desk-editor can easily see where changes have been made.

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First, we would like to announce that associate professor Eva Vaněčková, one of the longest-standing members of the ERIES Journal editorial board, has decided to step down from her position. Eva Vaněčková was one of the founding members of the journal, who shaped the journal's objectives and trajectory. We are more than grateful for all her rigorous, detailed, and constructive reviews that helped many authors to improve their manuscripts. The current international position of the journal is also a result of the worthy comments and suggestions associate professor Vaněčková raised during the annual Editorial board meetings, as well as during personal meetings at conferences. Thank you!

Second, we would like to share with our readers the latest evaluation of the ERIES Journal in the annual Scimago Journal & Country Rank. In the 2023 edition, ERIES Journal has been ranked again in the Q3 in the Education category with SJR of .293 (an improvement of +16.7% compared to the previous year). This growth indicates the increasing interest of the readers and the increasing impact of the ERIES journal in the field of education.

In this second issue of the year 2023 (Vol. 16, No. 2), we are delighted to present you six articles from different regions around the world: Austria, the Czech Republic, Kuwait, Peru and Turkey.

In the first article "E-Learning in Kuwait: Students' Perspective", Shaima AlShamali, Mohammed Hajeeh and Ahmad AlKhayat assessed the online learning process in Kuwait from the perspective of students as a response to the Covid-19 pandemic. The authors used an online questionnaire sent to 1000 students in Kuwait from private and public education institutions. In the end, 500 complete responses were obtainedand analyzed. The study principally aimed to investigate: How satisfied are the students with the organization's support, the role of the instructors, and the home study environment for facilitating online education?; and What are the positive and negative factors that influence students' online learning experiences? The results showed that most students have a strong foundation in computers and other online digital systems. However, most of them favored conventional face-to-face instruction due mainly to the ample communication with instructors and fellow students.

In the second article "Efficiency of Turkish Health Management Departments through Data Envelopment Analysis", Menderes Tarcan and Gözde Yeşilaydın aimed to determine which variables made a statistically significant difference in the efficiency status of undergraduate departments offering Health Management education in Turkey. The authors used a Data Envelopment Analysis methodology to analyze the efficiency of 43 Health Management departments. The Mann-Whitney U test was later used to analyze whether a statistically significant difference between the efficiencies of the departments based on the input and output variables exists. The authors observed that only 15 out of 43 departments were efficient, out of those 60% are located the Aegean, Central Anatolia and Marmara regions of Turkey. The authors recommend that the inefficient departments need to increase their publications in journals and conduct more research projects.

In the third article "Mobile Augmented Reality in Biological Education: Perceptions of Austrian Secondary School Teachers", Eva Schmidthaler, Branko Andjic, Mathias Schmollmüller, Barbara Sabitzer and Zsolt Lavicza aimed to determine the teachers' perceptions of the benefits and obstacles of employing mobile Augment Reality applications (mAR) in their biology education. The authors used a mixed-methods study to examine Austrian secondary school biology teachers' opinions. A questionnaire containing open-ended and closed-ended questions was distributed to 35 teachers. The results showed that the teachers perceive the utilization of mAR in their classroom as innovative, creative, and changes the design of the learning unit. Moreover, the teachers likely use mAR apps to teach human anatomy or to determine plants, fungi, or animals. However, they still need assistance and guidelines on where and how to find suitable mAR apps, and how to utilize them correctly and efficiently in their biology education.

In the fourth article "Preconceptions of Happiness and Satisfaction: The Perspective of Children from Czech Primary Schools", Jakub Pivarč researched what children aged 10–15 associate with happiness/satisfaction, as well as which factors are related to their feelings of happiness and their evaluation of life satisfaction. In the analysis, a total of 954 children attending Czech primary schools from various socio-cultural backgrounds were surveyed using the incomplete sentence method. The levels of happiness and satisfaction were measured using the Subjective Happiness Scale and Students' Life Satisfaction Scale. The results indicate that a relatively high level of experienced happiness/satisfaction among the children. Happiness/satisfaction was lower in children who described

themselves as 'melancholic', unaccepted by the caregiver, coming from a single-parent family, and spending their childhood in an institutional setting. These four personality and contextual factors significantly contributed to the prediction of happiness/satisfaction.

In the fifth article "Self-compassion as a Newly Observed Dimension of the Student's Personality", Kristýna Krejčová, Pavla Rymešová and Hana Chýlová evaluated the level of self-compassion by the students of the Faculty of Economics and Management at the Czech University of Life Sciences to precise the planned mindfulness-based intervention. To do so, the authors used the Self-compassion Scale and the NEO-PI-R assessment method and obtained responses from 206 students from bachelor's study programs. The results proved insignificant correlations between the self-compassion subscales and self-reported grades but also subtle differences in the structure of the self-compassion by males and females.

Finally, in the sixth article "Dropout Intentions in Higher Education: Systematic Literature Review", José Carlos Véliz Palomino and Ana Maria Ortega conducted a systematic literature review on predictors of students' dropout intention in higher education. For this, the authors focused on scientific production in Q1 and Q2 journals from 2018 to 2023, performed a bibliometric review and analyzed the available empirical and theoretical data on the phenomenon of dropout intention and its affecting factors. The presented review study detected that the dropout intention as a decision-making process includes five factors: Psychological factors, factors related to Academic integration, Social integration, and Institutional integration, and Financial factors.

We would like to thank all authors who have submitted their articles to ERIES Journal, and special thanks to all reviewers for their endless effort in revising the articles. We hope that all our readers will find this second issue of the year appealing. You can follow the latest updates related to the ERIES Journal on its LinkedIn page, where we post information about the highest cited articles, related upcoming events and calls for special issues.

Sincerely

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CONTENT

E-LEARNING IN KUWAIT: STUDENTS' PERSPECTIVE

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ABSTRACT

The Coronavirus (COVID-19) pandemic has wreaked havoc on societies around the world and continues to do so and produced cataclysmic socio-economic challenges. This virus compelled countries to enact restrictive policies in order to combat, defend, and prevent against the spread of infection. In most nations, including Kuwait, a complete lockdown was imposed, with necessary measures taken to limit social gatherings, wear protective masks, and encourage social distancing. Businesses, organizations, and institutions have been forced to discover new avenues to survive and thrive by converting to remote operation using digital technology. Similarly, the epidemic has forced educational institutions to abandon conventional face-to-face instruction in favor of online digital learning. The goal of this study is to assess the online learning process in Kuwait from the perspective of students. In this regard, a survey questionnaire was designed and distributed to students throughout Kuwait; 830 students responded, with just 500 students with complete answers. In light of the dangerous and widespread of the harmful virus, analysis found that students consent to online learning. However, most prefer face-to-face instruction in a classroom setting.

KEYWORDS

Online learning, Kuwait, COVID-19 pandemic, barriers, sustainability

HOW TO CITE

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Highlights

- *This study evaluates Kuwait's online education system from students' viewpoints.*
- *The majority of students prefer in-person instruction in a classroom setting over e-learning.*
- *While Kuwaiti teachers are less accustomed to e-learning, students possess knowledge of computer applications and online processes.*
- *All stakeholders and elements of Kuwait's educational systems must commit, dedicate, and work together to ensure the long-term viability and sustainability of digital learning systems in Kuwait.*

INTRODUCTION

Following the initial signs of its emergence in late 2019, COVID-19 spread rapidly throughout the world, killing millions of people and forcing countries into lockdown. Economic activity has ceased as a result of its ripple effect. Rapid spread of the virus forced organizations and companies to transition to an online mode of operation. The devastating effects of the COVID-19 pandemic have also disrupted many aspects of our lives, most notably education.

The crisis paralyzed the education sector and hence compelled officials to choose between closing schools to save lives or keeping them open. The virus has pressured students and faculties to stay at home. Face-to-face interaction between instructors and students is especially harmful due to the high contagiousness of Coronavirus. As a result, students' educational programs were disrupted, requiring a considerable change away from traditional learning in schools and universities and toward online or distance learning. Therefore, implementing remote education in various delivery modes assure educational continuity. E-learning is a method of transmitting knowledge to learners via the Internet, satellite, interactive television, intranet, or extranet (Chen et al., 2020). The concept of E-learning entails using modern technology and available E-tools for effective two-way communication in order to transfer knowledge to all key stakeholders in the education sector. Students, instructors, parents, institutions, and institutional administrators, as well as a competent information technology platform, are critical stakeholders in the online learning process, and their participation, cooperation, and joint efforts are important to maximize the process efficacy.

The most important purpose of digital learning is to close the learning gap produced by the lockdown. If one or more of the above-mentioned components does not operate or function effectively and satisfactorily, online learning is interrupted and hence blocked. Power outages, connectivity issues, internet availability, infrastructure, course design and organization online classes; course delivery and assessment; research and communication patterns; selecting the proper online teaching

platform and monitoring the effect and quality of online learning are just a few of the challenges that online learners face.

Instructors with mediocre perceptions of their knowledge of information technology are another barrier to online learning (Barrot et al., 2021; Adedoyin and Soykan, 2020). On the other hand, students had some of the same problems as teachers in this regard and were generally unprepared for online learning. However, students were hesitant to embrace online instruction because of their home obligations and lacked interaction between themselves and the lecturers. Some students did not have physical study spaces, environments, and online learning platforms. Many underdeveloped countries and with low incomes households do not provide students with a dedicated study area (Tang et al., 2023; Day et al., 2021).

Other problems that might develop as a result of a sudden change in one's lifestyle include stress, anxiety, and sadness (Saddik et al., 2020; Copeland et al., 2021). Low-income families lack basic necessities like food, shelter, running water, electricity, medical care, and safety for their children. These students are more likely to be targeted online because they are taking so many classes online and spending so much time on digital platforms. Students are now spending more unstructured and dangerous amounts of time online studying, which increases their risk of cyberbullying and exposure to violent information. Some schools and institutions lack the tools to support online teaching and learning, such as student access licenses for online library materials and functional online communication tools. Digital learning cost possess a burden for parents of students from low-income homes.

On the plus side, there are many clear accessibility benefits, flexibility, convenience, and a significantly more affordable study style in terms of travel and lodging. Many people are interested in whether online learning is superior to traditional in-class learning even though most academics and students prefer the traditional approach. Face-to-face learning is favorable due to the challenges that come with it; the participation of instructors is essential to the success of online learning.

Before the COVID-19 epidemic, digital education, or e-education, had been employed sporadically in some nations and only marginally or not at all in the majority. Nonetheless, it exists in a few different ways previously. For online expansion, modern equipment and means of transferring information are critical; thus, high-development computers and digital platforms exist. Distance education is very important and its widespread availability and feasibility as well as the expansion of computers and broadband Internet, have prompted their usage in educational activities (Makosa, 2014).

Computers and first-and second-generation communication technology were both used in early remote education courses. The mainstays of first-generation distance learning, which ran from the 1850s to the 1960s, were print, radio, and television. On the other hand, a variety of technologies were used in the second wave of distance learning courses without the use of computers. The establishment of the British Open University in 1969 marked a turning point in the usage of mixed-media technologies to deliver distance education. Text, audio, and visual learning materials were sent to students via mail and were supplemented by broadcast (Matthews, 1999).

This study aims to evaluate the appeal and usefulness of distance education among Kuwaiti students during a coronavirus lockdown. Additionally, clarify the areas of weakness and strength as expressed and characterized by students, and highlight difficulties and barriers encountered by students nationwide in the 2020–2021 academic year.

LITERATURE REVIEW

The growth of online learning over the years, particularly during the COVID-19 pandemic, is not a recent development in the education sector education. The Internet, social media, and other digital communication tools are used in online learning. The literature includes a long list of articles on online education. However, during COVID-19, the volume significantly increased.

As far as students' experience and readiness in using digital technology, according to Klein et al. (2018), WhatsApp has various qualities that are useful for higher education distance learning and is frequently used by students. It encourages engagement, knowledge sharing, and collaboration. Dhawan (2020) confirmed that the usage of social media for distance learning has undeniable benefits in improving communication between students and between teachers and students.

In their study, Noskova et al. (2021) developed a survey questionnaire to see whether students understood different ways to connect with digital learning resources and the most digital tools they preferred ones. Their findings revealed problems and gaps in students' information cultures and suggested means to improve their potential interactions with digital resources. Similarly, Singh (2020) looked into how management students felt about online education during COVID-19. The student had no idea that in-person instruction in the classroom would be replaced successfully by digital learning. Major obstacles sited by students included lack of teacher interaction and noisy home environment.

Dawadi et al. (2020) stated that online learning is expected to exacerbate previously existing disparities among students in low-income and developing countries, owing to existing socio-economic gaps in terms of wealth and education levels among the population. In the same line, Kapasia et al. (2020) emphasized the significance of a conducive learning environment, which is sadly lacking in many developing nations. Furthermore, according to Azorín (2020), students in some countries lack basic needs such as food, power, and clean water. Another barrier to e-learning is the lack of high-speed broadband or digital devices. For students, parents, and instructors, the proliferation of Covid-19 has produced social and emotional upheaval, uproar, and discomfort (Dorn et al., 2020).

Similarly, according to E-learning Africa groups (eLearning Africa and EdTech Hub, 2020), the constraints and limitations of online processes in Africa are not the same for everyone; they vary depending on region and degree. The issues that urban colleges face are distinct from those that rural primary schools face. Although Covid-19 has impacted all educational sectors, certain levels of education have been affected differently than others; however, higher education has been the least affected.

Teachers and parents play critical roles in the success of the educational system. Several studies have looked into

research from this perspective. For example, Flores and Gago (2020) conducted a study to examine the ability of Portuguese teachers to address difficulties and possibilities in digital instruction. De Boer (2020) found that due to the new teaching revolution in Dutch higher education, teachers are experiencing traumatic, demanding, and upsetting experiences along with psychological and professional issues.

Alqabbani and Almuwais (2021) developed a cross-sectional survey questionnaire in Saudi Arabia to gauge university professors' readiness attitudes and satisfaction with the shift to distance learning. The vast majority of responses were encouraging and positive. Using a survey with educators and learners on distance learning, Gupta et al. (2020) discovered a distinctly positive response among students and less favorable among teachers. Majority of respondents stated that online learning is inappropriate for teaching mathematics, which necessitates constant face-to-face engagement with the instructor besides being dissatisfied with the inadequate infrastructure. Farooq et al. (2020) looked into the issues that the medical faculty in Pakistan faced during COVID-19. Lack of sufficient training and minimal assistance from the university were among the main setbacks. In addition, difficulties such as internet connectivity and availability were mentioned.

Parents play an essential role in providing for children's needs, such as a safe and healthy home environment. In addition, they provide direction and stimulate their children in the e-learning process. In the Sultanate of Oman, a study on parents' perceptions of online education during the coronavirus pandemic was conducted to measure parent's view of e-learning. According to the parents, e-key learning benefits include exposing their kids to modern educational technology and teaching them how to function independently. One of the challenges was time management and network limitations (Al-Hadharami and Al-Saddi, 2021). E-learning in Jordan faces several logistical, administrative, and technical challenges, according to Abuhammad (2020). Parents spent time and energy trying to give their kids a nurturing and supportive environment, but they ran into personal, practical, and financial difficulties.

In terms of students' perspectives, the literature encompasses research articles for all academic levels, and several authors have investigated the viewpoints of non-college students. For this particular group of students, for example, Şahin et al. (2020) employed a variety of nonparametric tests, including the Kruskal-Wallis and Wilcoxon tests to measure the impact of delivering a learning psychology course in various methods on students' academic achievement and attitudes. Similarly, Mukluk et al. (2021) examined secondary school students' views on distance learning in mathematics education during the COVID-19 epidemic in Zambia.

In Alabama and Georgia, Lindner et al. (2020) used transactional distance to deliver a structured interview questionnaire to middle and secondary school agriscience teachers. Instructors emphasized that students should be provided with the necessary tools and materials, as well as receive proper training. In light of the sudden shift to online teaching, Hasan (2020) conducted a qualitative study among Indian students during the COVID-19 pandemic. In this study, convenience as well as flexibility were identified as advantages, the disadvantages were as weak network and connectivity. Rahayu and Wirza (2020) used survey questionnaires and interviews to investigate the attitudes of Indonesian junior high school English teachers about online instruction. Although the students favored online learning, they questioned the method's effectiveness.

In Zimbabwe, Maphosa (2021) conducted a survey of university undergraduate students. The main shortcomings stated by students included lack of technology, facilities, internet, and power outages. The major challenges were energizing and stimulating students to participate actively in the process. During COVID-19, Giray (2021) conducted a poll to find out how Turkish undergraduate computer science students perceive online learning. Students preferred in-class lectures. Moreover, the main deterrents of online learning were the lack of instructor support and scarcity of classmate interaction.

In California, Asgari et al. (2021) surveyed university engineering students on e-learning, findings revealed that privacy and security, as well as learning and teaching to be the significant technical problems. In a similar vein, during COVID-19 lockdown, Alsoud and Harass (2021) analyzed the perceptions of university undergraduate Jordanian students on e-learning process in the country. The sample included undergraduates under the age of 21, with few graduate students. Almaiah et al. (2020) conducted interviews with students and specialists in six universities in both Saudi Arabia and the Jorden during COVID-19 to determine the key hurdles facing the e-learning process. The participants indicated that the key elements for a successful on-line are having visionary policymakers, as well as qualified developers and employees. According to Doucet et al. (2020), no one unique online learning system exists that is customized to all subjects, ages, cultures, and regions. Yet, a study conducted in Lebanon by Fawaz and Samaha (2020), researchers discovered a positive correlation between university satisfaction levels and the prevalence of depression and stress.

The findings of Wahid et al. (2020) suggested that online learning is inappropriate for science disciplines, particularly those that require students to perform experiments in lab settings, like biology, chemistry, and physics. On the other hand, Kalman et al. (2020) aimed to evaluate how chemistry students reflected on online learning. Students expressed their excitement and satisfaction with the technique, provided they fully master the skills and developed a passion for the work

In order to identify the factors influencing students' intention to use e-learning, Al-Okailya et al. (2020) conducted a survey questionnaire among Jordanian university students. The responses were examined using partial least squares. The majority of students used smartphones in their online classes, according to data analysis. The majority of respondents cite poor communication with their peers, lack of technical support resources, and motivation as the main drawbacks of distance learning, the main concerns of instructors were a lack of technical support, particularly for those who were not accustomed to giving lectures or producing materials for online platforms.

Several studies in medical and other related fields have been conducted; for example, Diab and Elgahsh (2020) used

a descriptive correlational research process to assess Egyptian nursing university students' perceptions of online education. The majority of students, particularly first-year students, expressed their discontentment with e-learning process. The dissatisfaction was primarily caused by inadequate infrastructure and technology, a lack of management support, and improper instructor behavior and incompetence. The main issues raised by students included poor internet connectivity, particularly for students in rural and distant places, and a lack of a place and distinct room for studying. In a similar vein, other students admitted to feeling anxious or depressed in some way.

Hundekari et al. (2020) assessed Indian medical students' perceptions of online teaching during the COVID pandemic. Despite their preference of face-to-face instruction, students agree to use online instruction as a backup in dangerous or time-sensitive scenarios. skills. In Poland, Bączek et al. (2021) designed an on-online survey for medical students to assess the e-learning process. Analysis revealed that online learning is highly favored among students since it allows for more stays-at-home, ample access to online services, and studying at one's own pace. The absence of ample interactions with patients and technical problems were highlighted as the main drawbacks.

Basith et al. (2020) in Poland designed an online survey for medical students to evaluate the e-learning process. Data analysis shows that online learning is quite favored among students. It provides for more time spent at home, more access to internet resources, and the ability to study at one's own speed. The lack of adequate interactions with patients, as well as technical issues, were cited as the key negatives.

Furthermore, the instructor proposed conducting additional research on the ramification of e-learning on students. During the COVID-19 pandemic, a survey of university medical staff in Egypt revealed that proper tools and teacher experience were the most important success factors in online learning. Students' main concerns were a lack of facilities and a lack of internal connectivity within the country (Zalat et al., 2021). Alsmadi et al. (2020) investigated the efficiency of remote learning among Saudi Arabian medical students with 63% indicating that it was beneficial, but they lacked adequate contact with the teachers.

Quality assurance is imperative for the success of distance learning. Quality of teaching, learning, material, and facilities are essential ingredients for producing efficacious learning outcomes for students. Achieving quality teaching and learning is an aspiration of educational decision-makers but is an intricate endeavor since it involves multitudinous dimensions, such as curriculum design and course content and material, as well as assessment of the learning environments and outcomes. Furthermore, it necessitates sincere and fervent coordination, cooperation, and engagement among a wide range of stakeholders.

As an example of quality assurance, Marciniak (2018), identified several indicators for assessing the quality of online higher education programs. Kazaine and Arhipova (2018), on the other hand, proposed procedures for assessing and controlling the quality of e-learning materials. Chuah and Lim (2018) found that using quality tools is essential for improving Malaysian student' retention and supporting learnign processes.

MATERIALS AND METHOD

During the coronavirus pandemic, Kuwait, like most other nations, was put on full lockdown and had to alter all safety standards, and the country had to adjust and acclimatize to new living conditions. The majority of the country's economic operations and organizations were halted or slowed down, the education system was no exception. As a result, classes and face-to-face lectures were replaced by online instructions and lectures. Kuwait, as an oil-producing country, has no severe infrastructure concerns or shortages of electronic facilities, equipment, or other tools required for distance learning. Students were unfamiliar with this way of learning, and instructors were inexperienced and unequipped to teach in this manner, this was apparent particularly among high and middle school teachers.

This study is specifically aimed at answering the following research questions to investigate the factors that influence students' learning and experiences during online education:

- How satisfied are the students with the organization's support, the role of the instructors, and the home study environment for facilitating online education?
- What are the positive and negative factors that influence students' online learning experiences?
- How much do students prefer taking online classes in the future?
- Is there a discernible difference in opinion based on gender or academic level and discipline?
- What line of actions should decision-makers in the country make to successfully sustain the online education process?

This research study was initiated with the goal of adequately and professionally designing online classes and providing and administering methodical and efficient instruction in the future. As a result, a survey questionnaire was designed to assess and measure the effectiveness and identify the key success indicators of the online learning process in Kuwait from the perspective of students. The questionnaire consisted of 25 questions and was distributed to students via online distribution, covering all governorates, education levels, gender, and other parameters, as shown in Table 1.

More than 1000 students in Kuwait received the questionnaire via the Internet. A total of 783 students answered, with the final number reduced to roughly 500 following comprehensive scrutiny for missing answers and duplications. The student's responses were evaluated and visualized using SPSS software. The sample represented a close exemplification of the student population in Kuwait with different characteristics, as portrayed in the aforementioned table. Kuwait is divided into six governorates; schools are predominantly publicly supported by the state, with few privately owned and operated schools. There is one public university (Kuwait University) and a number of privately financed universities, and only one Technical school that offers a diploma. The nationals represent the bulk of students, along with many non-Kuwaiti students. Many of the expatriates are either single or have left their children in their own country. The female students are slightly more than the male.

Education Sector	Number of participants	Percentage (%)
Public (Governmental)	309	62
Private	191	38
Academic Level		
Middle School (Intermediate)	141	28
High School (Secondary)	189	38
Applied education and training (diploma)	80	16
University	90	18
Age Range (years)		
9-14	139	28
15-18	152	30
19 and above	209	42
Gender		
Female	276	55
Male	224	45
Nationality		
Kuwaiti (national)	363	73
Non-Kuwaiti (Expatriate)	137	27
Governorate of Residence		
Ahmadi	65	13
Al-Asema (Capital)	115	23
Al-Jahra	72	14
Farwaniya	54	11
Hawally	128	26
Mubarak Al-kabeer	66	13

Table 1: Demographic Characteristics of the participants in the survey

The sample was a good representation of Kuwait's student population, with various characteristics, as shown in the aforementioned table. Kuwait is divided into six governorates, with the majority of schools being publicly funded by the government and only a few privately run institutions. Female students outnumber male students by a small margin. Figure 1 displays the percentage of student participants from different genders according to education level in both public and private sector schools, based on the above-mentioned table.

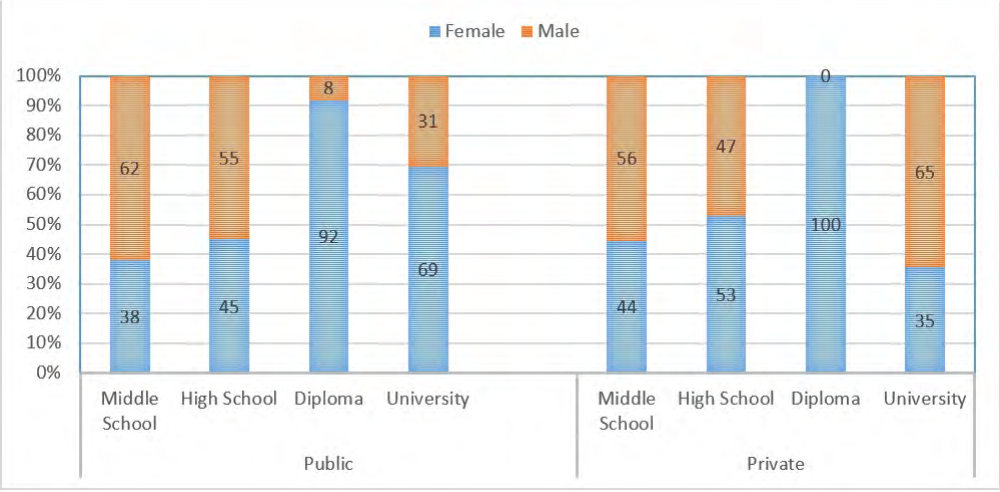

Figure 1: Percentage of student's participants in the survey according to the academic level from different genders and sectors

According to Figure 1, the female diploma student participants outnumbered their male counterparts in both the public and private sectors, but the percentages are frequently reversed in middle and high school.

RESULTS

The feedback from the survey questionnaire shows that, unlike many developed countries, Students in Kuwait overwhelming (97%) have computer knowledge and are familiar with and accustomed to using the internet and highly engaging in social media, and most own required devices for online learning. According to the survey, around 74% (369) claimed to have prior experience with using Microsoft Teams and Zoom applications.

Furthermore, just 45% stated having received the necessary materials for remote learning classes, although more than

half (58%) claimed of being comfortable using this form of learning; and 42% expressed their dissatisfaction.

Approximately 66% of students reported spending three to seven hours per day on online classes, while 10% claimed to spend more than seven hours, and 24% claimed to spend less than three hours per day. As shown in Figure 2 below, university students reported their grades had declined, while diploma students' grades did not change. High and middle school students' responses were nearly identical across all categories.

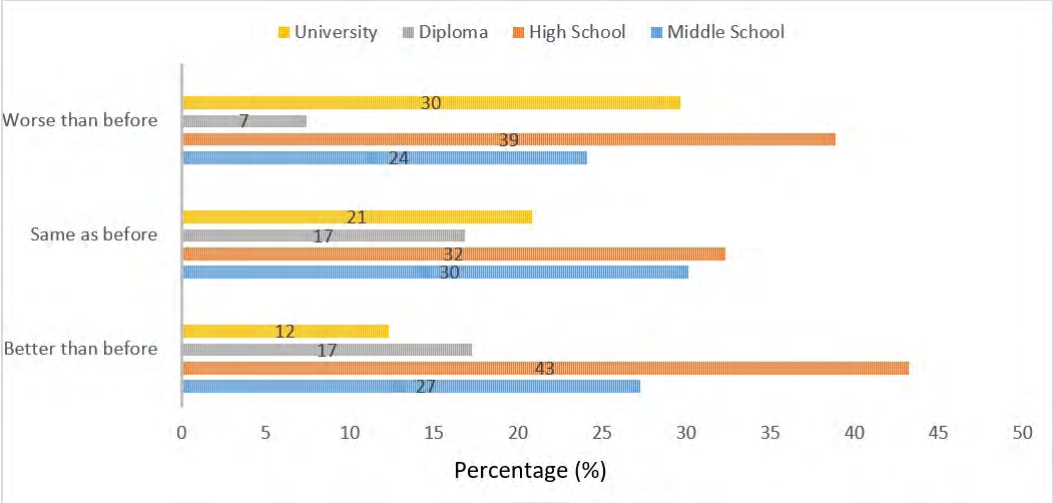

Figure 2: The status of students' grades in online learning versus in-class education in percentage according to academic level

As far as help and support from teachers, the bulk of students (85%) believe that they are available, with the bulk (56%) claimed that instructors are only available on occasion. Over 70% reported receiving some type of assistance from family and friends, with more information shown in Figure 3.

Figure 4 depicts the student respondents in terms of pleasure and content with the online learning experience. According to Figure 4, most students prefer conventional teaching methods. For example, 15% of university students, 37% of high school, 29% of middle school, and 17% of diploma students favor online teaching.

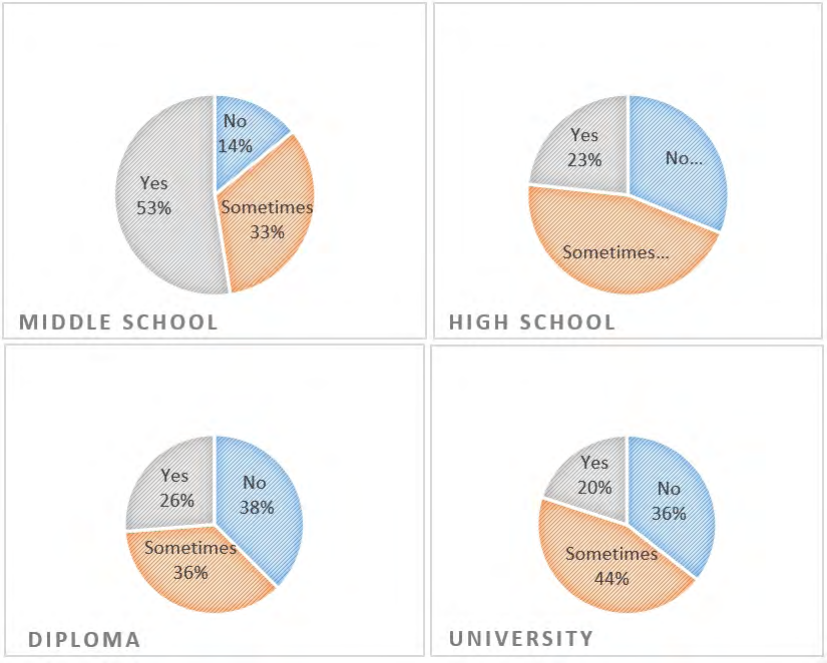

Figure 3: Percentage of students from different academic levels receiving assistance from family members and friends

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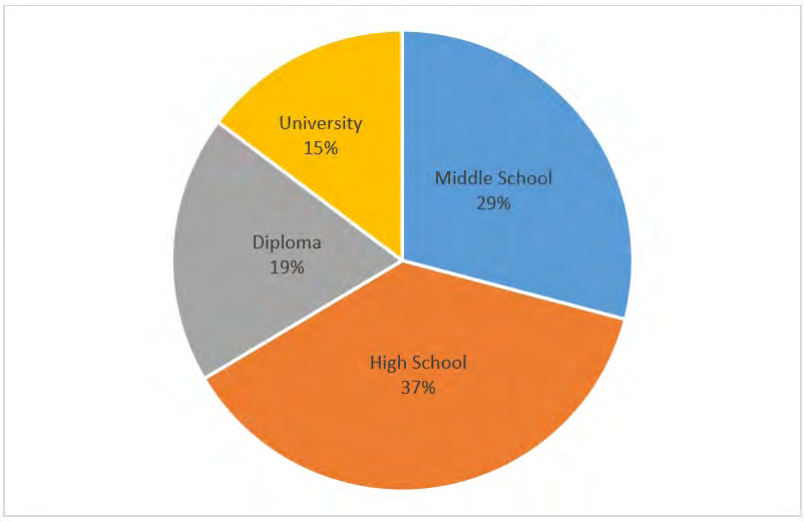

Figure 4: Satisfaction with online learning based on the academic level

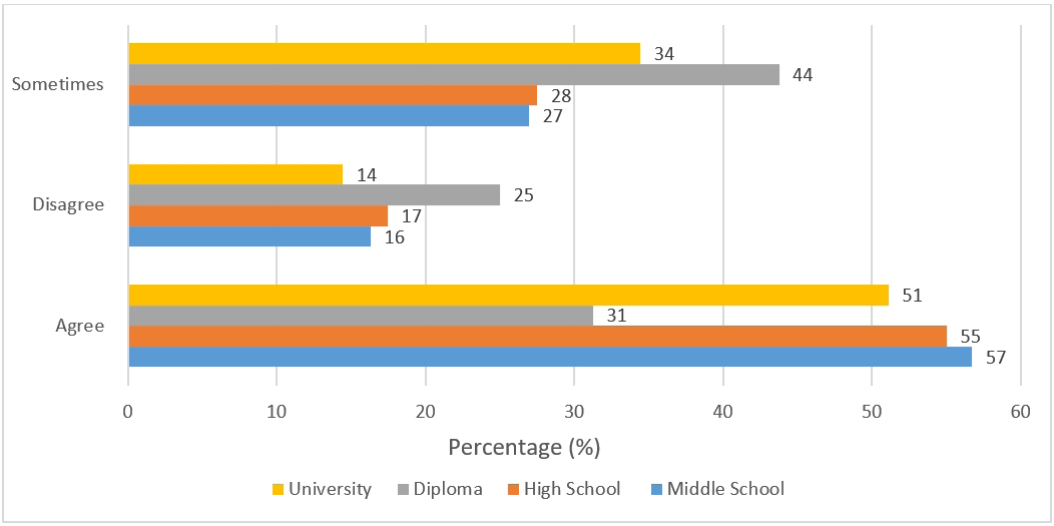

Figure 5: The need for face-to-face communication with instructors at various academic levels

Many students prefer to interact personally and face-to-face with teachers when communicating with them, even if it is only occasionally. College students are at the top of the list in this regard, followed by high school students (Figure 5).

Around 50% disputed that distance learning is more stimulating and inspiring, instead finding it to be rather uninspiring and uninteresting, prosaic and mundane. When it came to the mode of instruction, nearly 80% noted a significant difference between the traditional face-to-face teaching method and online instruction.

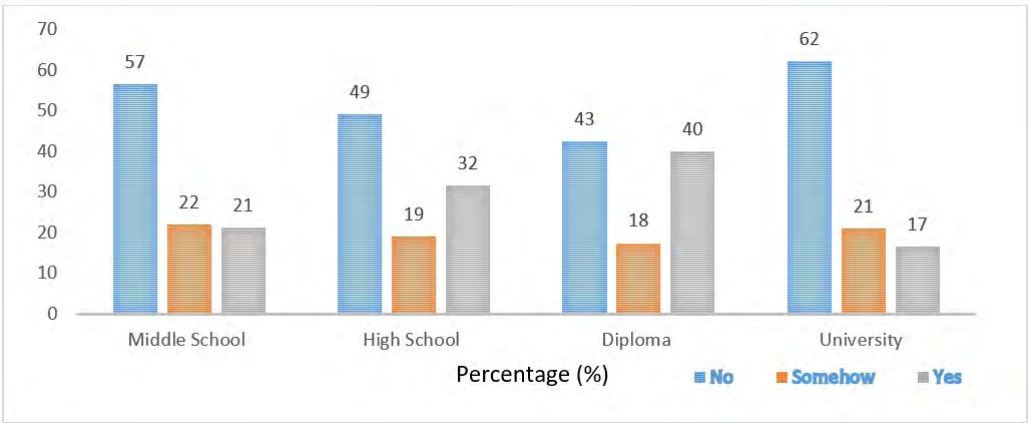

Figure 6: Students' acceptance of the stimulating degree of distant learning above traditional learning methods

The categorization agreement at various educational levels is shown in Figure 6. One of the most important measures of a student's comprehension of the material is his performance on the test. Nearly 95% of students who were asked whether their grades in online instruction compared to traditional face-to-face instruction improved or stayed the same said they did not, 44% said they did, and nearly 46% said they did not. Less expatriate students believed their grades improved, compared to more Kuwaiti students who thought they did. The survey respondents' responses are shown in Figure 7 by nationality and academic level.

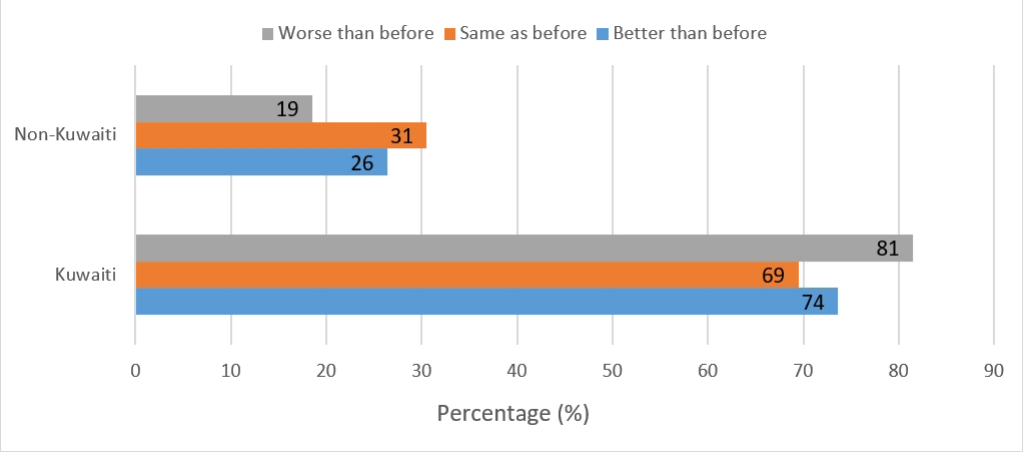

Figure 7: Comparison of native and expatriate students' levels of academic improvement in online learning vs. traditional teaching methods

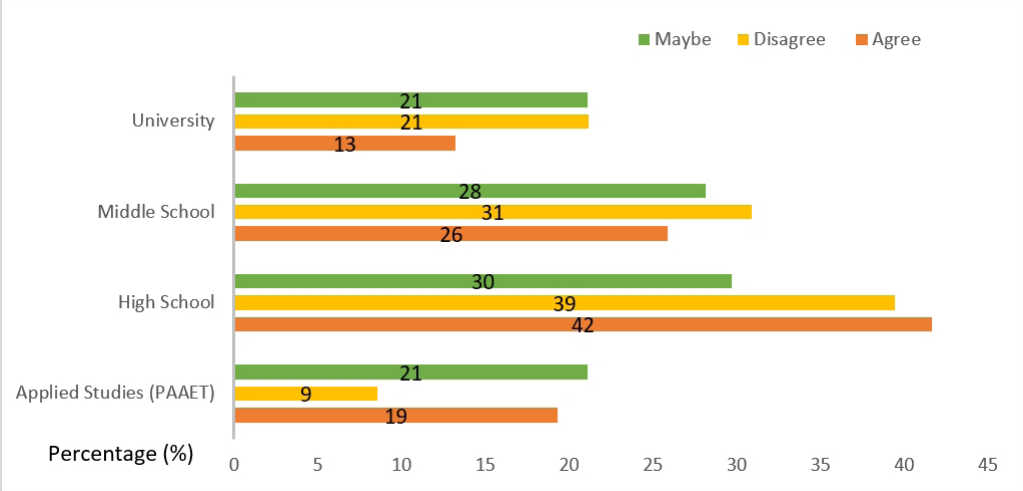

Figure 8: Approval of a total move to online learning in percentage by various academic level students

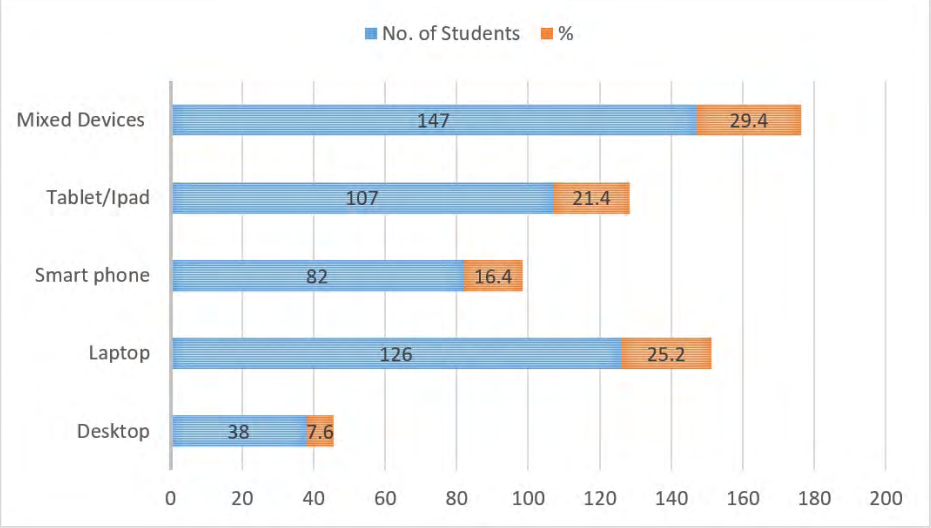

Figure 9: Number of students using the different devices in online courses

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Only 40% of the participants agree that learning should be entirely done online, while 35% disagree, and the remainder are undecided. According to the findings, more students disagree or are undecided. Carefully examining the numbers in Figure 8, one can deduce that diploma students have the highest degree of agreement (47%), followed by high school students (43%), middle school students (36%), and college students have the lowest level of agreement (28%).

Some students use only one device, as seen in Figure 9, with approximately 126 (25%) students using laptops in their online studies, 107 (21.4%) using tablets and iPads, 82 (16.4%) using smartphones, and 38 (7.6%) students using desktop computers. 147 students (29.4%) use several gadgets in their online courses.

SPSS software was employed to examine the various responses to the various questions, as well as to back up the previous findings shown in the various figures above. Since the majority of the items in the questionnaire list are qualitative, the answers are either yes, somehow, or no. Numerous nonparametric tests were applied in this regard. Either frequency or median is the most appropriate statistical analysis for comparison.

However, because of the nature of the questions, advanced statistical analysis, such as the Mann–Whitney U test, is recommended. The qualitative variables are labeled as follows: 0 for no (no = 0), 0.50 for somewhat (somewhat = 0.5), and 1.0 for yes (yes = 1). As a result, it will be easy to compare the results when examining the data. It will be displayed as a percentage, with zero as the lowest value and 100 as the maximum.

Table 2 summarizes the (Mann–Whitney U test) used to compare the average percentages of each group. Education type (public vs. private), gender (male vs. female), and nationality are just a few examples (Kuwaiti vs. Non-Kuwaiti). For example, students in public schools had an average proportion of "q8. experience utilizing Microsoft Teams and Zoom Applications" of 68.9%, which was substantially lower (U = 25749, p-value < 0.05) than students in private schools (81.7%).

The Mann–Whitney U test, on the other hand, revealed that there was no statistically significant difference in "q9, get equipped for distance learning" between public and private school students. By carefully reviewing the data in Table 2, it is possible to deduce the existence of a significant difference (p-value < 0.01) between replies of students in public education systems and those in private education schools to questions using the Mann–Whitney U test (8, 11, 12, 18, 20, and 24).

Furthermore, the answers to questions 11,12, and 20 differed significantly between the two genders. The Mann–Whitney U test revealed a significant difference (p-value < 0.05) in answers between nationalities in all questions except 8.

The Kruskal-Wallis H test revealed a statistically significant difference in answers to "q7. Knowledge on the internet" between at least one academic level ($\chi^2_{(3)} = 7.9$, $p < 0.05$) in the above-mentioned table. The Kruskal-Wallis H test, on the other hand, revealed no significant differences in q8-experience utilizing Microsoft Teams and Zoom Applications" between the three age groups, with a value of ($\chi^2_{(2)} = 5.3$, p-value > 0.1). With the exception of questions 8 and 21, the Kruskal-Wallis H test revealed that there is a statistically significant difference in replies between the different Academic Levels with (p-value < 0.05) across the board. In the same test, it was discovered that in questions 9, 11, 12, 15, 16, 20, 21, and 23, there was a statistically significant difference in answers between age groups. Furthermore, in questions 7, 8, 9, 12, 13, 15, 17, 18, 19, 20, and 23 the test revealed a statistically significant difference in replies between governorates as displayed in Table 3.

In addition, using SPSS, the analysis of variance (ANOVA) test was used to compare the average number of hours spent on lessons in question 14 (How many hours per day does it take you to complete your online learning lessons) between different social characteristics such as (Education Type, Gender, etc.). In this regard, the findings revealed a substantial variation across education type, academic level, age, and gender (Table 4).

Additionally, the analysis of variance (ANOVA) test was deployed using SPSS to compare the average number of hours spent to complete lessons in question 14 (How many hours per day it takes you to complete your lessons in online learning) between the different social characteristics such as (education type, gender, etc.). Findings indicated a significant difference between education type, academic level, age, and gender (Table 4).

Question	Education Type			Gender			Nationality		
	Governmental	Private	U test	Female	Male	U test	Kuwaiti	Non-Kuwaiti	U test
7 - Do you have any prior knowledge of computers and Internet?	79.3	80.1	**28969**	79.2	80.1	**29833**	80.7	76.6	**23107**
8 - Do you have experience using Microsoft Teams and Zoom Applications?	68.9	81.7	**25749*****	76.4	70.5	**29084**	69.7	84.7	**21142*****
9 - Have you ever been trained and provided with all the required materials for your distance learning lessons by your school?	60.5	58.6	**28591**	60.1	59.4	**30688**	59.8	59.9	**24791**
11 - Is opening the camera optional?	50.2	41.4	**26912***	42.4	52.2	**27870****	47.7	44.5	**24086**
12 - Is it requested to open the camera on tests?	40.8	73.3	**19913*****	56.9	48.7	**28370***	53.2	53.3	**24836**
13 - Are you comfortable with this method of learning?	58.6	58.1	**29373**	59.8	56.7	**29958**	56.2	64.2	**22867**
15 - when you need help, Is your teacher always available?	62.1	63.6	**28856**	62.7	62.7	**30573**	61.8	65.0	**23482**
16 - Do you receive any assistance during the study from family or friends?	51.5	51.8	**29389**	50.5	52.9	**29874**	51.9	50.7	**24400**
17 - Do you think there is a difference between traditional and distance learning?	86.6	90.1	**28113**	86.8	89.3	**29502**	87.6	88.7	**24303**
18 - Distance Learning is more stimulating and encouraging than traditional learning.	40.1	33.0	**26973***	38.9	35.5	**29635**	37.3	37.6	**24610**
19 - Is it easy to work in groups to complete the assignments online?	59.4	57.9	**28865**	59.1	58.5	**30636**	58.1	60.6	**24103**
20 - Is it necessary to communicate with the teacher face to face?	64.2	70.4	**26760***	63.0	71.0	**27863****	65.6	69.3	**23436**
21 - Did you hire a private tutor during distance learning?	29.4	30.9	**29084**	27.2	33.5	**28962**	31.4	26.3	**23590**
22 - Are your grades in the online academic achievements?	67.6	64.9	**28110**	67.8	65.2	**29559**	66.3	67.5	**24702**
23 - Do you think the grading system is excellent in online learning?	53.7	50.7	**19849**	52.8	52.3	**22155**	51.9	54.5	**16658**
24 - Do you recommend completing your studies using distance learning?	54.9	47.9	**26922***	54.0	50.0	**29405**	53.2	49.6	**23779**
25 - Do you think there are any advantages of distance learning?	75.5	79.8	**11419**	79.8	73.5	**13507**	76.4	78.1	**8684**

**** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1*

Table 2: Comparing knowledge by characteristics with their Mann–Whitney U test

Question	Academic Level					Age				Governorate						
	Middle School	High School	(PAAET)	University	$\chi^2_{(3)}$	9-14	15-18	19 and above	$\chi^2_{(2)}$	Ahmadi	Alasema	Allahra	Farwaniya	Hawally	Mubarak Alkabeer	$\chi^2_{(5)}$
7 - Do you have any prior knowledge of computers and internet?	78.4	80.2	74.4	85.0	**7.9****	78.1	82.6	78.5	**2.3**	74.6	86.5	73.1	82.8	79.5	86.5	**16.9*****
8 - Do you have experience using Microsoft Teams and Zoom Applications?	66.7	77.2	76.3	75.6	**5.3**	68.3	73.7	77.5	**3.6**	70.8	70.4	87.0	79.7	66.7	70.4	**11.1****
9 - Have you ever been trained and provided with all the required materials for your distance learning lessons by your school?	70.9	57.9	55.6	50.0	**17.5*****	71.6	58.6	52.9	**17.9*****	49.2	69.1	51.9	62.1	52.3	69.1	**15****
11 - Is opening the camera optional?	39.0	43.4	47.5	65.6	**17*****	35.3	45.4	55.5	**13.9*****	52.3	50.4	46.3	46.9	37.9	50.4	**3.7**
12 - Is it requested to open the camera on tests?	33.3	42.9	85.0	77.8	**84.6*****	40.3	44.7	67.9	**31.9*****	35.4	62.6	59.3	63.3	50.0	62.6	**28.5*****
13 - Are you comfortable with this method of learning?	60.3	57.7	68.8	47.8	**7.9****	60.4	56.6	58.4	**0.4**	58.5	53.0	44.4	66.4	57.6	53.0	**10***
15 - when you need help, Is your teacher always available?	68.4	60.3	58.1	62.8	**7.3***	69.8	58.2	61.2	**10.1*****	56.9	66.5	60.2	69.1	53.8	66.5	**13.3****
16 - Do you receive any assistance during the study from family or friends?	69.1	46.0	44.4	42.2	**41.5*****	68.0	45.4	45.2	**34.9*****	50.0	48.7	47.2	52.7	50.8	48.7	**4.9**
17 - Do you think there is a difference between traditional and distance learning?	87.9	91.5	75.0	91.7	**26.8*****	88.5	89.1	86.6	**0.8**	94.6	89.1	87.0	90.2	84.8	89.1	**11.5****
18 - Distance Learning is more stimulating and encouraging than traditional learning.	32.3	41.3	48.8	27.2	**13.1*****	32.4	36.8	41.1	**3.3**	44.6	27.8	32.4	36.7	38.6	27.8	**14.7****
19 - Is it easy to work in groups to complete the assignments online?	63.5	59.0	63.8	46.7	**9.4****	63.3	55.9	57.9	**2.1**	66.9	52.6	49.1	56.3	62.1	52.6	**12.8****
20 - Is it necessary to communicate with the teacher face to face?	70.2	68.8	53.1	68.3	**13.7*****	71.2	71.4	60.0	**11.4*****	54.6	72.6	64.8	71.5	72.7	72.6	**20.5*****
21 - Did you hire a private tutor during distance learning?	26.2	36.0	23.8	28.9	**5.7**	26.6	38.8	25.8	**8.1****	27.7	29.6	29.6	30.5	34.8	29.6	**1.1**
22 - Are your grades in the online academic achievements?	66.7	69.6	71.3	56.1	**12*****	64.7	70.7	64.8	**4.5**	70.8	60.4	62.0	67.6	68.9	60.4	**8.3**
23 - Do you think the grading system is excellent in online learning?	47.9	56.6	60.5	43.0	**10.5****	47.4	47.7	59.4	**8.8****	70.7	44.0	64.6	41.8	51.5	46.0	**26.3*****
24 - Do you recommend completing your studies using distance learning?	48.9	53.4	64.4	43.9	**10.6****	48.2	50.0	56.5	**3.6**	58.5	47.0	46.3	51.2	56.1	47.0	**5.8**
25 - Do you think there are any advantages of distance learning?	82.8	78.3	77.0	66.2	**6.5***	82.4	78.9	72.1	**3.8**	73.0	76.0	80.3	68.4	75.9	84.0	**3.7**

**** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1*

Table 3: Comparing knowledge by characteristics with their Kruskal-Wallis H

Characteristics		14 - How many hours per day it takes you to complete your lessons in online learning?	
		Average	*F*
Education Type	Governmental	2.1	**14.97*** **
	Private	2.4	
Academic Level	Middle School	1.8	**15.69*** **
	High School	2.3	
	PAAET	2.6	
	University	2.3	
Age	9-14	1.9	**12.62*** **
	15-18	2.3	
	19 and above	2.4	
Gender	Female	2.4	**13.87*** **
	Male	2.0	
Nationality	Kuwaiti	2.2	**1.21**
	Non-Kuwaiti	2.3	
Governorate	Ahmadi	2.2	**0.47**
	Alasema	2.2	
	AlJahra	2.1	
	Farwaniya	2.3	
	Hawally	2.3	
	Mubarak AlKabeer	2.3	

**** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1*

Table 4: Comparing knowledge by characteristics with their ANOVA test

DISCUSSION

The COVID-19 pandemic impacted the education industry worldwide and thus forcing many schools and colleges to suspend their activities. The epidemic has sparked a sudden and unprecedented digital change in education and thus bringing challenges and opportunities. This reckless decision has significantly harmed students, teachers, and educational administrators. As of July 2020, 1.725 billion children and youth, or 98.6% of all students, were affected by the pandemic in 200 countries, ranging from pre-primary to higher education (United Nations, 2020).

Since students are one of the main stakeholders in the E-Learning system and its main beneficiaries, they are given preference over other stakeholders in our study. In this study, a cross-sectional survey questionnaire was constructed and distributed to students. Data were collected from a sample of 500 students and analyzed in order to evaluate students' engagement, social presence, and satisfaction with emergency remote teaching and barriers encountered compared to the traditional technique. It is essential to understand these attitudes in order to assist the government and decision-makers in developing solutions to remove the obstacles that affect students.

E-Learning can be effective and unquestionably increased by having computer skills, technology-assisted learning platforms available, and an efficient and affordable interactive setting. In addition to being familiar with and accustomed to using the internet and being highly active on social media, the current research findings have shown that a vast majority (97%) of students in Kuwait possess computer knowledge and good digital skills. According to the survey, more than 70% claimed to have prior experience using Microsoft Teams and Zoom applications, University and private students reported having the highest levels of experience.

Digital skills can help students advance in their future careers, bridging digital gaps and positively affecting their social life. This finding is in concert with the result obtained by Egielewa et al. (2022) in Nigeria. Additionally, a study discovered that students who used social media displayed excellent learning performance (Mendoza et al., 2021). Our findings also revealed that young students, especially those between the ages of 15 and 18 (80%), demonstrated superior computer technology knowledge, which is in concert with the findings of Hong and Kim's (2018) research.

Gender did not significantly moderate the association between the various barriers and students' resistance to online classes, according to an analysis of the study's data. The findings revealed that generally speaking, there are no appreciable differences in average involvement, grade, motivation, and satisfaction between male and female students. On the other hand, Gaur et al. (2020) in India found a significant gender difference in the respondents' responses to students' challenges with online learning. The results of this study were inconsistent, much like Baticulon et al. (2021) discovered divergent perspectives on gender factors when participants reported personal barriers.

University students' grades are declined, whereas diploma students said there had been no changes. High and middle school students' responses were identical in all categories. Nearly 95% of respondents who chose online learning over traditional face-to-face instruction said their grades did not worsen, 44% expressed their grades had improved, and around 46% did not report any changes. A few expatriate students believed their grades improved, compared to more Kuwaiti students who thought they did. Additional research has examined this topic; for instance, Wang et al. (2019) found a positive correlation between ratification and GDP; Perets et al. (2020) found that students with higher GDP had better marks than others.

Students' satisfaction with online instruction is significantly influenced by the availability of good, effective, and relevant e-learning systems, knowledge of educational technology tools, support and guidance from the educational institutions. According

to this survey, 53% of students expressed their satisfaction with online education in this way, with approval rates for diploma and middle-class students being the highest (68% and 60%, respectively), and university students being the lowest. Everyone, except for one governorate, was in or near their mid-fifties.

Comparing to other researchers' findings; these results are also consistent with a study conducted among medical students by Abbasi et al. (2020), where the vast majority of students indicated disapproval of taking online courses in the future (77%). These results, however, are at odds with those of Dobbs et al. (2017), who claimed that students who had taken online courses tended to perceive them favorably and expressed an interest in doing so in the future. Similarly, Paudel (2021) discovered that every study subject expressed a desire and willingness to enrol in online courses in the future.

According to the results of our investigation, both private and public schools gave an approval rate of online learning in the upper fifties percentage. Nevertheless, Ansar et al. (2020) findings revealed that students from private sector institutions were more unsatisfied with their online experiences, which are in contrast. The approval rates were in the mid-fifties (55%).

One of the essential elements in the success of online learning is the instructor. He is necessary for effective distance learning because students think of their instructor as a person, not just a computer. This feeling encourages online learners to participate in the course. Most students (85%) believe that instructors are available, while only 60% believe that instructors are only occasionally available, according to the responses from the current study.

The majority of respondents (about 65%) agreed that having a teacher present is necessary, with private school students (80%), men (71%), and non-citizens (69%) having the highest rates of agreement. Unlike what we discovered, Walker and Koralesky (2021) discovered that students also claimed to feel disengaged from their professors. The absence of the instructor impacted negatively students' online learning, according to Tamim (2018)'s research.

Peer interaction and support have been shown to elevate student achievement, particularly for students from underrepresented groups. Williams and others, 2017. During the COVID-19 pandemic, a lack of peer support has negatively impacted students' motivation Support of Family and friends is essential for enhancing online learning and better preparing students. The percentage of students who acknowledged receiving some assistance from family and friends in this study—more than 70%—was the highest among intermediate schools. When asked about working in groups and communicating, students, 58% preferred to do so; only 47% of college students agreed. Thus, the correlation between family support and learning engagement has been the subject of earlier research (Gao et al., 2021; Frawley et al., 2019). Our findings support this. Wissing et al. (2022) identified peer interactions as a resource that can mitigate or even eliminate the adverse effects of required online education.

Unfortunately, these group activities don't always meet the designers' higher expectations for learning or have a strong student appeal. Some students abuse the trust, and free riding happens when someone shares the rewards of the group while not contributing their fair share of work (Gabelica et al., 2022).

A key component of effective online learning is effective communication between students, teachers, and other students, which is one of the fundamental interaction skills in schools. According to survey results, a higher proportion of students (65%) prefer to speak with their teachers in person, even if it's only occasionally. University students are at the top of the list in this regard, followed by students in high school. This result is in line with studies on college students conducted by Taghizadeh and Hajhosseini (2021). As per Shalian (2021) and Toppo and Philomina (2021), distance learning may impair students' capacity for accurate assessment and lessen the intensity of teacher-student interaction.

Due to exhaustion, stress, and lack of sleep during COVID-19, students' ability to manage their time can be difficult when learning online. According to our study, 66% of respondents claimed to spend three to seven hours a day or less on online coursework, 10% said they spent more than seven hours, and 24% said they spent less than three. A study by Sari et al. (2020) among Indonesian students revealed a positive correlation between time management and learning outcomes concerning management during the COVID-19 pandemic. Students in a different study by Paudel (2021) reported having trouble managing their time during the pandemic due to fatigue.

Nearly 80% of students preferred face-to-face instruction over distance learning, and about 50% disagreed, finding distance learning uninspiring, uninteresting, prosaic, and mundane. However, only a small percentage of students thought distance learning was more stimulating and inspiring than face-to-face instruction. It appears that the majority of students favor traditional teaching strategies. For instance, 15% of college students, 37% of high school students, 29% of middle school students, and 17% of diploma students prefer online instruction. 63% of respondents disputed the claim that distance learning is more inspiring and stimulating. Only 40% of participants believe that learning should be exclusively online, 35% disagree, and the remaining are unsure.

According to the findings of the studies by Kemp et al. (2019) and Aguilera-Hermida (2020), attitudes toward the advantages of online learning, such as the freedom to communicate and manage schedules, are favorable. The results show that more students disagree or are unsure. After carefully examining the data, we can conclude that diploma students (47%), high school students (43%), and middle school students (36%), have the highest levels of agreement. Participants' attitudes toward the benefits of online learning, such as the freedom to communicate and manage schedules, were found to have a positive impact on their preference to conduct e-learning for a longer period of time, according to the findings of the studies by Aguilera-Hermida (2020) and Kemp et al. (2019).

Research by Adarkwah (2021) found that more than half of respondents thought traditional instruction was preferable to online learning, which is consistent with our findings. Few participants believe that online learning would be more effective to traditional teaching. Due to the challenges of online learning, students prefer traditional face to face learning methods (Adarkwah, 2021). Many participants believe using online learning in middle and high schools has not been beneficial (Rouadi and Anouti, 2020). According to Khalil et al. (2020) thematic content analysis, many preclinical students opt for online learning for the following educational sessions.

But according to Nambiar (2020), respondents (59%) are against taking online classes. He showed that several factors, including

timely and high-quality communication between students and teachers, technological support, narrowly focused online course modules, and adaptation of traditional classroom instruction for online delivery, influence how satisfied students are with online learning. Technical support is one of these factors have a significant impact on students' approval of online courses. Although flexibility and convenience are advantages of online learning, there is insufficient network access. However, generally speaking, Online learning appears to provide students with more preference than in-person instruction on factors such as learning gains, satisfaction, learning styles, and study habits (Paulsen and McCormick, 2020).

Limitation

At universities, specialization is essential. In this study, student participants were considered as a single group. In general, type of university courses and specialization has an impact on how students react to online learning. There are courses that call for hands-on learning and laboratory work, especially in the sciences and the medical fields, and as a result, their perspective is different from that of the art majors. We suggest future research to evaluate student's satisfaction and approval of distance learning on the basis of their field of study.

The chaos and stress brought on by the pandemic's nature, risk, and rapid spread do not exclude students. The study did not, however, look at students' mental health. Stress and anxiety and their state of mind should be taken into account during the pandemic because they may have long-term detrimental effects on students' minds and their performance in online courses. Therefore, when developing and adopting effective policies for online learning, stress, and anxiety impact should be taken into account.

The study compared students' perceptions of traditional face-to-face instruction with those of online learning. It was not investigated how students perceived hybrid or blended instruction. Future circumstances might call for the usage of blended learning, which might be feasible given the widespread use of cutting-edge computer technology. For a more realistic evaluation and to properly evaluate online learning process in the country, a holistic study should be conducted that encompasses viewpoints from all significant stakeholders, including students, teachers, school administrators, and education decision-makers.

CONCLUSION

Many scholars worldwide have studied the impact of coronavirus spread (COVID-19) on teaching and learning, identifying the benefits, drawbacks, problems, limitations, and other significant concerns. Kuwait as many developing countries has adopted the online distance learning mode to avoid depriving students of their education during the closure. This research aimed to examine the e-learning process in Kuwait through the eyes of students from various academic levels. A sample of middle school, high school, diploma, and university students in the public and private sectors participated in a survey questionnaire.

When the feedback was analyzed, it was found that the bulk of students have a good and strong foundation in computers and other online digital systems. Nevertheless, the majority favored the conventional face-to-face instruction due mainly to the ample communication with instructors and fellow students. Furthermore, most agreed that the country's internet infrastructure is both accessible and inexpensive. Several benefits of online learning were identified by the students, including protection from the serious threats posed by the Coronavirus, transit time and expense savings, avoidance of traffic congestion, and continuous accessibility throughout the day. Students also cited other benefits, such as improvement in communication skills and reinforcement of their peer relationships. Others, on the other hand, saw an improvement in their performance and their grades. The primary drawbacks identified are a lack of sufficient connection and communication with the instructors and the occasional failure of the Internet. Others believe that online learning puts a higher load on students because it demands organizing capabilities, self-motivation, and proper time management skills. As a result, some acknowledged to regularly request support and help from their parents, family, and friends.

The availability and accessibility of technical infrastructure, tools, and equipment at the students' home are not the only important factors in the success and sustainability of online digital education, but rather the right digital pedagogical skills and effective student-parent-teacher-and-school communication, dialogue, and cooperation. In Kuwait, the government and the educational sector should accept and embrace the digital education culture. To achieve this goal, first and foremost, everyone involved in the educational process must be educated and trained on the use of digital tools and technologies, and support must be provided to students, teachers, and school administrators in the form of materials, computers, and reliable information. The following actions should be undertaken by the government:

- Kuwait must make every effort to keep online learning alive. To make progress and develop resilience in Kuwait, the government, educational authority, school administrations, and all other educational institutions and entities should use the lessons learned from the COVID-19 pandemic and crisis as a catalyst and incitement to digital and remote learning and technology use. This shift toward remote learning necessitates Kuwait to expedite, accelerate, and boost digital transformation.
- The long-term viability and sustainability of digital learning systems in Kuwait necessitates the dedication, commitment, and devotion of all stakeholders and components of Kuwait's educational systems and procedures, as well as their combined efforts. The government must take a holistic approach to digital learning. It must develop and implement a digital education strategy with clear and actionable goals and a timeline that is both realistic and practical. The government must also establish key performance indicators (KPIs) to track the strategy's progress and success. The government, as well as educational providers and entities, must set aside the required finances to ensure the strategy's success.
- On behalf of the government, the Ministries of Education and Higher Education must establish curriculums that enable digital education and develop important digital skills among students, and they must be accorded the same priority and importance as other necessary talents.

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Full research paper

EFFICIENCY OF TURKISH HEALTH MANAGEMENT DEPARTMENTS THROUGH DATA ENVELOPMENT ANALYSIS

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ABSTRACT

The purpose of this study was to determine which of the input and output variables made a statistically significant difference in the efficiency status of undergraduate departments offering Health Management education in Turkey, to identify areas where inefficient departments could improve, and to determine which of the input and output variables made a statistically significant difference in the efficiency status of inefficient departments. The output-oriented data envelopment analysis model was employed in the efficiency analysis. As a decision-making unit, there were 43 Health Management departments. Mann-Whitney U test was used to analyse whether or not there was a statistically significant difference between the efficiencies of the departments based on the input and output variables. In Turkey, 15 of 43 state universities providing formal undergraduate education in the field of Health Management are fully efficient. Also, there was a significant difference in terms of the "number of completed projects" and the "number of papers in journals screened within the scope of Web of Science Core Collection (WOSCC)" variables. No study examining the efficiency of Health Management departments has been found in the literature. Department administrators are encouraged to increase their publications and look into ways to design more initiatives.

KEYWORDS

Health management, Data Envelopment Analysis, efficiency, Turkey

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Highlights

- *Evaluation of the efficiency of Health Management undergraduate departments in Turkey by use of data envelopment analysis.*
- *15 of 43 state universities providing formal undergraduate education in the field of Health Management are fully efficient.*
- *Especially in times of crisis such as pandemics, we think that it is vital to question the efficiency of health management departments.*
- *This study creates a paradigm for future studies about the efficiencies of health management departments.*

INTRODUCTION

Major changes in the healthcare sector have continued to have a faster impact on the industry of healthcare services in the new century. Changes in the reimbursement system have resulted in risk-based fixed-price financing and value-based pricing, raising concerns about patients' access to services, as well as their quality and satisfaction. In addition, notable advances have been made in information systems and information technology. Furthermore, changes in the administration and education of health institutions will be unpreventable in the future in order to adapt to the application and integration of possible new lines of work in fields such as e-health, as well as changing government regulations and vendor relationships (Kleinman, 2003). In this context, the health management profession has also included competencies, in which the roles of hospital administrators have changed significantly and which require qualities aimed at market success as well as complex business knowledge and skills, which have become increasingly important as a result of changes in the healthcare sector over time.

Furthermore, as emphasized by organizations such as the World Health Organization and the World Bank, improving healthcare systems is a global concern. Fundamentally, the forefront of strengthening the healthcare system is research aimed at enhancing the system's administration and administrative capability (Kebede et al., 2010). Despite the fact that administrative capacity has been established at all

levels of national healthcare systems, this issue has become more prominent due to the unique characteristics of hospital administration. Initially, hospitals are frequently perceived as highly complex organizations that necessitate administrative issue solutions and excellent resource coordination. Complexity of organizations providing healthcare service, healthcare service costs, which have increased in the past few years, and constant updating of the present payment structure, have made the management science an integral part of healthcare services in the recent years. It is critical that hospitals improve their administrative skills in order to provide a safe, high-quality, low-cost service that meets the needs of patients while also integrating and coordinating medical, administrative, and other medical human resorces. Furthermore, hospital administrations play crucial roles in complicated clinical and information technology, critical procedures and supplies, and healthcare facility equipment. Secondly, hospitals often account for more than half of a country's health-care spending, highlighting the need of better managing hospitals and their resources (Barnum and Kutzin, 1993; Lal and Roh, 2014). As a result, particularly during the last century, as hospitals grew in size and complexity and funding of the healthcare transitioned from out-of-pocket to prospective payment systems, healthcare administration as a profession evolved to deal with these new problems (Greenspan, 2009).

Gary Filerman, former chairman of the Association of University Programs in Health Administration (AUPHA), as Johnson et al. (1990) point out in their study, defines Health Management as "the most complex and important management responsibility in modern society" and points out importance of hospital management as a profession by emphasising that this job is a profession which is strong enough to directly affect the quality of life of a single individual in society. An administrator is responsible for ensuring that the public has access to high-quality, convenient healthcare services, which can only be accomplished with a financially solid organization, an efficient and effective structure, skilled and appropriate staff, and social sensitivity. A professional health institution administrator, according to Filerman, „contributes to this complicated, fascinating, and enthralling setting with his organizational leadership and management skills." Education should give the required information and abilities in the administration of health organizations to fulfill the various demands and obstacles of a dynamic healthcare services system (Johnson et al., 1990).

As a result, the importance attributed to the topic of „health institution management" grows by the day, and the increased demand for institutions providing health management education compels a re-examination of the education provided by these education systems (Sahin et al., 2011). Furthermore, within the framework of the Health Transformation Programme (HTP), which was attempted to be implemented after 2003, Turkey's healthcare industry has primarily become a sector in need of „management." As a result, there has been a surge in interest in health management concerns across the country (Akdag, 2009; OECD, 2008). Furthermore, hospital directors must be physician health sciences licensees with a bachelor's, master's, or doctoral degree in the field of health management, according to Decree Law No. 663 established under the http (MoH, 2011).

As a result of these practices, there has been a significant growth in the number of higher education programs offering health management education in Turkey. In 2003, two colleges offered undergraduate health management programs; by 2010, that number had risen to seventeen. The number of departments offering health management education expanded from 45 in 2015 to 58 in 2017, and to 79 in 2019 (YOK, 2003; YOK 2010; YOK 2015; YOK 2017; YOK 2019). Among the programs in the field of health sciences, the Health Management department has experienced remarkable growth.

With the expansion in the number of health management programs, particularly after 2007, it has become important to challenge the departments' qualitative competency and the success of the educational activities they provide. In this regard, it is believed that health management departments' efforts to assess their efficiency are critical. In this sense, the goal of this research is to assess the efficiencies of Health Management departments that provide formal undergraduate education in Turkey, make recommendations for inefficient departments, and determine which of the input and output variables made a statistically significant difference in the efficiency status.

The purpose of the study was to evaluate the efficiencies of Health Management departments providing formal undergraduate education in universities in Turkey through data envelopment analysis. The following questions were asked in order to achieve this goal:

- How many of the Health Management departments are efficient?
- Which input and output variables make more contribution to efficiency of efficient departments?
- What can be the improvement suggestions for inefficient Health Management departments?
- Which one of input and output variables creates a significant difference between efficient and inefficient departments?

THEORETICAL FRAMEWORK

It is classed as efficient if an organization provides the highest possible output (output-oriented) from a specified input group or utilizes the smallest possible input (input-oriented) for the result delivered (Gralka et al., 2019). In terms of management, efficiency assessment is critical for institutions to better understand their previous accomplishments and plan their future improvement and success (Kao, 2014).

Efficiency analysis is used in the education sector, as it is in all other sectors (Kashim et al., 2018; Mousa and Ghulam, 2019). Evaluation of efficiency in the education sector plays a key role in the growth and development of countries (Duan, 2019; Fuentes et al., 2016). Many research on efficiency analysis in higher education have been published in recent years. While some of these studies focused on the efficiency of universities, vocational high schools, grammar schools and faculties (Kempkes and Pohl, 2010; Ozel Kadılar, 2015), others looked at the efficiency of individual departments within a university or

faculty (Abdullah et al., 2017; Altamirano-Corro and Peniche-Vera, 2014; Barra and Zotti, 2016b; Jauhar et al., 2018; Kashim et al., 2018; Sirbu et al., 2016; Halásková et al., 2022).
There are other studies that compare the efficiency of the same departments at various institutions. When the literature is examined, it is seen that the efficiencies of Econometrics (Yesilyurt, 2008); Economics (Gnewuch and Wohlrabe, 2018; Johnes and Johnes, 1995; Madden et al., 1997; Wohlrabe and Friedrich, 2017; Yesilyurt, 2009); Banking and Finance (Duramaz, 2018); Statistics (Icoz and Sonmez, 2015); Accounting Training (Celik and Ecer, 2009; Tomkins and Green, 1988); Chemistry and Physics departments (Beasley, 1990; 1995); MBA programmes (Colbert et al., 2000), Engineering Programs (De La Hoz et al., 2021) and Business Management (Doyle et al., 1996) departments have been assessed. In the literature, on the other hand, there is no study examining the efficiencies of Health Management departments.

MATERIALS AND METHODS

Data Envelopment Analysis

Data envelopment analysis (DEA) is one of the most used approaches for evaluating the efficiency of higher education institutions (Aleskerov et al., 2017; Andersson et al., 2017; Chuanyi et al., 2016; Johnes and Tone, 2017; Mikušová, 2017). The DEA is often used for efficiency comparison in situations where numerous inputs and outputs are observed and these inputs and outputs cannot be transformed into a single variable (Altamirano-Corro and Peniche-Vera, 2014; Ozel, 2014; Wang, 2019). The DEA is a linear programming-based and non-parametric method used in measuring the relative efficiency of homogeneous and data-oriented decision-making units which produce a great number of outputs by using multiple inputs (Cooper et al., 2011; Ebrahimnejad and Tavana, 2014; Tavana and Khalili-Damghani, 2014).
The linear programming model for data envelopment analysis is obtained as follows (Santana et al., 2014):

$$\text{Min} \sum_{j=1}^{n} v_j . x_{j0} - w \qquad (1)$$

subject to

$$\sum_{i=1}^{m} u_i . y_{ik} - \sum_{j=1}^{n} v_j . x_{jk} + w \le 0 \qquad \text{for } k = 1,2,\ldots.h \qquad (2)$$

$$\sum_{i=1}^{m} u_i . y_{i0} = 1 \qquad (3)$$

w without restriction of signal

where x_{jk} represents the amount of input j of *DMU* k; y_{ik} represents the amount of output i of *DMU* k; x_{j0} represents the amount of input j of *DMU* under analysis; y_{i0} represents the mount of output i of *DMU* under analysis; v_j represents the weight of input j for the *DMU* under analysis; u_i represents the weight of output i for the *DMU* under analysis; w represents the scale factor; m represents the number of outputs analyzed; n represents the number of inputs analyzed; and h represents the number of *DMUs* analyzed.

The DEA aims to find the "best" decision-making units which produce maximum output using minimum input compound (Visbal-Cadavid et al., 2017). When the efficiency value of decision-making units is 1 (100%), it is asserted that the decision-making unit is efficient. Units, whose efficiency value ranges from 0 to 1 (0 to 100%) or in other words is under 1 (100%), are inefficient decision-making units (Clermont et al., 2015; Gralka et al., 2019). The DEA also offers an improvement goal to decision-making units to increase their efficiency beyond calculating their efficiency value (Ando et al., 2012).

Selection of Decision-Making Units

Decision-making units which are one of the terms specific to the DEA, are units which have similar inputs and outputs and whose efficiency is intended to be measured (Charnes et al., 1978). Health Management departments of several state universities in Turkey that provide formal undergraduate education were examined as decision-making units in this study. There were 43 Health Management departments as a decision-making unit. These units were acquired from the Undergraduate Atlas of the CHE (Council of Higher Education, 2019) (https://yokatlas.yok.gov.tr/lisans-bolum.php?b=10238). Accordingly, the data of 43 state universities were accessed as of March 2019. When the geographical distribution of 43 decision-making units is examined, 30.2% of them are in the Central Anatolia; 20.9% of them are in the Marmara Region.
Since all data relating to foundation universities was not supplied in a healthy manner, this study solely included state universities in the analysis. Because formal undergraduate education was defined as a basic requirement, open university programs were not included in the study.

Selection of the Data Envelopment Analysis Model

Changes in input sources are not always achievable in universities. Universities or departments, as decision-making units, have more control over outputs than input sources and are more likely to optimize outputs (De La Torre et al., 2017a; Gralka et al., 2019; Wang, 2019). When dealing with inflexible (not completely under control) inputs, Tyagi et al. (2009) recommend using the output-oriented approach.
Moreover, numerous studies have adopted the output-oriented model for evaluating the efficiencies of universities/departments (Abdullah et al., 2017; Barra et al., 2018; Berbegal-Mirabent, 2018; De La Torre et al., 2017b; Duan, 2019; Gralka et al., 2019; Guironnet and Peypoch, 2018; Jauhar et al., 2018; Klumpp, 2018; Lehmann et al., 2018; Mikušová, 2017; Quiroga-Martínez et al., 2018; Visbal-Cadavid et al., 2017; Wang, 2019). The output-oriented strategy was used in this study as well, because the input sources were difficult to control and it was more critical to maximize the outputs, which is consistent with the literature.
The Variable Returns to Scale (VRS) strategy, on the other hand, was chosen because it was believed that changes in department input quantities would not be the same as changes in department output amounts. In addition, the VRS technique was commonly utilized in research evaluating the efficiency of

higher education institutions. Furthermore, the VRS technique was heavily employed in research evaluating the efficiency of higher education institutions (Agasisti and Ricca, 2016; Agasisti and Wolszczak-Derlacz, 2015; Barra and Zotti, 2016a; Barra and Zotti, 2016b; Guccio et al., 2016; Mikušová, 2017; Sirbu et al., 2016; Tyagi et al., 2009; Wang, 2019).

Selection of the Input and Output Variables

Universities are organizations which use multiple inputs to produce multiple outputs (Halkos et al., 2012). However, there is no agreed general rule regarding the most appropriate input and output cluster to be used in evaluating the efficiency of universities (Duan, 2019). The variables used in the study were obtained as a result of an extensive national and international literature review (Abdullah et al., 2017; De La Torre et al., 2017a; De La Torre et al., 2017b; Mousa and Ghulam, 2019; Quiroga-Martínez et al., 2018; Sagarra et al., 2017; Tzeremes and Halkos, 2010; Ferro and D'Elia, 2020).

Gralka et al., (2019) claim that „teaching" and „research" are the two main functions and primary activities of universities. Examining the literature reveals that „the number of academic staff" and „the number of students" are frequently included in the range of teaching activities, while „the number of publications" is the variable related to the research activities of universities.

According to De La Torre et al. (2017a), there are two components of human capital within the universities regarding the inputs. One of them is "the number of students" while the other is "the number of academic staff". When the studies in the literature that evaluate the efficiency of universities with DEA are examined, it is seen that "the number of students" is generally considered as the input variable and "the number of graduate students" as the output variable (Agasisti and Ricca, 2016; Andersson et al., 2017; Guccio et al., 2016; Jauhar et al., 2018; Barra et al., 2018; Lita, 2018; Mikušová, 2017). Similarly, in accordance with the literature, the number of undergraduate students was also taken into consideration as an input variable in this study. On the other hand, it is challenging to obtain precise information about the number of graduate students across all universities. Therefore, this variable is not used as an output variable.

When the studies in the literature that evaluate the efficiency of universities with DEA are examined, it is seen that the most used output variable is "the number of publications". This is an important variable that represents scientific production and research activity. In particular, publications in internationally accepted indexes are very valuable. Therefore, in this study, the number of publications in different categories were considered as output variables.

Input Variables	Data Source
Number of enrolled undergraduate students	Undergraduate Atlas of the CHE
Number of academic members (Prof., Assoc. Prof., Asst. Prof.)	Department web pages
Number of other academic staff members (Instr., Res. Asst., Expert, Lecturer)	Department web pages
Output Variables	
Number of papers in journals screened within the scope of WOSCC (within the scope of SCI, SSCI, SCI-E, and AHCI) [a]	CHE Academic Search module[b]
Number of completed projects[a]	CHE Academic Search module[b]
Number of publications published in international peer-reviewed journals[a]	CHE Academic Search module[b]

[a]Repeated publications and projects conducted by multiple people in the same university were eliminated and examined as a single study.
[b]https://akademik.yok.gov.tr/AkademikArama/

Table 1: Input and output variables used in the study

In the DEA, the number of variables to be used in the analysis is as important as variable choice. In the literature, there are different views on the correlation between the number of decision-making units and the number of input/output variables. The calculations for the two different views (Dyson et al., 2001; Cooper et al., 2001) are as follows.

$$N \geq 2m \times s \quad (1)$$

$$N \geq \max\{m \times s; 3 \times (m+s)\} \quad (2)$$

where n = number of decision making units, m = number of inputs and s = number of outputs

When the number of decision making units = 43, m = 3; and s = 3;

$$43 \geq 2.3 \times 3 \qquad 43 \geq 18 \quad (3)$$

$$43 \geq \max\{3 \times 3; 3 \times (3+3)\} \qquad 43 \geq \max\{9; 18\} \qquad 43 \geq 18 \quad (4)$$

Both views were confirmed.

RESULTS

In Turkey, 15 of 43 state universities providing formal undergraduate education in Health Management were fully efficient (efficiency value of 100%). The remaining 28 universities were inefficient. In this situation, it may be said that less than half of the departments in Turkey were efficient. Among inefficient universities, the lowest efficiency rate was 12% and the highest rate was 88.9%. All departments had an average efficiency rate of 69.28%, while 21 of the state universities had an efficiency rate that was below average (Table 2).

The factors were used to determine the prospective improvement rates of Health Management departments in order to make them more efficient. The primary variable which had a great importance in terms of improvement was the number of papers in journals screened within the scope of Web of Science Core Collection (75.36%). This variable was the primary variable which needed to be improved the most and was aimed in terms of improvement. Then, another variable which needed to be improved was the number of completed projects (23.79%) (Table 3).

Total Number of Departments:	43
Number of Efficient Departments:	15
Number of Inefficient Departments:	28
Lowest Efficiency %	12.0%
Highest Efficiency %:	88.9%
Average Efficiency %:	69.28%
Number of Departments below Average:	21

Table 2: Results of the efficiency analysis for Health Management departments

Variables	Improvement Rate
Number of enrolled undergraduate students	-0.15%
Number of academic members (Prof., Assoc. Prof., Asst. Prof.)	0.00%
Number of other academic staff (Instr., Res. Asst., Expert, Lecturer)	-0.06%
Number of publications published in international peer-reviewed journals	0.64%
Number of completed projects	23.79%
Number of papers in journals screened within the scope of WOSCC	75.36%

Table 3: Total potential improvement results

Another dimension of the study was testing whether or not there was a statistically significant difference between the efficiencies of the departments according to the input and output variables. Since the data did not meet the normal distribution hypothesis, the Mann-Whitney U test, a non-parametric test, was performed (Table 4).

Variables	*z*	*p*
Number of enrolled undergraduate students	-0.229	0.819
Number of academic members (Prof., Assoc. Prof., Asst. Prof.)	-0.576	0.564
Number of other academic staff (Instr., Res. Asst., Expert, Lecturer)	-0.814	0.416
Number of publications published in international peer-reviewed journals	-1.823	0.068
Number of completed projects	-3.658	0.000
Number of papers in journals screened within the scope of WOSCC	-2.662	0.008

z: Mann Whitney U test; p: significant level < .05

Table 4: Comparison of efficiency and inefficiency of the departments according to the variables

There was no statistically significant difference between the efficiency status of the departments and any of the input variables. However, when the output variables were examined, there was a significant difference between efficient and inefficient departments in terms of the "number of completed projects" and "number of papers in journals screened within the scope of WOSCC" variables. These two variables were crucial in the efficiency status of departments (Table 4). A similar result was observed in the improvement rates (Table 3). In this case, the improvement rates obtained as a result of the DEA were also confirmed with the gap analysis.

DISCUSSION

As a result of globalization, competition among educational institutions has intensified, and applications targeted at maximizing resource efficiency have accelerated (Ozel, 2014). This has made the efficiency evalution of higher education institutions'educational process and research outputs critical (Jablonsky, 2016). The results of the efficiency studies may provide useful information to higher education administrators, allowing them to identify areas that need to be addressed in higher education institutions (Jauhar et al., 2018). Furthermore, via comparisons with other similar education institutions or other universities overseas, it is possible to better comprehend development potential and assess the strengths and limitations of higher education institutions (Nazarko and Šaparauskas, 2014). The efficiency study's findings are also useful for decision-making units that want to use efficient institutions as a model for allocating resources more evenly (Wang, 2019). In light of these considerations, the study's major goal was to assess the efficiency of health management departments in providing formal undergraduate education in Turkish public institutions.

Many studies employing the DEA to evaluate educational efficiency have been published in the literature. When considering Turkey in particular; it is seen that efficiency analysis has been also performed in Econometrics, Statistics, Banking and Finance, Economics and Accounting departments. In the study conducted by Yesilyurt (2009), 48 Economics departments were examined as decision-making units and five departments were found to be efficient. Another study conducted by Icoz and Sonmez (2015) investigated the efficiencies of 18 Statistics departments. They also investigated whether the efficiency of departments in Turkey's higher education system was distinguished based on two distinct program types (day and night time education; solely day time education). They discovered that four departments were efficient as a consequence of their research, and that there was no statistically significant difference between the types of programs (Icoz and Sonmez, 2015). Two departments were

determined to be efficient in the other research examining the efficiency of Banking and Finance departments (Duramaz, 2018). Celik and Ecer (2009) examined the efficiency of accounting departments at 45 state colleges and found 10 to be efficient. Five departments were determined to be efficient in a research undertaken by Yesilyurt to analyze the efficiency of Econometrics departments (Yesilyurt, 2008). As is seen, it was determined that nearly half and fewer of higher education programmes were efficient. Similarly, less than half of Health Management departments were found to be efficient in this research.

Beasley investigated the efficiency of physics and chemistry departments in the United Kingdom, whereas Tomkins and Green investigated the efficiency of accounting departments in the worldwide literature (Beasley, 1995; Tomkins and Green, 1988). According to research done by Johnes and Johnes (1995) on the economics departments of UK universities, the DEA contributed positively to the development of measures impacting university performance. Gnewuch and Wohlrabe (2018) examined the efficiency of economics departments throughout the world and discovered a shaky relationship between efficiency and department reputation. Because some smaller departments may be more efficient in their use of limited resources, it was concluded that well-known Economics departments at reputable universities may not be efficient at the same time. Similarly in the study conducted by Wohlrabe and Friedrich (2017) to examine the efficiency of 207 Economics departments worldwide, no good correlation was determined between the efficiency and reputation. Colbert et al. (2000) evaluated the efficiency of 24 MBA programmes in the United States. They concluded that the combined use of factors linked to student and recruiter satisfaction increased the number of efficient programs. Madden et al. (1997) examined the efficiencies of Economics departments in Australian universities in two years (1987, 1991). Accordingly, they found that 7 out of 24 Economics departments were efficient in 1987 and 11 were efficient in 1991. It is not appropriate to make a comparison because Turkey‘s higher education system differs from that of other nations. However, in general, it can be said that the efficiencies of higher education institutions have been studied at an international level for many years.

As a result of the study, it has been seen that the primary need for the efficiencies of Health Management departments in Turkey is to increase the number of publications in journals screened within the scope of WOSCC and also projects. This result is remarkable in terms of making Health Management departments visible in the international arena. It is thought that the results obtained from this study will be useful in terms of implications practice. First of all, by increasing the number of qualified publications, the competencies of the academicians will be a step in terms of internationalization in the Health Management education offered in the country. Thus, it will contribute to the delivery of universal knowledge to students. It also demonstrates the importance of developing strategies for advancing the field of Health Management in Turkey. In addition, the results of this study will contribute to the current situation analysis of the departments and to determine their strengths and weaknesses. On the other hand, increasing the number of national and international projects will strengthen cooperation with stakeholders. Considering the effect of globalization; when faced with extraordinary situations especially pandemic, crisis, disasters, emergency situations etc., the importance of this cooperation becomes more evident.

The study had several limitations. One of these limitations was that the study only covers departments in state universities. Since all the data of foundation universities was not reached, these departments were not included in the study. Another limitation is that the study was conducted on departments that offer formal undergraduate education. Open education programs were not included in the analysis. Thanks to this limitation, the homogeneity of the decision-making units, which is one of the assumptions of data envelopment analysis, is ensured. Moreover, since there was no data related to the revenues of departments, financial variables were not used.

CONCLUSION

Only 15 of 43 state institutions that offer formal undergraduate health management education were determined to be efficient, according to the study‘s findings. As a result, it may be stated that fewer than half of Turkey‘s Health Management departments were efficient. When the distribution of efficient decision-making units according to geographical locations is examined, it is seen that 9 of the 15 decision-making units are located in the Aegean, Central Anatolia and Marmara regions. The reason for this situation may be the socioeconomic development values of the mentioned regions. Descriptive information about the decision-making units is presented in Table 5 in the Appendix. According to the SEGE 2017 (2019) report, the most developed provinces in Turkey are located in the Aegean, Central Anatolia and Marmara regions.

The possible improvement rates of Health Management departments were estimated based on variables in order for them to be efficient. According to the findings, the number of publications in journals screened within the scope of WOSCC was the most important variable for Health Management departments to improve. This variable was followed by the number of completed projects. As a result, it was discovered that Health Management departments often published as a research output in international peer-reviewed journals, with the number of publications in journals screened within the scope of WOSCC and projects being relatively low.

For the departments to be efficient, they primarily need to increase their publications in journals screened within the scope of WOSCC and conduct more projects. As a result of the gap analysis conducted regarding efficient and inefficient departments, a similar situation was encountered and it was determined that there was a statistically significant difference between the number of projects and number of papers in journals screened within the scope of WOSCC variables and the efficiency of departments. It is recommended for department administrations to investigate the ways of increasing these two variables. It is also suggested that academicians be supported in increasing their research outputs and that resource and workload distribution be balanced. In addition, the finding of the necessity of increasing the number of projects revealed the importance of carrying out projects in which students are

also included in practice. In Turkey, 2209-A Research Projects Support Programme for Undergraduate Students is carried out by Tübitak (https://www.tubitak.gov.tr/tr/burslar/lisans/burs-programlari/icerik-2209-a-universite-ogrencileri-arastirma-projeleri-destekleme-programi). In line with these results, it is recommended to increase the number of applications to this program and to expand the projects in which Health Management students are involved.

The study's conclusions were intended to assist decision-makers, department, faculty, and university administrators, department instructors, students receiving education in the department or student candidates, and, in general, the complete target group. In order for Health Management departments to improve their efficiency, information was presented to this target population to discover relevant solutions. As a result, policymakers, educators, Health Management department administrators, and academic staff members will be able to take strategic steps, determine efficiency parameters, and enable university administrators to develop strategies for departments to publish more research in their improvement plans. It is recommended for future research to include financial variables related to the research revenues of departments and the data related to student satisfaction in the analysis and to make comparisons by measuring long-term efficiency through the data related to multiple years.

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APPENDIX

Decision Making Unit	Geographical Location of Universities	Efficiency Scores	No. of Students	No. of Academic Members	No. of Other Academic Staff	No. of international peer-reviewed journals	No. of Projects	No. of Journals Screened Within the Scope of WOSCC
DMU 1	Aegean	100	71	4	7	27	23	3
DMU 2	Central Anatolia	46.5	120	4	1	25	2	0
DMU 3	Central Anatolia	100	462	9	11	112	26	22
DMU 4	Central Anatolia	100	339	7	9	49	34	17
DMU 5	Central Anatolia	81.8	62	3	2	36	0	8
DMU 6	Marmara	31.8	66	3	1	14	1	1
DMU 7	Black Sea	20.5	77	3	0	9	0	0
DMU 8	Mediterrenian	76.6	279	5	2	49	5	6
DMU 9	Southeastern Anatolia	100	314	1	1	16	4	2
DMU 10	Black Sea	71.2	306	4	2	30	11	1
DMU 11	Eastern Anatolia	29.2	176	3	5	9	4	1
DMU 12	Central Anatolia	60.1	175	3	1	12	7	7
DMU 13	Black Sea	57.0	221	4	5	33	5	1
DMU 14	Central Anatolia	100	171	10	18	141	26	104
DMU 15	Black Sea	100	60	2	2	13	4	0
DMU 16	Marmara	75.0	126	3	2	33	2	3
DMU 17	Marmara	37.3	320	6	4	19	4	17
DMU 18	Aegean	100	61	2	1	3	8	1
DMU 19	Aegean	100	40	5	0	49	18	22
DMU 20	Mediterrenian	56.4	350	3	2	24	5	5
DMU 21	Black Sea	27.0	217	3	3	10	3	1
DMU 22	Central Anatolia	29.5	71	3	0	13	2	0
DMU 23	Central Anatolia	81.9	283	4	4	36	13	9
DMU 24	Southeastern Anatolia	100	41	2	1	12	1	10
DMU 25	Marmara	100	367	11	6	52	33	63
DMU 26	Aegean	69.1	214	5	2	26	14	10
DMU 27	Central Anatolia	63.8	232	5	1	36	4	2
DMU 28	Black Sea	88.8	208	4	3	41	13	4
DMU 29	Marmara	63.3	224	6	0	31	1	4
DMU 30	Central Anatolia	68.7	65	3	0	20	3	7
DMU 31	Marmara	100	314	7	4	84	14	13
DMU 32	Central Anatolia	88.9	337	7	6	79	6	3
DMU 33	Central Anatolia	35,3	275	5	3	20	6	6
DMU 34	Mediterrenian	100	319	9	7	88	31	3
DMU 35	Marmara	31.7	319	4	2	13	5	4
DMU 36	Central Anatolia	59.2	60	3	1	19	1	9
DMU 37	Eastern Anatolia	100	132	4	0	11	14	32
DMU 38	Marmara	100	62	3	0	44	8	10
DMU 39	Marmara	17.7	241	4	4	10	2	4
DMU 40	Mediterrenian	100	253	2	0	23	6	5
DMU 41	Eastern Anatolia	44.3	227	3	6	19	4	1
DMU 42	Black Sea	12.0	225	3	0	5	1	0
DMU 43	Aegean	54.6	131	3	0	8	5	0

**Data with a value of 0 were included in the analysis as 0.0*

Table 5: Descriptive information on decision-making units

Full research paper

MOBILE AUGMENTED REALITY IN BIOLOGICAL EDUCATION: PERCEPTIONS OF AUSTRIAN SECONDARY SCHOOL TEACHERS

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ABSTRACT

Today's teachers play a critical role in preparing students for the integration of educational technologies, such as augmented reality (AR), into their lessons. It is thought that AR implementation improves collaboration, motivation, and learning outcomes. Considering this, this study aims to determine the teachers' perceptions of the benefits and obstacles of employing mobile AR applications (mAR) in their biology education, along with suggestions for practice, app developers, and policymakers. Therefore, a mixed-methods study was used to examine Austrian secondary school biology teachers' opinions. A questionnaire containing open-ended and closed-ended questions was distributed to 35 teachers. Descriptive statistics were employed to process quantitative data, whereas grounded theory was utilized to process qualitative data. According to the findings, biology teachers likely utilize mAR apps to teach about human anatomy or to identify living things (e.g., plant determination). According to the teachers, mAR can improve students' learning outcomes, motivation, and collaboration, and further their enthusiasm for learning biology. The main obstacles that teachers encounter whilst integrating mAR into their lessons are lack of technical devices, Internet issues, inconsistency with the curriculum, and questionable scientific accuracy of information. Despite the promising results, additional future studies with larger sample sizes are needed.

KEYWORDS

Augmented reality, biology, mobile learning, secondary school, education, STEM

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Highlights

- *Implementation of mAR apps in biology education is perceived by the surveyed teachers as innovative and increases enjoyment, collaboration, interest, and learning success.*
- *Main obstacles mentioned are a lack of devices, limited Internet connections, erroneous information, and a missing link between mAR apps and curriculum.*
- *The teachers need guidelines on where and how to find suitable mAR, and how to use the apps in their biology education.*
- *Further research with a larger sample size needs to stress this topic in the future.*

INTRODUCTION

Nowadays, teachers are responsible for introducing the latest technologies to their students, if it is possible at their school location, due to the digitization process. Therefore, digital technologies and methods in education have steadily gained an inherent role in recent years (Fernandez, 2017). According to a study by Tobinski and Cyra (2021), more than 90% of today's teachers are using digital educational applications in Germany to prepare lessons, and another 88% also include them in the classroom on a regular basis. So far, a substantial body of literature on digital educational technologies has shown that these technological innovations have the potential to improve learning processes, increase students' motivation, and promote engagement in the classroom (Saidin et al., 2015; Shapley et al., 2011). In this context, virtual (VR) and augmented reality (AR) have received considerable research attention in the last few years as two particularly promising examples of digital education. VR and AR are referring to modern technological devices that allow users to interact with video, pictures, music, and three-dimensional (3D) objects (Karacan and Akoglu, 2021). Despite their similarity in terms of names and functions, there are several important differences between VR and AR. Whereas VR enables us to immerse in an artificial environment, AR enhances reality rather than replacing it, by

allowing users to perceive the actual environment with virtual elements overlaid on or composited with it (Elmqaddem, 2019; Jang et al., 2021). Further, VR accomplishes visual interactions by a head-mounted display, which can be either an independent device or one that is tethered to a computer that powers the visualisation gear (Barrow et al., 2019). By contrast, AR technology involves the three-dimensional (3D) arrangement of four separate elements in the actual world: a camera, computer infrastructure, a marker, and the real environment (Arena et al., 2022). Also, AR is a technique that involves the appearance of four-dimensional (4D) items designed on a developer's goal image, output, or materials and creates the illusion that the object is on said elements, therefore, enhancing existing reality by adding virtual components to it (Omurtak and Zeybek, 2022). Due to the broad adoption of AR technology over the last decades, requirements for expensive hardware and complex machinery (like head-mounted displays) have significantly decreased (Godoy, 2021). Furthermore, with the current use of mobile smartphone technology and the utilization of various applications, augmented reality has become widely available to use and function (Jumani et al., 2022).

Benefits in Educational Settings

Over the last few years, an increased interest in technologies such as VR and AR has emerged in the educational field (Ibáñez et al., 2018), especially in AR. Ke and Hsu (2015), for example, posed the question of whether the introduction of AR applications on smartphones would positively impact prospective teachers' learning processes. Their results indicated that AR could increase not just participants' conceptual comprehension and knowledge, but also further key abilities such as problem-solving, cooperation, and communication. Similarly, Akçayr and Akçayr (2017), who analyzed research mostly from kindergarten to 12th grade (K-12) settings, characterized increased accomplishment, motivation, and enjoyment as the primary benefits of utilizing AR. However, one of the most significant advantages of AR seems to lie in its capabilities to enable 3D learning settings that allow students to accomplish more than they would be able to do in the classroom context and, in addition, help them develop unique skills by allowing a more interactive environment (Celik et al., 2020).

Benefits in STEM Education

Especially in the fields of science, technology, engineering, and mathematics (STEM), teachers are often confronted with various issues such as expensive or insufficient laboratory facilities, equipment errors, and difficulties recreating experimental settings (Godoy, 2021). AR seems to address these problems not only through its easy and cost-saving applicability or its intrinsic interactivity between the physical and the virtual world but also through its potential to improve students' understanding and knowledge at the same time (Restivo et al., 2014; Hsu et al., 2017). For instance, Petrov and Atanasova (2020) found that the use of AR tools significantly improves students' grasp of the subject matter at the secondary school level. Likewise, Wahyu et al. (2020) demonstrated that AR-assisted learning could lead to superior students' science literacy as well as science learning achievements compared to conventional learning strategies. In addition, Ajit et al. (2021), who have conducted an extensive discussion of the existing literature on the advantages and disadvantages of using augmented reality in STEM, argue that AR significantly improves conceptual understanding, learning outcomes, collaboration skills, and student engagement. Another major benefit of using AR in STEM fields seems to lie in its ability to increase students' interest and motivation in those subjects. Rarely, as some teachers are looking for innovative instructional methods to solve fundamental issues related to students' motivation and engagement, current research appears to support the notion that the use of various AR-based applications could contribute to the solution of this problem (Mystakidis et al., 2022). As an example, Hsu et al. (2017) demonstrated in their study on high school students that AR-enhanced lessons with a medical task profile could both increase students' motivation and act as an inspiration for a future STEM-oriented career. This finding is also congruent with a recent study by Dakeev et al. in 2021, who examined the effects of AR-based lessons during an intervention study with primary school students. Their results showed that incorporating AR tools into STEM lessons increased students' enthusiasm for learning, interactions between the students, as well as their engagement in the classroom.

Benefits in Biology Education

According to Saidin et al. (2015), AR is viewed as one of the technologies that has a lot of promise in life science education, especially when it comes to visualizing abstract concepts. In this sense, teaching biology seems to be particularly challenging because the concepts that make up scientific knowledge in this area are often abstract and unfamiliar to students, and the links between the concepts are complex (Celik et al., 2020). In accordance with another study by Fuchsova and Korenova (2019), AR technology assists in understanding difficult subjects regarding biological teaching topics (e.g., human anatomy). Further, Bogomolova et al. (2020) demonstrated that students with limited visual-spatial ability may benefit from 3D anatomical models which are viewed stereoscopically in AR. Likewise, the findings of Yapıcı and Karakoyun (2021) indicate that AR activities could lead to a better understanding of abstract concepts in biology classes. Lastly, Celik et al. (2020), who analyzed the effects of AR implementation on laboratory learning in pre-service teachers, concluded that AR facilitates concept understanding regarding biological topics (e.g., anatomic construction of the heart). Additionally, by using AR in their biology lesson, the authors also noticed a favorable change in the learning environment, which was considered a result of increased student engagement and motivation. Given these potential positive effects that AR may offer to education, it seems critical to raise awareness among teachers to incorporate them into their (science) lessons (Jang et al. 2021). Fortunately, a considerable amount of research on the use of VR and AR-based applications and mobile augmented reality (mAR), and further, the attitudes of teachers towards it in biology lessons have emerged over recent years. Unsurprisingly, current empirical evidence appears to confirm the notion that

teachers increasingly view AR and VR as promising teaching methods in biology classes (Çakır et al., 2021; Kalana et al., 2020). For instance, Tan and Waugh (2013), who conducted a study on the use of a VR-based technology for molecular biology in secondary schools, showed that the introduction of additional digital resources was generally well-received by most teachers. This view is supported by Garcia-Bonete et al. (2019) who argue that VR- and AR-enhanced learning is positively associated with biology students at the University of Gothenburg. In addition, the authors showed that participants rated the implementation of VR and AR as advisable in a range of instruction-related content. In the same vein, a recent study by Çakır et al. (2021) on thirty-one pre-service biology teachers demonstrated that interest in technology was positively affected by AR applications incorporated over the duration of the investigation. Moreover, when asked about a potential future implementation, 93% of the participants responded that they would also like to use AR-based technology in their teaching later. Also, participants cited ease of use, visual support, and the ability to improve student attention and learning during lessons as the main reasons for future use.

Disadvantages and Limitations in Educational Settings and STEM

Apart from the advantages, current research also seems to frequently highlight possible limitations regarding the use of AR in educational settings (Akçayır and Akçayır, 2017). Common issues include technical difficulties (e.g., poor Internet connection, glitches), interfered student interactions, vision problems, necessitating technical hardware, and teachers' lack of technological competency (Uluyol and Eryılmaz, 2014; Yapıcı and Karakoyun, 2021). Other disadvantages include marker detection problems, insufficient device usability, and high acquisition costs (Ajit et al., 2021). To address these issues, Osadchyi et al. (2021) argue that the utilization of AR in STEM fields is required to form accessible three sorts of resources: 1) Adequate digital educational resources, 2) Quality control over educational content, and 3) Specialized content creators and trained teachers.

Regarding appropriate digital educational resources and quality assurance, it is also important to develop guidelines for the material and content development, at school or for the application itself. Further, for the utilization of the mAR apps, a quality-assurance strategy is needed, such as a "certification process", as there has been for educational applications (learning apps) in Austria since 2021. The "seal of quality" for learning apps, introduced by the Austrian Federal Ministry of Education, Science, and Research, is a proof of quality for learning apps that have gone through a new standardized state evaluation and certification process (Federal Ministry of Education, Science, and Research, 2021; Agency for Education and Internationalization, 2021). However, no certified learning apps with AR features in Austria for the subject "biology" are still available (Agency for Education and Internationalization, 2021).

Besides quality control, mAR applications need specialized content creators, ideally biologists, and trained teachers for all school types who can use mAR correctly in the classroom.

Efficiency and Responsibility in Austrian Biology Education

The utilization of new technologies such as mAR in Austrian biology lessons is essential for several reasons. Firstly, the implementation of educational applications and other new technologies (e.g., AR) into biology education was specified and required by the Austrian Federal Ministry of Education, Science, and Research. The use of modern and new technologies is anchored in the curriculum of secondary schools (Federal Ministry of Education, Science, and Research, 2019). The guiding principles of the general educational goal state: 'The education and training process takes place against the background of rapid social changes, particularly in the areas […] of science, demography, business, technology, the environment, and law. […] Innovative technologies of information and communication as well as the mass media are increasingly penetrating all areas of life. Multimedia and telecommunications have become determining factors for the evolving information society. […] In order to promote digital competence, these developments must be considered in the context of teaching, and the didactic potential of information technologies must be harnessed while at the same time critically and rationally examining their mechanisms of action in business and society. The creation of independent work using information technology is to be encouraged to an age-appropriate extent'. Furthermore, the utilization can be found in the areas of responsibility of the school, such as strengthening self-reliance and personal responsibility, and in the creation of references to the pupils' everyday life: 'The materials and media used in the lessons have to be as up-to-date and clear as possible, to encourage active participation of the students. […] New technologies are becoming increasingly important, […] [and the] creation of independent work using information technology is to be encouraged' (Federal Ministry of Education, Science, and Research, 2019). Therefore, Austrian biology teachers need to employ the latest technologies, which include mobile AR applications, in their classes to fulfill the general Austrian educational goal. Further, the teachers are encouraged to educate their students to use them in a careful and critical way. Moreover, the students are learning through the example of the teacher the efficient and meaningful employment of mAR in school or in self-study. Furthermore, regarding the disadvantages of smartphone use and mobile learning (Uluyol and Eryılmaz, 2014; Ajit et al., 2021; Yapıcı and Karakoyun, 2021) with the assistance and guidance of their teachers, students can possibly use mAR or other mobile applications in a responsible and safe way in biology education.

METHODOLOGY

Research Aim and Design

Despite all these above-mentioned positive findings regarding AR, the vast majority of work in this area has focused on potential effects that seem to lead to improvements in student learning, motivation, and engagement. However, comparatively few attempts have been made to investigate the motivational and methodological background of AR and mAR apps utilization

from the teachers' perspective, especially in biological education. With the aim to examine Austrian biology teachers' perceptions of mAR apps, a mixed-methods research design was employed. For this purpose, the following research questions addressed in this paper are

a) *Why are teachers using mAR apps in biology classes?*
b) *In what part of the lessons are mAR apps used?* and
c) *What barriers and suggestions for improvement are expressed regarding the use of mAR?*

Therefore, in September 2021, an online survey for in-service Austrian biology teachers explored which mAR apps teachers use in their classrooms on a regular basis. Results of the first online survey were that the most frequently used apps are the following: *Insight Heart, Anatomy 3D Atlas, Seek by iNaturalist,* and *Atlas der Humananatomie (Visible Body)*. After the data collection, another questionnaire with closed-ended and open-ended questions was designed and sent to biology teachers.

Sample

The participants of the research were included by using the purposive sampling approach. Purposive sampling is recommended for educational research that aims to examine a certain phenomenon, opinion, attitude, or concept among a specific group of participants (Cohen et al, 2002). The primary requirements for including teachers in this study were that they are in-service biology teachers in Austria and have some experience using mAR in their teaching. The online questionnaire was sent to six different higher and lower secondary schools in Upper Austria (two middle schools (MS), two general secondary schools (AHS), and two vocational higher and middle schools (BHMS)) and was additionally posted in an Austrian-wide online forum on social media for in-service and pre-service biology teachers. Thirty-five (27 female, 8 male) biology teachers) participated in this research. The participants were from all parts of Austria and did not collaborate with the research team beforehand in previous studies. The teachers were mainly female (77.1%) with an average age of 31.7 years. The majority were between 22 and 37 years old, only five teachers were older than 56.

Questionnaire Design

The questionnaire contained five open-ended and fourteen closed-ended questions (as seen in *Appendix 1*). During the development of the methodology for the collection and processing of monitoring data, the methodology that was used and recommended in previous similar studies was used (Anđić, et al., 2018; Mikropoulos et al., 2003). Four of the closed-ended questions were multiple-choice, and ten could be answered via a 5-point Likert Scale, in order to capture and compare the different teachers' opinions on mAR. The teachers indicated which mAR apps they have already used or are currently using. Further, the teachers had to delineate their frequency of utilization. Onwards, the teachers had to rate the various statements regarding students' motivation, collaboration, exams, interest in science, and in addition, learning ability, support, and preference. After the assessment of the statements, the teachers had to depict what they particularly like about using mAR. Furthermore, they had to give a description of how and in which part of the learning unit mAR applications can be used in a creative and innovative way. Lastly, the teachers had to display possible problems and issues with mAR, and describe what may be improved in the future, to implement those applications safely and in a correct manner into biology lessons to teach the required curriculum. The questionnaire used in this research contained more closed and some open questions, and the reason for this survey design is twofold. First, when creating the questionnaire, we followed the suggestions of previous research (Anđić, et al., 2018; Anđić, et al., 2021; Anđić, et al., 2022; İpek et al., 2020; Mikropoulos et al., 2003) which dealt with the application of different digital technologies in biology education. Another reason for this kind of questionnaire design is that participants who complete an online survey are more willing to answer closed-ended questions than open-ended questions because they are less time-consuming and require less commitment (Zhou et al., 2017; Fan and Yan, 2010). In this way, the authors tried to ensure a higher response rate.

Data Collection and Processing

The data collection took place from 1st December 2021 to 21st February 2022 via an online survey on Google Forms. The quantitative data, collected in an Excel sheet, were processed using descriptive statistics (using the program SPSS), as it is recommended in previous similar research (Anđić et al., 2018; Mikropoulos et al., 2003). The grounded theory was employed for processing the qualitative data. Each of the three authors participating in this study independently read and reread the answers to the open-ended questions before coding the data. This coding procedure used grounded theory (Strauss and Corbin, 1990). The open coding was done manually. The codes' frequency served as the standard for acceptance or rejection. The creation of subcategories, categories, and themes was then conducted using the constant comparative technique (Strauss and Corbin, 1990). The authors in this study assigned the codes to distinct subcategories, topics, and themes. The degree of agreement between the fundamental codes, as well as the placement of the codes inside subcategories, categories, and themes, were used by the researchers to assess the dependability of the codes and the accuracy and precision of the coding. This approach to analyzing data in research related to biological and scientific education has been recommended by previous research (Anđić et al., 2021; Maloney, 2005; Bahng and Lee, 2017).

RESULTS

Results of the Quantitative Data

Quantitative data in this study indicate that mAR can be used for the promotion of natural sciences and scientific principles among secondary school students. Summarizing the data, according to the opinions of the teachers about mAR, the app brings a double benefit in teaching biology. Firstly, the impact on students' knowledge, and secondly, the contribution to students' motivation to acquire new biological knowledge. The results of the quantitative evaluation are described in more detail and shown in *Figures 1-4*.

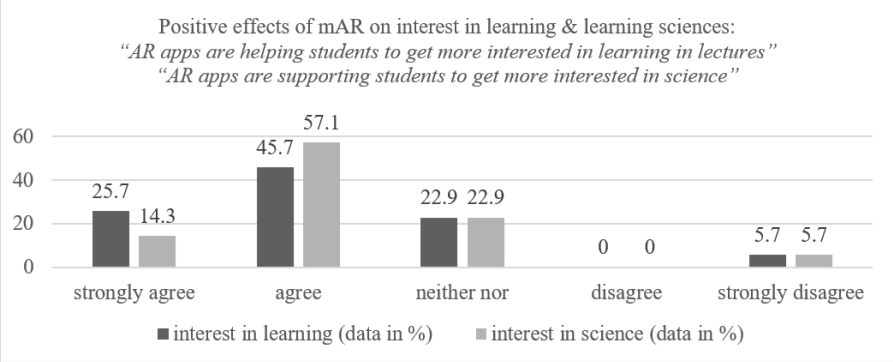

Figure 1: Teachers' opinions about the positive contribution of mAR to the students' interests in learning and learning science-oriented content

Most of the teachers who participated in this research chose the option *I agree* (57.1%) or *completely agree* (14.3%) that mAR positively influences students' interests in learning science-related content, as shown in *figure 1*. Only 5.7% of teachers expressed full disagreement with this statement. In addition, 71.4% of all teachers agreed or strongly agreed that mAR helps students to increase their learning interest in their lessons. Also, only 5.7% fully disagreed with this statement.

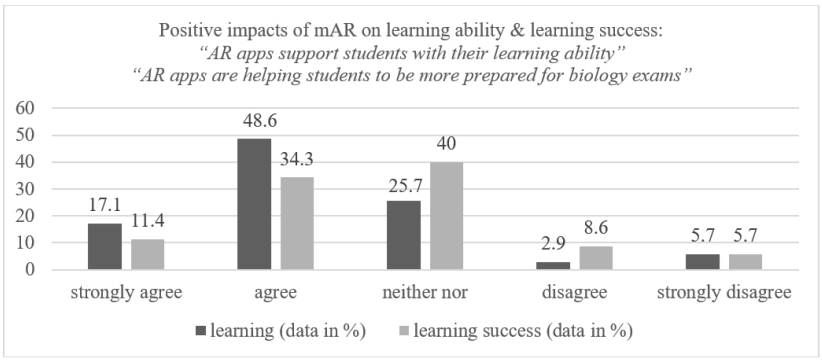

Figure 2: Teachers' opinions about the positive impact of mAR on students' learning success in science

As could be seen from *figure 2,* most of the teachers had a positive opinion about the contribution of mAR to students' learning success (45.7%). However, a significant number of teachers (40%) were indecisive (neither option *agree* nor *disagree*) about the contribution of mAR to the students' learning success. Furthermore, most teachers (65.7%) think that mAR positively affects their learning because students prefer to learn with their smartphones compared to a textbook. 25.7% were indecisive and only 8.6% disagreed.

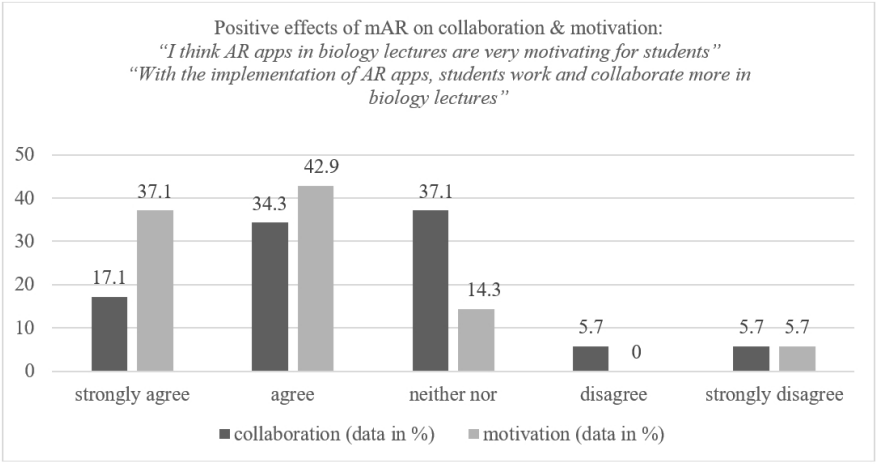

Figure 3: Teachers' opinions about the positive effects of mAR on students' motivation and collaboration in biology lessons

The surveyed teachers mostly agreed that mAR positively affects students' motivation to learn science and collaborate with their peers in this learning process. Only 14.3% of the teachers were hesitant or disagreed with the statement that mAR positively affects students' motivation to learn science and collaborate with their peers in the learning process, as shown in *Figure 3*.

Concerning the teachers' opinions on the most important characteristics that mAR offers in biology teaching, the results are presented in *Figure 4*. Findings indicate that the majority of the teachers (71.4%) thought that the most important contribution of using mAR in biology teaching is creativity in the lesson structure and the learning unit's design. Another important feature that mAR brings into the teaching of biology according to a large number of teachers (65.7%) is to increase the visualization of teaching content, innovation in teaching, and enables learning with the use of smartphones. Teachers felt that the following features of mAR applications were also important for teaching: creating a sense of enjoyment in learning (62.9%), enabling learning that is independent of time and place (40%), free availability (37.1%), and furthermore, that the content is provided quickly (34.3%), and user-friendly (34.3%).

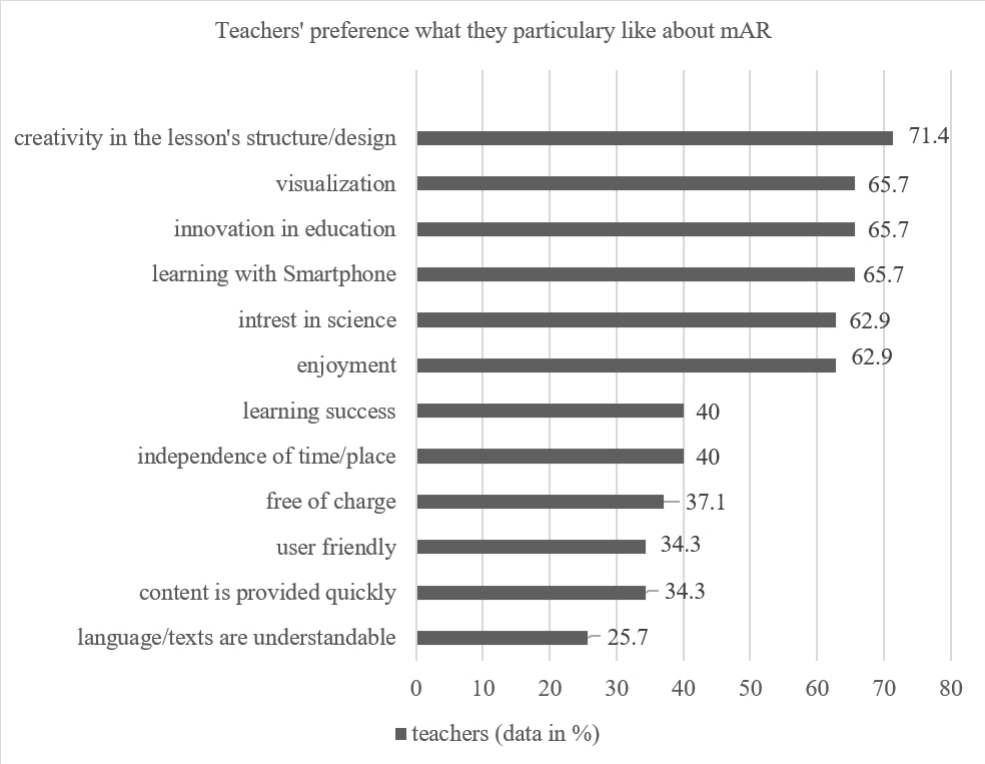

Figure 4: Teachers' opinions on the most important characteristics that mAR offers in biology teaching

Results of the Qualitative Data

The data obtained in this research are classified within 254 codes, 11 sub-categories, and 2 core phenomena (*Challenges* and *Potentials)* and 4 core consequences (*"I need…", "I do…", I create…", and "I can…").* In order to ensure the validity of the obtained data, the degree of agreement in the distribution of codes into categories and themes was calculated between members of the research team, as well as between members of the research team and external experts in the field of STEAM qualitative research. Krippendorff (2013), Bowers (2019), and Miles et. (2014) suggest using this method to check the validity and reliability of qualitative data. The concordance in the classification of codes in categories and themes among the members of the research team was 90%, while the concordance between the members of the research team and external experts in STEM education research methods was 84%. These data indicate that the results obtained are valid.

From the coding of the participating educators in this study regarding mAR, the authors developed a grounded theory-based model "The Perceptions of mAR in Biological Education" for secondary school biology teachers in Austria (as shown in *Figure 5*). The developed model incorporates the main components of a grounded theory: *strategies* (selected learning and teaching strategies and their impact), *core phenomena* (challenges and potentials regarding mAR, its impact, and consequences regarding students' and educators' teaching process, content, and competencies), *contextual* and *intervening conditions* (participant characteristics, subject "biology") (Corbin and Strauss, 2015). Bowers (2019), used a similar model to present his qualitative results in his dissertation. With this study, the codes of the consequences according to the teachers for themselves, their subject/lessons, and their students were additionally evaluated and rated according to a "positive" (green colors) or "negative" (red color) influence or conditions.

In the following the findings of the two core phenomena and their four consequences, based on grounded theory (Corbin and Strauss, 2015), are further described in more detail and are shown in *Figures 6-9*. The core phenomenon *"Potentials"* includes all the stated and rated benefits of mAR in relation to the teaching/learning process *(I do: Impact of mAR on the learning and teaching process)*, the biological content learned and taught *(I create: Impact of mAR on the learning and teaching content),* and also the competencies acquired *(I can: Impact of mAR to the development of students and*

teachers' skills and competencies). Furthermore, the core phenomenon *"Challenges"* describes all the issues, barriers, limitations, and problems related to mAR in biology lessons (e.g., technical requirements) that the teachers reported (I need: B*arriers to the use of mAR in learning and teaching*). Within each of these four consequences, additional subcategories are described, as well as examples, and frequencies of codes from teachers' narratives. The bubbles are linked, and colors are also adjusted depending on whether the codes/subcategories are more relevant to students or teachers, or both. The codes are shown as bubbles. According to the frequency of mentions, they are either larger or smaller. Also, they are related/overlap when related (e.g., outdoor learning can be done as homework, as shown in Figure 6).

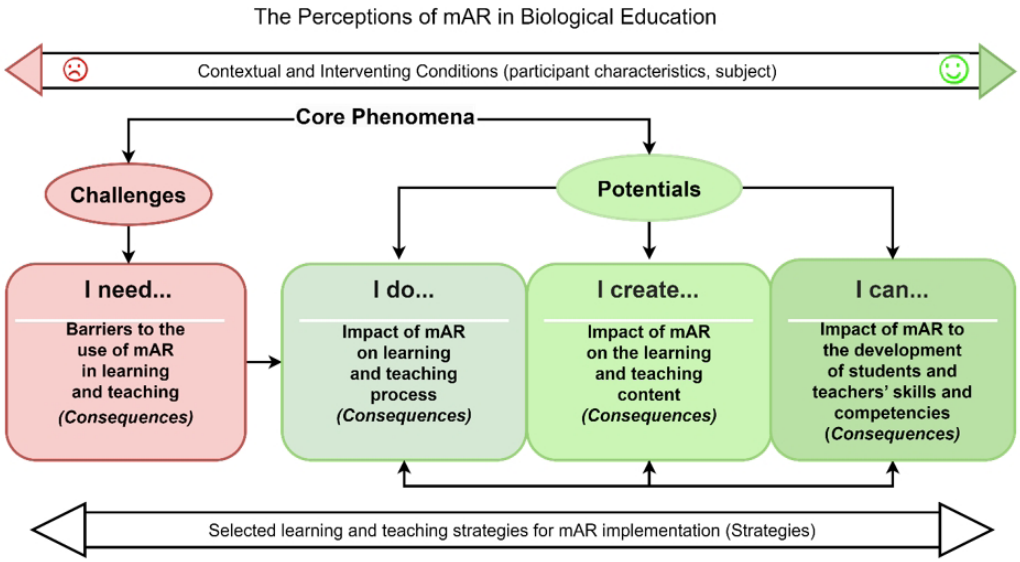

Figure 5: The Perceptions of mAR in biological education. A grounded theory-based model for secondary school biology teachers in Austria (Corbin and Strauss, 2015)

What is interesting about this data is that teachers who participated in the study considered that the implementation of mAR can contribute to both the teaching and learning process as well as to the students' and teachers' digital skills. Qualitative results indicate that the application of mAR improves students' learning activities as well as contributes to teachers' ability to better organize teaching. Further analysis showed that mAR improves the presentation and visualization of teaching content, which is very important in science education, but of particular importance for biological education. However, the qualitative data also revealed very significant obstacles that teachers face when using mAR in teaching. Among these are the lack of resources and the sometimes surprisingly questionable teaching content shown in the described applications, as well as the connection of the content with the teaching curriculum.

Impact of mAR on Learning and Teaching Process (I Do)

This topic includes teachers' opinions on the use of mAR applications as teaching media to improve learning and teaching. Most teachers felt that mAR could contribute to teaching and learning processes. Within this topic, four subcategories have been made: *development of student activities and tasks, support in the organization of classes, teaching approaches and methodology of teaching*, and *student motivation*. Examples of codes and their frequencies (*f*) per participant, as well as their classification in these categories within this theme, are shown in *Figure 6*.

The teachers believe that mAR teaching materials are very suitable for the '*Development of student activities and tasks*'. In this category, the code with the highest frequency is '*Determination of living beings*' (*f* = 22). Teachers believe that mAR can be utilized very successfully in student activities that involve the determination of living things, fungi, plants, and animals. (Respondent 1, male teacher, 31: *'Students can use mAR for determination exercises'*.)

Teachers generally had a very positive opinion when it comes to the application of mAR for the determination of organisms from their environment.

In addition to this activity, many teachers believe that these applications can be successfully used for the realization of students' homework, fieldwork of students in the field of biology, as well as for the exchange of ideas-brainstorming. The category '*Support in the organization of classes*' includes codes used by teachers to describe the application of mAR applications in the organization of honor. Most teachers believe that mAR can be used very successfully in the main part of the class (f = 13), while a significant number of teachers believe that these applications can be used in any part of the class. However, it was also emphasized in this research, that the successful implementation of mAR depends on the respective teachers and their (mobile) abilities: Respondent 2: female teacher, 23: '*In theory, AR can be used everywhere in the lecture, but its utilization always depends on the teacher herself, and how she uses it'*.

The category '*Teaching approaches and methodology of teaching*' includes codes by which teachers have described the teaching methods and approaches used in the application of mAR. As can be deduced from *table 1*, the largest number of teachers consider that these applications are suitable for

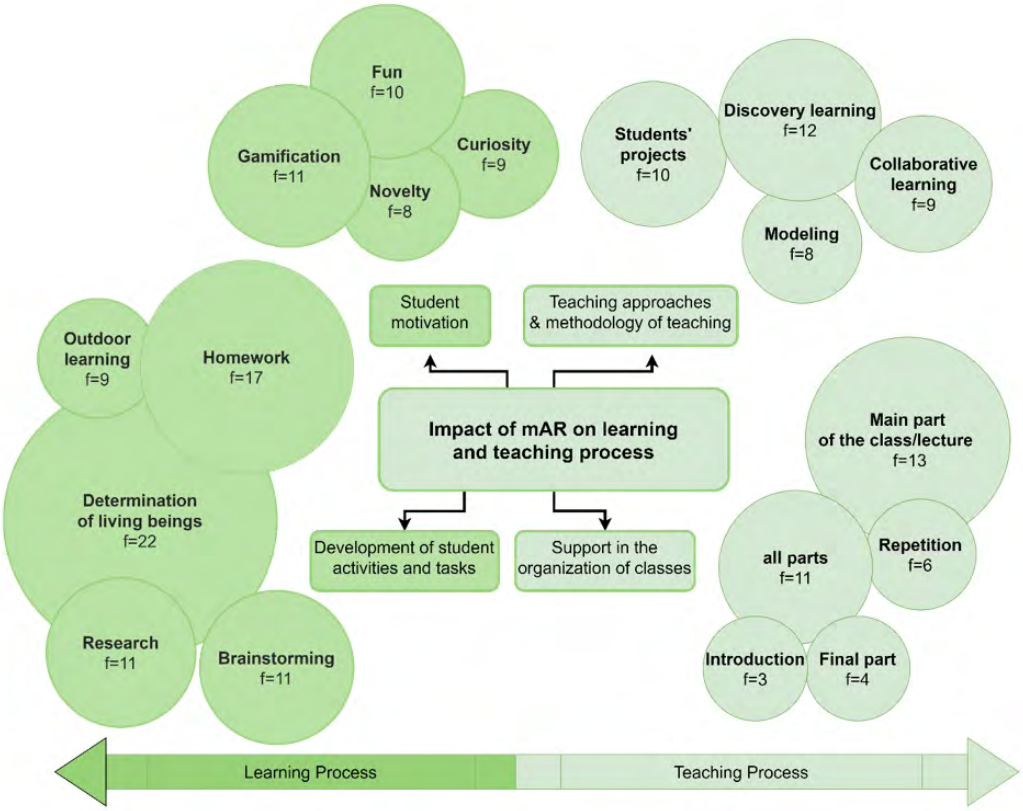

Figure 6: Example of codes within the core phenomenon "Potentials" impact of mAR on learning and teaching process (I do). The frequency per participant is shown in a bubble (larger/smaller according to the frequency of mention), and the subcategory in which they are classified are given

discovery learning (f = 12) (e.g., fieldwork), then students' project approach (f = 10) (e.g., leaf collection), but also collaborative learning (f = 8), and modeling (f = 8).

Impact of mAR on the learning and teaching content (I create)

Within this theme are classified codes by which teachers described the use of mAR applications to display teaching content or parts thereof. Two categories have been developed, namely: *presentation of teaching content to students* and *the development of materials by students*, as shown in *Table 2*. The '*presentation of teaching content to students*' category includes those codes by which teachers have expressed their opinion on how mAR can be employed to present teaching content to students. The code with the highest frequency in this category is '*the vividness of the illustrations*' (f = 13), with which teachers expressed their opinion that these applications are particularly useful for a clearer and better presentation of teaching content than two-dimensional photographs. (Respondent 3, male teacher, 31: *'You can use mobile AR for the illustration of the content'*.)

The teachers believed that mAR provides the possibility of better presentation of teaching contents in biology, improving their attractive and more interesting appearance.

Visual representation of anatomical structures (f = 12) also stands out with its frequency and indicates the opinion of teachers that mAR applications are very useful for presenting teaching content in anatomy and morphology. Teachers also thought that mAR was useful for depicting different types of organisms, such as plants, animals, fungi, etc., but also for presenting processes in biology teaching. Teachers who participated in this research expressed their opinion that mAR can also be used as teaching media for the development of materials by students. Thus, for example, teachers felt that students could consciously use these applications for map and schema development (f = 5) or for the modeling process (f = 7).

Impact of mAR to the development of students' and teachers' skills and competencies (I can)

This topic includes teachers' opinions on the contribution of mAR applications to the skills of teachers and students. Teachers are of the opinion that the utilization of mAR applications contributes to students' digital skills (*category 1*) and teachers' digital skills (*category 2*). Examples of codes and their frequencies per participant and their classification in these categories within this theme are shown in *Table 3*.

As can be seen from Image, the teachers who participated in this research believe that the application of mAR applications contributes to students' skills to use smartphones for educational purposes (f = 9) and contributes to their digital skills (f = 8), as well as safe Internet utilization (f = 7). Teachers also felt that these applications contribute to teachers' abilities to use smartphones in teaching (f = 9) but also contribute to the development of their digital skills (f = 7).

Respondent 4, female teacher: '*You can use the AR apps to increase the fun of learning and teaching, for creative new lessons, and for a safe use of smartphones in the classroom'*.

As can be seen, the opinion of the teachers from this category

is not oriented towards the teaching content, but rather towards the achievements of the students and the learning outcomes that the students achieve with the application of MAR in learning. It is very interesting that teachers indicate the skills that students acquire by applying mAR in biology classes, which contribute to their digital skills. Teachers also experienced that applying mAR in teaching contributes to developing their digital skills and abilities.

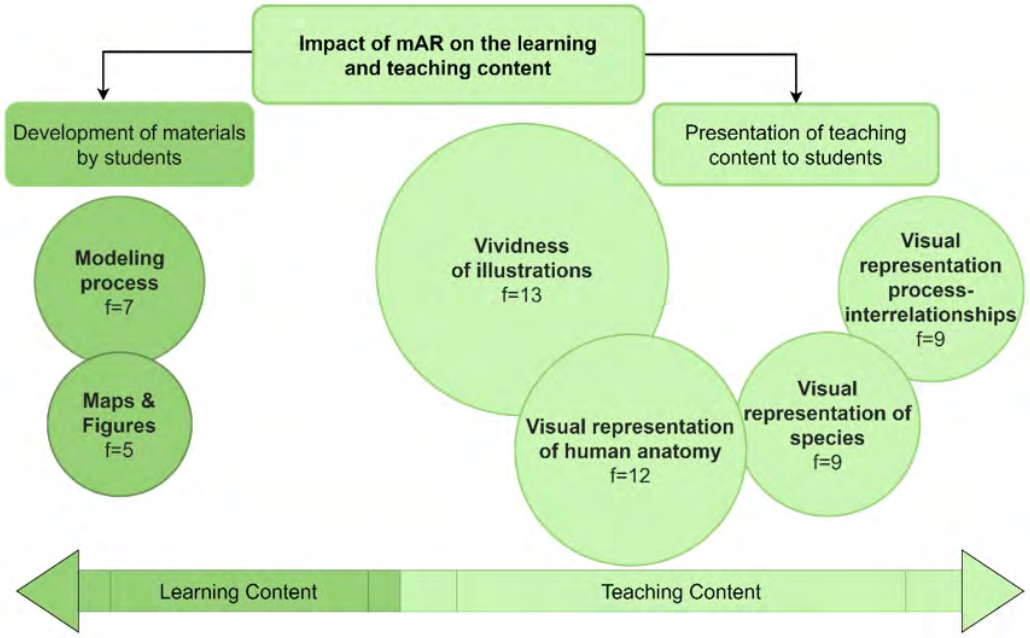

Figure 7: Example of codes within the core phenomenon "Potentials" impact of mAR on learning and teaching content (I create). The frequency per participant is shown in a bubble (larger/smaller bubble according to the frequency of mention), and the subcategory in which they are classified are given

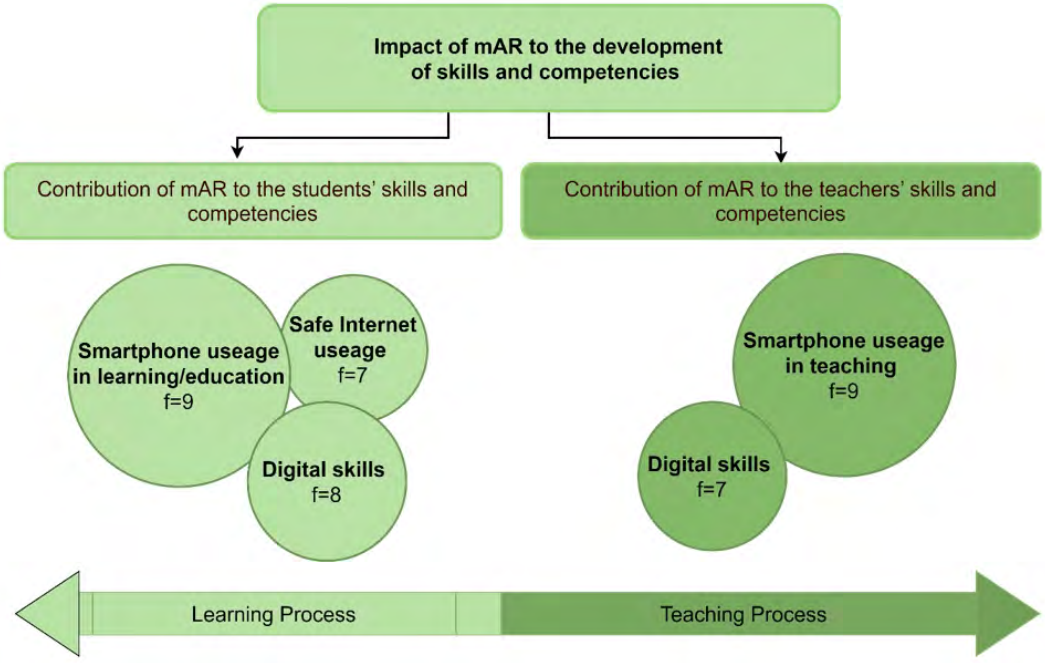

Figure 8: Example of codes within the core phenomenon "Potentials" impact of mAR on learning and teaching competencies and skills (I can). The frequency per participant is shown in a bubble (the larger/smaller bubble according to the frequency of mention), and the subcategory in which they are classified are given

Theme 4: Barriers to the use of mAR in learning and teaching

The fourth theme includes teachers' opinions on the obstacles and issues biology teachers face when applying mAR in their teaching. Three categories have been developed within this theme: '*lack of resources'*, *'questionable teaching content in applications'*, and *'curriculum connections'*.

As can be seen from *Image 4*, teachers considered the lack of devices to be one of the main obstacles to the use of mAR in teaching (*f* = 15), but also limited Internet access.

Respondent 5: female teacher: *'Every child must have a suitable device for mobile exercises, which is not always the case!'*.

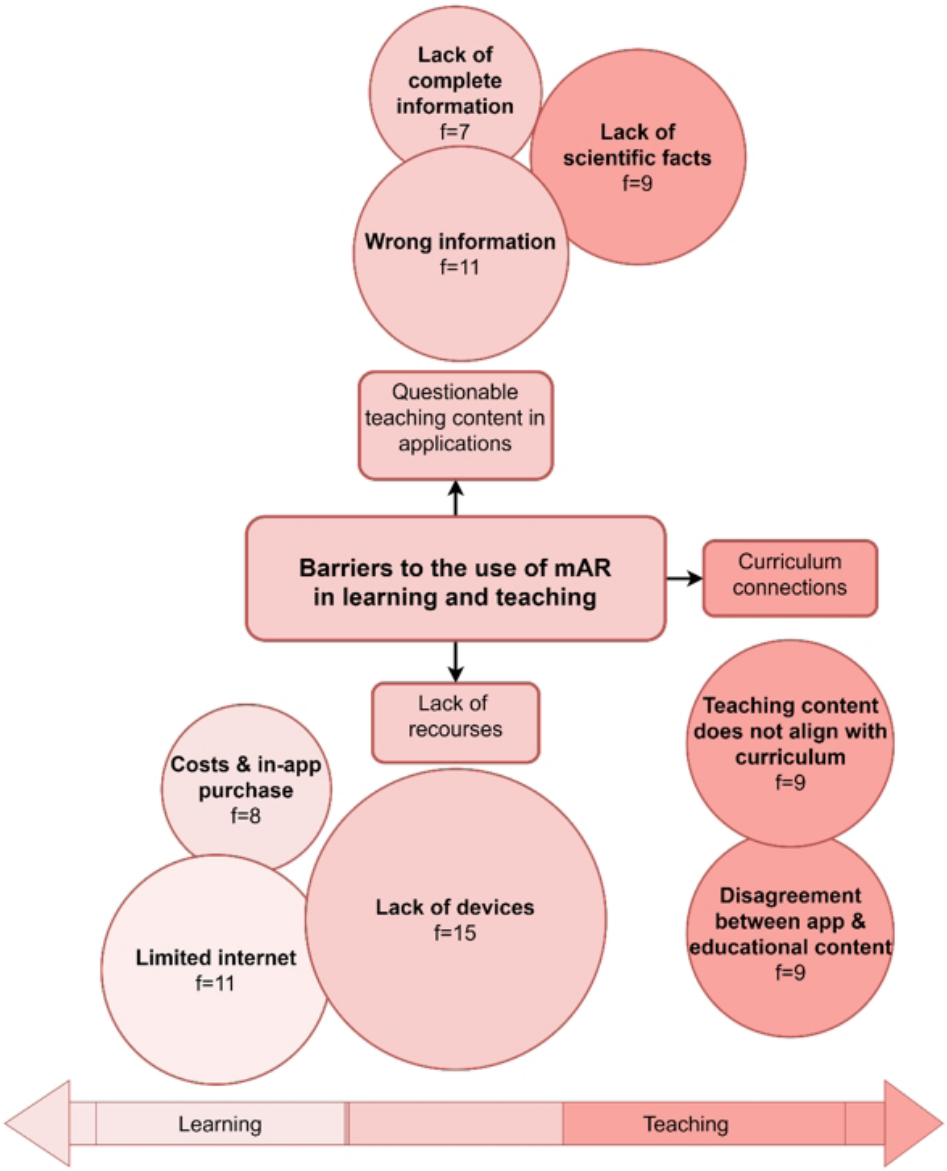

Figure 9: Example of codes within the core phenomenon "Challenges" barriers to the use of mAR in learning and teaching (I need). The frequency per participant is shown in a bubble (the larger/smaller bubble according to the frequency of mention), and the subcategory in which they are classified are given

When it comes to the teaching content presented in these applications, teachers believe that they may contain erroneous information (*f* = 11), as well as information that is not focused on scientific facts (*f* = 9): Respondent 6, female teacher, 24: '*Results are often false, and the students need to be able to think critically in addition to enjoying the use of AR apps. Quite often the correct answer is not the first search result.'*. As one of the obstacles to the use of these applications, the teachers mentioned the lack of connection between the curriculum and applications (*f* = 11), as well as the disagreement between mAR and educational activities recommended in the curriculum (*f* = 9). In addition to the problems with the curriculum, there was also a lack of knowledge about the efficient utilization and where to find mAR apps mentioned by some participants:

Respondent 6: female teacher, 31: '*There is a lack of information about which mAR apps are available and how to find them. In addition, for which topics they can be used. Some apps are rather suitable for the lower secondary level, as the appropriate apps are sometimes missing for the upper secondary school. It needs an overview, adapted to the curriculum, on which topic you can use a certain app'*.

According to the opinion of the teachers who participated in this research, the lack of devices, the accuracy of the information found in the applications for mAR and the inconsistency of the curriculum with the applications are the most common obstacles to the use of this technology in biology education. In addition, some of the teachers believed that the high price and partial information are additional obstacles to the application of mAR in biology education.

DISCUSSION

This paper gave an overview of AR and mAR technology as well as some current mAR examples of mobile applications, frequently used by 35 Austrian biology teachers, with different approaches and contexts in biology education. The aim was to show and describe the perceptions of Austrian secondary school biology teachers on the utilization of mAR apps in their teaching. The purpose of the review and the study was to possibly increase the efficient and responsible applicability and the impact of mAR apps in biology education. Furthermore, to show the problems and obstacles of mAR in Austrian secondary schools, and examine the barriers, which are perceived by the questioned teachers. The results of this study can serve as an approach for further research to solve the problems mentioned in the future.

Regarding the impact of mAR on the learning and teaching process, and in which part of the lesson mAR can be used, research findings show that mAR could contribute beneficially to teaching and students' learning processes. Further, according to the surveyed Austrian teachers, mAR-based teaching materials can be suitable for the development of student activities and tasks, especially for the determination of living beings. In addition, mAR can be utilized for the realization of students' homework, outdoor learning (e.g., fieldwork), the exchange of ideas (e.g., brainstorming), as well as supporting the organization of classes, in any part of the lecture. However, some participating teachers emphasized that the implementation of mAR depends on the respective teachers and their (mobile) abilities. In theory, according to the surveyed biology teachers, it is possible that mAR could be employed in the lecture anytime. However, if the teachers are not familiar with the app or its AR functions, or do not deal with it sufficiently, some educators may generally refuse to use it in the classroom at all. In the future, there will be a need for guidelines and assistance on how to motivate and help biology teachers to employ mAR in their classrooms despite reservations.

Concerning the mAR-based teaching approaches and methodology teaching, the participating teachers felt that mAR is possibly suitable for discovery learning, students' project approaches, collaborative learning, and even modeling. Regarding the presentation of teaching science content to the students, the findings demonstrate that mAR can be useful for a clearer and better presentation of teaching content, such as human anatomy and morphology, for depicting different types of organisms, and for presenting processes in biology teaching. Furthermore, mAR can be used as teaching media for the development of materials by students, according to the participating teachers. Concerning the contribution of mAR to the development of students' and teachers' skills, this research results indicate that the utilization of mAR can be beneficial for students, according to the teachers, by using smartphones for educational purposes, improving digital skills, as well as learning safe Internet use. Moreover, the data indicate that mAR contributes to teachers' skills to use smartphones in teaching as well as improving their digital skills, according to the participants. In this study, it must be emphasized that most respondents probably have a possible positive attitude towards AR and/or mobile learning, perhaps because of their age.

According to the teachers' perceptions of the impact of mAR on learning science and interests in science-based content, the findings showed that most of the participating teachers in this study believe that mAR positively influences students' interest in learning science-related content and that mAR helps them to get more interested in biology lectures. These results are congruent with a recent study in 2021 (Dakeev et al., 2021), where incorporating AR tools into STEM lessons increased primary school students' enthusiasm for learning.

Furthermore, in regard to the opinion of the impact of mAR on the learning process and learning success, in this research, most of the biology teachers had a positive opinion towards the contribution of mAR to the student's learning process and learning success. The majority of the participants' opinions were that mAR helps students with their learning and that the students prefer to learn with mAR rather than with the textbook. However, a significant number of teachers were indecisive about whether mAR positively impacts the students' learning success. This result is interesting, because although many young teachers in this study like to use the mAR apps frequently in their classrooms, they are not quite sure whether the applications increase the students' learning success in the long term. These findings differ slightly from the results of previous studies (Wahyu et al, 2020; Ajit et al, 2021). Their research indicated that mAR-assisted learning improved the learning outcome in STEM subjects, and further, mAR could lead to superior students' science literacy and science learning achievements compared to conventional learning strategies. After comparing the findings with other studies, the authors assume that the surveyed biology teachers in this research have a lack of scientific evidence that mAR enhances learning, a lack of knowledge about the apps themselves and that some of the participating teachers, especially older ones, never use or are hesitant to use mAR in class.

In terms of the positive effect of mAR on motivation and collaboration, by questioning the biology teachers, it became evident in this study that most of them believe that mAR positively affects students' motivation to learn science, and furthermore, collaborate with their peers throughout the learning process. These assumptions can be confirmed by a study by Ke and Hsu (2015), where the findings indicated that AR increased participants' ability to problem-solve, cooperate, and communicate with peers in class. In addition, in a study by Hsu et al. (2017), AR-enhanced lessons also positively affected students' motivation. These results can also be found in the study of Celik et al. (2020), where the authors noticed a positive change in the student learning environment, which was considered a result of increased motivation. Throughout

these results, it can be assumed that mAR positively impacts the student's motivation and collaboration in biology classes.

Within this research, it was also ascertained what the teachers' opinion about the main features that mAR offers in biology lessons was. The results of the descriptive methods in this research demonstrate that the majority of the teachers think that the most important contribution was creativity in the lesson structure to design a creative biology course unit. Besides creativity, the importance of innovation in biology lectures was also mentioned. Huang (2017) reached similar results through the application of an experimental research study. He concludes that mAR technologies and creative learning applications can help teachers to better understand the growing research on the role of AR in learning. Assumptions for these findings of this research are that the Austrian biology teachers may think that a creative design course unit and teaching in an innovative way provides variety and reduces student boredom, increases classroom enjoyment and learning outcomes, and further, surprises themselves and students.

In addition to innovation and creativity, the participating biology teachers' perceptions were that creating a sense of enjoyment in biology learning was also important for teaching. Many studies, such as Akçayr and Akçayr (2017), have found that the utilization of AR brings fun into the classroom. These quantitative results indicate that teachers think that AR-based learning creates enjoyment in biology lectures. Moreover, the authors assume that students prefer learning (science) with fun rather than under pressure, to increase their interest in the subject and students' engagement, and motivate the teachers themselves, as seen in other studies (Irwansyah et al., 2019; Berry and Wintl, 2009).

Furthermore, analyzing the quantitative data, it was shown that the questioned Austrian teachers in this study also agreed that particularly important characteristics that mAR provides in their biology teaching were visualization and enabling learning with the use of smartphones. The result regarding the utilization of smartphones in the classroom probably indicates that the participating biology teachers are aware of the importance of teaching the correct, meaningful, and safe use of smartphones in school. Concerning the visualization, in addition to the results of this teacher survey, other studies like Saidin et al. (2015) show that the visualization of scientific abstract concepts or objects can help students to learn science.

Regarding the barriers to the use of mAR in learning and teaching, the findings of this study show that the lack of devices is one of the main obstacles, according to the surveyed teachers. Furthermore, also limited Internet access. These results correlate with many other studies about this topic (Uluyol and Eryılmaz, 2014; Yapıcı and Karakoyun, 2021; Ajit et al., 2021). Research by Ajit et al., (2021) and Müller (2014), indicate that the selection of quality technical devices is very important for the successful implementation of mAR in the teaching process and that the lack of adequate technical devices is one of the most frequent obstacles to the use of this technology in education. This information can be of particular importance to policymakers in education systems, which should consider these obstacles when developing strategic plans for implementing mAR in education.

The utilization of modern and new technologies is anchored in the curriculum of Austrian secondary schools, as required by the ministry. Regarding efficiency and responsibility in Austrian biology education, the teachers, therefore, have the responsibility to prepare their students for dealing with mobile educational applications such as mAR in their lessons. Due to the mentioned and already known issues with mAR, the students need teachers who are very familiar with the apps and their AR functions, and ideally who have completed teacher training, to efficiently prepare their students for the lessons, regarding content, smartphone, and AR utilization, not only in biology classes. Therefore, if the teachers are not properly trained or only have little information about the correct applicability, the teachers and students can have bad experiences in education or with the app or device, and the lessons cannot run smoothly. These impressions can also lead to the teachers and/or students refusing to use mAR or other technologies at all.

This research also demonstrates another very important issue to the use of mAR, which is related to the teaching content presented in those applications, (partly) false information, information that is not focused on scientific facts, lack of connection between the biology curriculum and mAR, as well as a disagreement between mAR and educational activities recommended in the curriculum, are mentioned. This study agrees with previous research (Radu, 2012; Urban et al., 2022; Kuleto and Paun, 2022), which indicates that mAR applications sometimes neglect the scientific accuracy of the content due to the desire to present the content in an attractive way. It was further emphasized by the questioned biology teachers that there is often uncertainty about where to find good mAR or science-based apps and how to properly connect them to the curriculum. It was also mentioned that there is a lack of suitable mAR apps for higher secondary school students. Based on this data, recommendations can be made for developers of mAR applications, who should, when creating applications, take into special consideration the scientific accuracy of facts as well as compliance with curricula in order to increase the applicability of these applications in teaching. There should also be a larger selection of suitable mAR apps for all age groups, as well as guidelines on how to use them correctly.

Limitations and Further Research

The main limitations of this study are the sample size of participating teachers ($n = 35$) and the imbalance regarding age as well as gender. These facts may affect the results because most of the participants were in their twenties or thirties and female, which is why in the future, more research with larger numbers of balanced participants will have to explore this topic in more detail, in order to be able to make a more precise statement with general plausibility about the perceptions on mAR of Austrian biology teachers.

Although the questionnaire was posted online and sent to six different Austrian schools, it was mainly filled out by very young teachers, who are persuaded that mAR positively influences students' interests in learning science-related content. Therefore, it can be assumed that either older teachers have inhibitions against mobile learning, apps, or AR in general, or have problems with or no time filling out an online questionnaire. Another study with Austrian biology teachers,

analyzing interviews, should clarify what inhibitions they have against mobile AR apps in biology lessons. In addition, these interviews are intended to shed more light on the advantages and disadvantages of mAR implementation in Austrian biology lessons. Moreover, it could help to clarify whether this questionnaire was only completed by biology teachers who have had positive experiences with AR or learning apps in general. After further studies with teacher interviews, all collected results are used in upcoming teacher training courses to reduce possible reservations against mAR in biology education and to increase their implementation in class.

Regarding the aim of the Austrian biology curriculum, that new media such as mAR should be used in the classroom and that students should be educated to deal with them critically, further research is needed to what extent this is already being implemented by Austrian biology teachers. Furthermore, additional studies by the authors will take place on the perceptions of students on the implementation of mAR applications and science-based educational applications in Austrian biology lectures.

CONCLUSION

In summary, after surveying and analyzing 35 Austrian biology teachers' opinions on mAR in biology lectures, it can be assumed that the participating biology teachers think the utilization of mAR in their classroom is innovative, creative, and changes the design of the learning unit. Moreover, the surveyed teachers likely use mAR apps to teach human anatomy or for the determination of plants, fungi, or animals. In addition, the participating teachers' perception of mAR is that these applications are good for visualization, proper smartphone usage, modeling, and enjoyment. Further, according to the teachers, mAR apps may possibly increase students' learning outcomes and success, collaboration, and interest in learning and science. This study collected already known problems with augmented reality, such as technical requirements (e.g., missing devices and Internet).

In addition, according to the participating teachers, mAR currently still has incorrect scientific content, there are not enough choices for teachers for all age groups, and some mentioned mAR apps are not yet linked to the biology curriculum. The teachers also need assistance and guidelines on where and how to find suitable mAR apps, and how to utilize them correctly and efficiently in their biology education. In order to confirm these assumptions and to reduce possible mentioned limitations, further research with a larger and more balanced sample size needs to be done on this topic in the future for general significance.

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APPENDIX

QUESTIONS FROM THE ONLINE QUESTIONNAIRE

- Demographic data: Age, Gender, Profession
- Which mAR apps have you already used, or are you currently using? Please list your apps
- How often do you use mobile AR apps in your biology lessons (*never, once a school year, once a semester, once or twice a month, several times a month, or weekly)*
- Why do you use mobile scientific AR apps in studies or in class? Please describe your answer
- How often do you use mobile AR apps in private (*never, once a school year, once a semester, once or twice a month, several times a month, or weekly)*
- Why do you use mobile scientific AR apps in private? Please describe your answer

Rate the following statements (*strongly agree, agree, neither nor, disagree, strongly disagree*):

- "AR apps are supporting students with their learning ability"
- "AR apps are helping students to be more prepared for biology exams"
- "I think AR apps in biology lectures are very motivating for students"
- "With the implementation of AR apps, students work and collaborate more in biology lectures"
- "AR apps are helping students to get more interested in learning in lectures"
- "AR apps are supporting students to get more interested in science"
- "AR apps break and loosen up traditional lessons' structure"
- "Students rather prefer to learn with AR apps than with an analog textbook"
- Please tick the appropriate box: What do you particularly like about the use of AR apps in science lessons/studies? Multiple answers possible:
  - ❒ Use and learn with the smartphone
  - ❒ Fun
  - ❒ Creativity in class or study
  - ❒ Learning success
  - ❒ Innovation in learning and teaching
  - ❒ Illustrations and representation of objects/objects (visualization)
  - ❒ Freedom to use the app anywhere
  - ❒ Utilization is easy and fast (user-friendly)
  - ❒ mAR App is free or inexpensive
  - ❒ Learning content is delivered quickly
  - ❒ Language and texts are easy to understand
- Please tick the appropriate box: How and where can AR apps be used creatively and innovatively in the classroom? Multiple answers possible:
  - ❒ Work order (groups, partner work)
  - ❒ Homework
  - ❒ Visualization of objects
  - ❒ Reading articles
  - ❒ Development of new and deepening of already learned content
  - ❒ Repetition of learning content
  - ❒ Quiz
  - ❒ Project
  - ❒ research-based learning
  - ❒ creative use of the smartphone
  - ❒ Station operation
- Describe how and in which part of the learning unit or lesson mAR can be used? Please justify and describe your answer
- What bothers you about scientific mAR apps and how can mAR applications be improved to be easier to use in the classroom/education? Please justify and describe your answer
- What are the main obstacles and problems to using mAR in teaching? Please justify and describe your answer

Full research paper

PRECONCEPTIONS OF HAPPINESS AND SATISFACTION: THE PERSPECTIVE OF CHILDREN FROM CZECH PRIMARY SCHOOLS

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ABSTRACT

The aim of this research was to determine what children aged 10–15 associate with happiness/satisfaction as well as to analyse which factors are related to their feelings of happiness and their evaluation of life satisfaction. A total of 954 children attending Czech primary schools from various socio-cultural backgrounds were surveyed using the incomplete sentence method. The levels of both their happiness and satisfaction were measured using the Subjective Happiness Scale and Students' Life Satisfaction Scale. The results indicate that the children considered themselves relatively happy and satisfied, and they understood happiness/satisfaction in terms of the concept of eudaimonia (personal growth, achievement of school goals, etc.). Happiness/satisfaction were indicated at a significantly lower level if the children did not feel accepted by their caregivers, described themselves as 'melancholic', were raised in a single-parent family, or spent their childhood in institutional care. Further, as the children grew older, their happiness/satisfaction levels declined. Neither gender nor spirituality were found to predict happiness/satisfaction.

KEYWORDS

Children preconception, Czech Republic, happiness, life satisfaction, quantitative research

HOW TO CITE

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Highlights

- *The study features empirical data to explore an issue much neglected in research in the Czech Republic: the preconceptions of children aged 10–15 years regarding the happiness/satisfaction.*
- *Level of happiness/satisfaction is analysed through psychometrically validated scales which have not been used previously in Czech educational research.*
- *This study shows that psychosocial factors contribute significantly more to happiness/satisfaction than do sociodemographic factors.*
- *Children from a socio-culturally disadvantaged environment, e.g., youngsters who have spent their childhood in children's homes or other public or private institutions show a lower level of happiness/satisfaction.*

INTRODUCTION

It is widely accepted that based on their life experiences children develop intuitive ideas, lay theories, and conceptions regarding the world around them (Kyriakopoulou and Vosniadou, 2020). In school practice and in the research context, these ideas, theories, and conceptions are generally referred to as 'preconceptions' (Pivarč, 2017) through which children interpret and decode the reality of the external world. Preconceptions influence the child's behaviour, emotional experiences, as well as how the processes of teaching and learning are perceived. In any analysis, preconceptions must always be related to phenomena such as specific acts, subjects, concepts, processes, and natural laws. In terms of structural characteristics, a preconception is shaped by a *cognitive dimension* that reflects views and rational evaluations relating to a particular phenomenon; by an *affective dimension* that expresses an individual's emotional experiences and feelings towards the phenomenon; and a *structural dimension* representing thought associations with concepts (including relations among concepts) that represent the phenomenon in the individual's mind.

Since the 1960s, the conceptualisations of children regarding these phenomena have been a prominent subject of research interest, with many investigations undertaken in various fields of science and technology (Vosniadou, 2013). The number of studies involving research on preconceptions in the social sciences and humanities has also increased (Pivarč, 2017), with notable examples including examinations of children's

preconceptions of economic, political and legal phenomena (Barrett and Buchanan-Barrow, 2005) as well as analyses of children's conceptions regarding social pathologies (Xu et al., 2012), religious concepts (Aylward and Freathy, 2008), and intellectual disability (Pivarč, 2019).

Research interest in the constructs of happiness and life satisfaction has grown markedly since the 1980s (Stavrova, 2019). This interest has been motivated, *inter alia*, by a growing recognition that subjective experiences of happiness and satisfaction influence many areas of human life. It is often pointed out that the focus of research on happiness and satisfaction has been hitherto unbalanced, since studies in the adult population are much more prevalent than those focusing on children (Jiang et al., 2021).

The subject of child happiness and satisfaction – including studies on the well-being of primary school children – has received significant attention in international surveys (e.g., OECD, 2019[1]) and research (Delgado et al., 2020). In contrast, marginal attention has been devoted to this issue in the Czech context; for children aged 10–15, neither the factors influencing their happiness and satisfaction, nor what they associate these constructs with has thus far been explored in detail. The purpose of this study, therefore, is to analyse these issues using primary empirical data obtained from Czech primary school pupils. By comparing the findings of the present study to results found in Europe and other environments, increased awareness may be raised both domestically and internationally of this vital but relatively neglected issue.

The phenomenon of happiness and satisfaction: definitions and foundations

The terms *happiness* and *satisfaction* tend to be used inconsistently, vaguely, and sometimes interchangeably within the literature (Forgeard et al., 2011). Although many different theoretical approaches and terminological nuances have been explored, a general consensus has emerged that these concepts should be viewed through a paradigm that emphasises the subjectivity of evaluation (Diener, Lucas and Oishi, 2002). According to Ed Diener, who earned the nickname "Dr Happiness" due to the extensive time and effort he devoted to conceptualising constructs such as life satisfaction, the concept should be understood primarily as the individual's rational assessment of her/his own life (Diener et al., 1999). Satisfaction has been described as the conscious evaluation of the extent to which the current state of an individual's life approaches an ideal state according to criteria set by the individual (Bieda et al., 2019; Jiang et al., 2021). On the other hand, happiness reflects affective experiences or positive emotional states (Lyubomirsky, King and Diener, 2005) wherein positive emotions have dominance over negative ones. A distinction is often made in research between what has been called the hedonic paradigm of well-being associated with Epicurean philosophy and Aristotle's concept of eudaimonia. The hedonic paradigm is understood as achieving emotionally experienced pleasure, joy or euphoria by the maximisation of pleasant experiences through sensory experiences and pleasure, thus it is episodic in nature. By contrast, the eudaimonic paradigm is based on the view that true happiness and satisfaction relate to a long-term paradigm of the overall meaningfulness of human existence, self-actualisation, personal growth, self-realisation, and living in virtue.

In this study, we proceed from the theoretical standpoints described above, i.e., we understand happiness as a state in which the experienced positive emotions dominate over the negative ones (affective dimension of preconceptions). Similarly, life satisfaction is defined as a rational assessment of one's own life (cognitive dimension of preconceptions), thus a person can be considered happy and satisfied if they indicate that they feel this way.

The psychosocial correlates of happiness and satisfaction in primary school children

Research on preconceptions of happiness and satisfaction in primary school children entails certain specificities which depend on the different stages of psyche ontogenesis as well as on individual peculiarities in the subject's cognitive and emotional development. Another specificity is that, while children may be more affected by some social factors than adults, they have less opportunity to influence the social environment, including the living conditions affecting them (e.g., material and economic conditions of the family, family background, social status of the family, social relations etc.) (Schütz et al., 2014). They also have less opportunity to make decisions about themselves and compared to adults they may not have a sufficiently developed range of strategies to overcome potential life difficulties. In addition, in terms of psychosocial development, adolescence represents a dynamic, sensitive and vulnerable period. It is therefore particularly important to devote attention (psychological, pedopsychiatric, pedagogical as well as research) to mental health. Besides caring for the overall subjective well-being of children, concerns include the early identification of difficulties that may result in the development of more serious problems which would later require care in the stages of adolescence and adulthood. As research shows (see below), the conditions that surround and influence children clearly impact how they assess their own happiness and life satisfaction as well as what they associate with these affective states.

A number of studies have shown that low levels of perceived happiness at school age have a significant effect on personality development and can affect intelligence, creativity, and school performance (Badri et al., 2018). Similarly, Izzaty (2018) highlights a link between experiencing unhappiness and emotional problems which have a negative impact on cognitive development, learning problems associated with low concentration, low memory capacity, along with behavioural problems that increase the likelihood of delinquency and criminality in adulthood. Other authors point to a negative correlation between a child's life satisfaction and problems such as depression, stress, interpersonal rejection, aggressive behaviour, substance abuse, and/or risky sexual behaviour (Siyez and Kaya, 2008; Proctor, Linley and Maltby, 2010;

1 Programme for International Student Assessment. In this survey, 65% of children from Czech schools reported being satisfied with their lives (OECD average 67%) (PISA, 2019).

Shek and Liu, 2014; Tian, Zhang and Huebner, 2015). On the contrary, a higher level of perceived satisfaction during school age acts as a 'buffer' against the negative effects of stress and the development of mental disorders. Further, high levels of satisfaction are also associated with better learning outcomes, more fulfilling interpersonal relationships (with peers, parents, and teachers), greater self-acceptance, a more positive self-image as well as higher indicated levels of self-efficacy, hope and positive attitudes towards school (Tian, Zhang and Huebner, 2015). In many developed countries, children's happiness and satisfaction are key considerations reflected in various strategies for education policies (OECD, 2011). In the Czech Republic, for example, in 2020 a program titled 'Strategy for Education Policy of the Czech Republic 2030+' was initiated. This strategy identifies the well-being of primary school children as an important part of their psychosocial development (Strategy 2030+, 2020).

Several significant general conclusions have been determined so far from research findings in the Czech environment as well as internationally. One drawback is that most of the implemented studies, especially in the Czech context, have mostly focused on only one structural characteristic of preconceptions (e.g., on research into children's life satisfaction, Slezáčková et al., 2015). Surprisingly little attention has been devoted to a multidimensional perspective which would reflect both the cognitive dimension and the affective and structural dimension. In addition, studies have highlighted a range of inconsistent results or even conflicting findings in relation to the role of individual psychosocial correlates of children's happiness and satisfaction. A number of analyses of correlates of happiness/satisfaction in primary school children have shown that sociodemographic characteristics (such as gender and age) play a far less role than a child's individual characteristics (with temperament, spirituality, and quality of social relationships with adults and peers among the more significant) (Diener et al., 1999; Leto, Petrenko and Slobodskaya, 2019).

Based on a meta-analysis of research, Proctor, Linley and Maltby (2009) found that children/adolescents differ only slightly in their levels of happiness and satisfaction with respect to gender and age, with girls showed a marginally lower level of happiness and satisfaction during the onset of adolescence. By contrast, a study conducted in the Czech Republic by Slezáčková et al. (2015) showed that boys aged 8–14 were less happy than girls of the same age, and the boys' levels of satisfaction did not change much with age. In research focused on analysing the structural dimension of preconceptions of happiness, it was found that children aged 9–13 associated happiness primarily in terms of hedonistic concepts, in particular joy, pleasure, fun, and laughter. For older children (aged 14–16), the conceptualisation of happiness was expressed in terms of a eudaimonic perspective, as their ideas were more oriented towards achieving personal goals (e.g., better grades at school, other achievements) (López-Pérez, Sánchez and Gummerum, 2016).

Important correlates of happiness and satisfaction include personality traits and spirituality. It has been found that higher levels of happiness and satisfaction in children correlate positively with extraversion and negatively with neuroticism (Holder and Klassen, 2010). Proctor et al. (2009) claim that everyone has a predisposed level of subjective well-being. While adolescents may not yet have a fully developed personality, temperament may reflect origins of personality traits. By determining the relationship between temperament and subjective well-being in adolescence, it is possible to better understand how personality traits can help explain individual differences in the degree of happiness and satisfaction experienced. One important aspect of personality development during adolescence is represented by spirituality, which relates to an internal belief system the individual relies on to provides strength and comfort. Based on this characterization, spirituality is also seen during this period as a significant protective factor against emotional problems such as depression and anxiety which negatively affect well-being. Although in relation to personality factors numerous studies have shown a significant relationship between spirituality and the subjective well-being of adults, less research has been devoted to this issue in children/adolescents. As Holder, Coleman and Wallace (2010) point out, higher levels of spirituality have also been found to engender higher levels of happiness. Nevertheless, this research and many other similarly focused studies have been conducted on samples of respondents in countries with a strong Christian tradition and in countries with a higher degree of religiosity. This relationship is insufficiently mapped in countries where there is a high proportion of people who indicate a lower level of religious beliefs and practices such as the Czech Republic.

In the period of adolescence, life satisfaction and the happiness of children/youth cannot be separated from the influence of contextual factors and life events. For example, some studies have shown that weak or dysfunctional family ties and the separation or divorce of parents have a negative impact on children's happiness and satisfaction (Bjarnason et al., 2012; Shek and Liu, 2014). Institutional care and education are also negative influential factors, for instance affecting children who are placed in facilities such as children's homes, shelters, corrective institutes, diagnostic institutes, and psychiatric facilities[2]. Compared to other European countries, the Czech Republic has one of the highest numbers of children/adolescents placed in institutional care (Committee on the Rights of the Child, 2003; OECD, 2011). An average of 6,700 children/adolescents have been placed in such facilities every year in the past decade, with the highest percentage (76%) associated with children's homes with or without a school[3]. The number of children/adolescents in children's shelters is also high; in 2019, almost one third of all shelter home clients were under the age of 18 (approximately 2,200 children/adolescents) (Nešporová et al., 2019). Some studies (Schütz et al., 2014; Delgado et al., 2020) have shown that these children are less happy and satisfied compared to children from birth, foster or

2 Institutional care for children and adolescents in the Czech Republic consists of a wide range of facilities varying by, *inter alia,* age, user circumstances, duration of stay, or the on-site presence of educational and medical services. Examples of such institutions are youth homes, shelter homes, children's homes, children's homes with a school, diagnostic institutes, and corrective institutes.

3 Source data for our calculations were obtained from the publicly accessible database of Statistical yearbook of education from the Ministry of Education, Youth and Sports (2022).

other complete families. These children are also more likely to fail at school or engage in risky behaviours (e.g., truancy, absconding, substance abuse, and risky sexual behaviour). They have also been found to feel less loved, less socially supported by the adults around them (especially carers) and less secure (Lausten and Frederiksen, 2016); these children also indicated having less choice about their leisure time as well as less stable lives (Dinisman, Montserrat and Casas, 2012). It is clear that the child's feeling of acceptance from the carer as well as an overall sense of security are important needs during this life cycle, including stimulus from the environment in which adolescents experience their maturation. All of these factors have also been linked to how children experience happiness and how they value satisfaction with their lives.

RESEARCH GOALS AND RESEARCH QUESTIONS

Following from the above discussion and the current state of literature, the present research is guided by the following aims: (1) to analyse the structural, affective, and cognitive dimensions of preconceptions, i.e. to determine what children from Czech primary schools aged 10–15 associate happiness/satisfaction with, and to ascertain their levels of happiness/satisfaction; and (2) to examine selected factors (see below) and analyse whether they affect children's experiences of happiness/satisfaction.

Research studies conducted in the Czech Republic provide insufficient knowledge of the factors affecting children's happiness/satisfaction. Using primary empirical data, this study will therefore explore and analyse the characteristics and psychosocial factors that have been identified as significant in international literature (see an overview above).

The aim will be to answer the following research question: *How do the happiness/satisfaction levels of children (aged 10–15) from Czech primary schools differ based on*: (i) gender and age; (ii) the environment in which they have spent their childhood (at home in a complete family, at home in a single-parent family, or in institutional care settings) (referred to henceforth as 'childhood environment'); (iii) subjective assessment of the security and stimulation of their childhood environment (safe, unsafe, stimulating, non-stimulating); (iv) subjective assessment of the feeling of acceptance by their caregiver (feels accepted or does not feel accepted by the parent, foster parent, social worker, educator in an institution, etc.); (v) subjective assessment of spirituality (considers himself/herself a spiritual person or does not consider him/herself a spiritual person); (vi) subjective assessment of one's own personality typology (sanguine, choleric, phlegmatic and melancholic); and (vii) whether they associate happiness/satisfaction with the concept of hedonism or eudaimonia.

MATERIALS AND METHODS

Research sample, data collection and research ethics

The research was conducted in the Czech Republic on 954 primary school children at the beginning of 2020 in the period before schools were closed as a measure against the SARS-CoV-2 pandemic. The age of the surveyed children ranged from 10 to 15 years (M = 13.26, SD = 1.49). Girls (n = 573, 60.1%) were represented more than boys in the research study. Non-probability sampling was used, specifically, a selection of children was available (as this research sample is not representative, the validity of the study findings cannot be applied to the entire child population; the research findings, however, may be viewed as detailing certain indicators that predict happiness/satisfaction of pupils from Czech primary schools). The sample was compiled in cooperation with primary schools and several other forms of institutional care centres (e.g., children's homes, shelters, corrective institutes, diagnostic institutes, and psychiatric facilities). All of these institutions were contacted and requested to participate in the research through e-mail contacts listed in the publicly available Directory of Educational Institutions of the Ministry of Education, Youth and Sports of the Czech Republic and in the Register of Social Service Providers in the Czech Republic. The institutions that expressed a willingness to participate in the research were selected. Data collection was carried out online with the informed consent of the headmaster, the head of the institution (or another person of appropriate competence), or the child's legal guardian. The administration of the questionnaires was provided by trained persons of the institution. In accordance with the Code of Ethics of Czech Educational Research Association and the guidelines specified in the American Psychological Association Manual (2009), the children were thoroughly acquainted with the research objectives and all the essential aspects associated with participation in the study (i.e., anonymity, voluntary participation, possibility of withdrawing from the research at any time). The study research plan was also evaluated and approved by the Ethics Committee of the Faculty of Education of the J. E. Purkyně University in Ústí nad Labem (proceedings number pf_ujep_11/2022/02).

Research tools and processing/analysis of obtained data

The research instrument used in this study was a questionnaire with several parts. The first part introduced the objectives of the research and provided instructions for completion. The next part employed two scales, the Subjective Happiness Scale (SHS) (Lyubomirsky and Lepper, 1999) and the Students' Life Satisfaction Scale (SLSS) (Huebner, 1991). The SHS was used in order to collect data on the affective dimension of preconceptions; this instrument consists of four items measured on a 7-point scale to determine the overall level of happiness. The total score indicated the level of happiness, with higher values indicating a higher level of happiness. The SLSS measures the cognitive dimension of preconceptions, and in our case was used to collect data on the subjective assessment of children's overall (global) life satisfaction. The SLSS contained seven statements, for which the children were able to express their level of (dis) agreement on a 6-point scale, with higher scores indicating higher life satisfaction.

As some other studies have noted, both scales are suitable for use with children aged 8 to 18 years, have satisfactory psychometric properties, and represent a unidimensional

construct in terms of factor structure (Holder, Coleman and Wallace, 2010; Extremera and Fernández-Berrocal, 2014; Jiang and Huebner, 2017; Dai and Chu, 2018; Leto, Petrenko and Slobodskaya, 2019). The individual items/questions from SHS and SLSS which were used in this research were translated by the author of this work from the English language into Czech. Subsequently, a back translation into English was performed in order to assess the conformity of the translation with the original version. Next, validation and adaptation of SHS and SLSS in the Czech environment were performed, with the psychometric properties of these scales verified (the results of the psychometric analysis of the SHS and SLSS in Czech primary school pupils are described in the Results section – see below).

To analyse the structural dimension of preconceptions, the incomplete sentence method was used in the questionnaire. This is a non-standardized method, the purpose of which is to identify concepts that come to the subject's mind in relation to happiness/satisfaction. The pupils commented on only one formulated unfinished sentence, namely '*When you say happiness/satisfaction, I think of…*'. The children's task was to name one key term that they would associate with happiness/satisfaction. As in another thematically-related study (López-Pérez, Sánchez and Gummerum, 2016), the chosen technique appeared to be suitable for subsequent comparison, categorical classification, and the statistical processing of associated terms. The last section of the questionnaire examined the children's sociodemographic characteristics along with living conditions and circumstances.

The obtained data was analysed using the SPSS program ver. 26 and SPSS AMOS ver. 23. In analyses, linear regression (Enter method) was applied as the main procedure. This regression was used to determine the effect of observed sociodemographic characteristics and psychosocial factors on the dependent variable. The summary raw score for both scales (SHS/SLSS) was calculated based on the arithmetic mean of the items (a higher value indicates a higher level of experienced happiness/satisfaction) and represents the dependent variable in the regression analysis. For the data obtained through the incomplete sentence method, a qualitative content analysis of the terms chosen by the children was performed. In the first phase of open coding, the terms were classified into a total of seven categories, i.e. happiness/satisfaction was conceptualised in terms of: '*interpersonal aspects of life*' (e.g. friendship, family, relationships with people); '*material well-being*' (e.g. money, home, computer); '*pleasure and leisure*' (e.g. joy, fun, sport); '*value of health*' (e.g. health, absence of disease); '*need for personal development*' (e.g. school, study, recognition, learning, autonomy, good performance); '*life harmony*' (e.g. peace, love, freedom, tranquillity); and '*does not know/did not answer*'. In the second phase of coding, the concepts were classified into categories that reflected the '*hedonic*' (e.g., money, entertainment) or '*eudaimonic paradigm*' (good performance, health, peace, recognition). The reliability of the coding into the above categories was estimated using Cohen's Kappa coefficient. The values obtained indicated a moderately strong, and therefore acceptable, degree of agreement in the coding of terms between the author of this work and an independent evaluator ($\varkappa = 0.43$; $p < 0.001$) (Landis and Koch, 1977). An analysis of the frequency of associated terms in these categories was performed and a dummy variable (hedonic vs. eudaimonic paradigm) was created which served in the linear regression analysis as an explanatory predictor of the children's happiness/satisfaction.

RESULTS

Validity and reliability of the Czech versions of the SHS and SLSS scales

The construct validity, including the factor structure of the SHS and SLSS questionnaires, was verified using confirmatory (CFA) factor analyses. For the 4-item SHS scale, the results of the CFA performed on a sample of 954 children (aged 10–15) from Czech primary schools showed that the assumed one-factor model adequately corresponds to the data. The chi-square test value (χ^2 (2.543) = 2, p = 0.280) served as an absolute indicator of the fit. Other relevant indices of the model's conformity with the data [(specifically the Root Mean Square Error of Approximation (RMSEA); Standardized Root Mean Square Residual (SRMR); Comparative Fit Index (CFI); and Tucker-Lewis Index (TLI)] also provided satisfactory results (RMSEA = 0.017 with 90% CI: 0.000, 0.069; SRMR = 0.016; CFI = 0.999; TLI = 0.998). The standardised factor loadings of the four SHS items within the factor were sufficiently high (with values ranging from 0.83 to 0.49).

The CFA results also confirmed the unidimensional structure of the 7-item SLSS scale and the overall good conformity of the model with the data. The chi-square test (χ^2 (25.667) = 14, $p < 0.05$) indicated that the model represented the data rather unsatisfactorily (the significant difference found between the observed covariance matrix and the covariance matrix implied by the model may be due to the sample size). However, the RMSEA values = 0.030 with 90% CI: 0.009, 0.047; SRMR = 0.032; CFI = 0.996; TLI = 0.994 were acceptable. In addition, the standardised factor loadings for the seven SLSS items within the factor were sufficiently high, ranging from 0.86 to 0.45.

With regards to reliability, the Cronbach's alpha (α) and McDonald's omega (ω) coefficients were used to estimate the internal consistency of the SHS and SLSS. The SHS can be considered reliable, as the coefficients had acceptable values (α = 0.775, 95% CI [0.750, 0.798]; ω = 0.777, 95% CI [0.755, 0.800]). The coefficients for the SLSS were also acceptably high, thus this instrument can also be considered reliable (α = 0.853, 95% CI [0.838, 0.866]; ω = 0.854, 95% CI [0.840, 0.868]). Verification of test-retest reliability was performed on a sample of 180 children from Czech primary schools one month after the initial administration of the questionnaires (SHS, r = 0.615, $p < 0.001$; SLSS, r = 0.594, $p < 0.001$). Both tools met the basic requirements for stability over time.

Following the model of the original SHS and SLSS instruments, it turned out that both tested Czech versions showed a unidimensional factor structure and high reliability. The Czech versions of the tools also contain an identical number of questionnaire items with an identical answer format.

Conceptualisations of happiness/satisfaction

Based on the incomplete sentence method, the structural dimension of preconceptions was identified, i.e., the concepts that children most often associated with happiness/satisfaction were ascertained (see Table 1).

The analysis showed that almost 27% of children from Czech primary schools did not indicate any term to describe what they associate with happiness/satisfaction. By contrast, about a fifth of the children associated happiness/satisfaction with the interpersonal aspects of life, i.e., with concepts that are in some way related to friendship, family, its individual members, relationships, society, etc. An interesting finding is that children associated happiness/satisfaction with the need for personal development rather than with material well-being or pleasure and leisure activities (e.g., travel, sports, etc.). Overall, about a tenth of all of the children, and therefore only a small portion, perceived happiness/satisfaction in terms of the harmony of life or the value of health.

A total of 697 terms from the above categories (with the exception of the 'does not know/did not answer' category) were submitted for the second-order analysis, which aimed to determine whether children view happiness/satisfaction in terms of eudaimonia or hedonism. This analysis showed that children associated happiness/satisfaction with the eudaimonial paradigm (n = 477, 68.4%) rather than with the hedonic one (n = 220, 31.6%).

Category	Absolute frequency of terms	Relative frequency of terms (in %)
Does not know/did not answer	257	26.9
The interpersonal aspects of life	194	20.3
The need for personal development	167	17.5
Pleasure and leisure	123	12.9
Material well-being	97	10.2
Life harmony	89	9.3
The value of health	27	2.8
In total	**954**	**100.00**

Table 1: Representation of associated terms in individual categories, 2022 (source: own calculation)

The levels of happiness and satisfaction

The values of the average score (M) given in Table 2 express the level of happiness (measured by the SHS) and the overall life satisfaction of the children (SLSS). The table 2 shows that the children from Czech primary schools described themselves as relatively happy and also assessed their own life satisfaction positively. Correlation analysis also showed a significant and positive link between the degree of happiness and the overall satisfaction rating ($r = 0.718$, $p < 0.001$, $N = 954$). The results of the research further show that the highest levels of happiness and satisfaction were declared generally by the boys as well as by those who spent their childhood at home in a complete family (i.e., with both mother and father), considered their environment safe and stimulating, and felt accepted by their caregivers. Regarding the subjective assessment of spirituality, it was found that those who considered themselves to be spiritual declared only a slightly higher level of happiness than those who did not. Table 2 also shows that children who described themselves as cheerful (labelling themselves as 'sanguine') achieved the highest average scores on both the SHS and SLSS. Also, children who associated happiness/satisfaction with concepts reflecting the hedonic paradigm showed higher values of the average score on the SHS/SLSS than those who associated happiness with the eudaimonic paradigm.

Exploration of the effect of sociodemographic characteristics and psychosocial factors on happiness/satisfaction

For the following analytical purposes, a strong correlation between happiness and satisfaction is considered. Therefore, one complex model (happiness/satisfaction) was analysed instead of two separate regression analyses for happiness and satisfaction. Tables 3 show the result of the regression analysis obtained by the standard Enter method. In accordance with the objectives of this research (see previous sections), the primary purpose of the analysis was to identify and describe how much of the variance of the dependent variable can be explained by predictors, or the influence that individual independent variables have on level of happiness/satisfaction. For a more accurate estimation of the predictive power (effect) of individual independent variables included in the model on the dependent variable, standardised regression coefficients (β) and values of squared structure coefficients (r_s^2)[4] have been interpreted (Courville and Thompson, 2001; Yeatts et al., 2017). Before performing the calculations, diagnostics of collinearity and outliers which might disrupt the parameter estimates were performed. The parameters of the Cook distance did not indicate outliers, which ranged from 0.000–0.043 for SHS/SLSS model. Regression model was not affected by multicollinearity, as shown by tolerance values of no less than 0.1 and a variance inflation factor (VIF) that ranged from 1.021 to 1.322.

4 The standardised beta coefficients (β) indicate the extent to which a particular predictor accepts 'credit' for the prediction of a dependent variable given that the effect of other predictors in the regression model is controlled. Structure coefficients (r_s) provide information on the predictive utility of predictors. The structure coefficients show how the predictor is related to the so-called Yhat ($\hat{Y}$) score independently of other predictors. The $\hat{Y}$ score then represents the predicted estimate of the resultant variable based on the synthesis of all predictors in the regression equation. Finally, the squared structure coefficient (r_s^2) shows how much variance the $\hat{Y}$ predictor itself can explain, that is how much deviation of the effect of R^2 it can explain.

		Happiness– SHS (scale 1–7)	Satisfaction – SLSS (scale 1–6)
	N (%)	*M* (*SD*)	*M* (*SD*)
Respondents	954 (100.0)	4.70 (1.30)	4.40 (1.04)
Male	381 (39.9)	4.85 (1.22)	4.45 (1.04)
Female	573 (60.1)	4.60 (1.34)	4.37 (1.04)
Environment in which children spent their childhood			
At home in a complete family	670 (70.2)	4.88 (1.24)	4.57 (0.94)
At home in a single-parent family	181 (19.0)	4.26 (1.41)	4.12 (1.08)
In institutional care	103 (10.8)	4.29 (1.25)	3.79 (1.26)
Subjective assessment of the feeling of security in the environment in which children spent their childhood			
Safe	815 (85.4)	4.77 (1.27)	4.50 (0.98)
Unsafe	73 (7.7)	4.08 (1.42)	3.63 (1.29)
Does not know	66 (6.9)	4.48 (1.39)	4.08 (1.05)
Subjective assessment of the stimulating nature of the environment in which children spent their childhood			
Stimulating	491 (51.5)	4.84 (1.25)	4.51 (1.01)
Non-stimulating	110 (11.5)	4.28 (1.30)	3.88 (1.23)
Does not know	353 (37.0)	4.63 (1.34)	4.42 (0.97)
Subjective evaluation of the feeling of acceptance by the caregiver			
Feels accepted	855 (89.6)	4.82 (1.24)	4.53 (0.95)
Does not feel accepted	56 (5.9)	3.39 (1.15)	2.92 (1.16)
Does not know	43 (4.5)	3.91 (1.40)	3.82 (0.96)
Subjective assessment of spirituality			
Considers him/herself spiritual	396 (41.5)	4.71 (1.32)	4.37 (1.04)
Does not consider him/herself spiritual	473 (49.6)	4.70 (1.30)	4.41 (1.06)
Does not know	85 (8.9)	4.64 (1.20)	4.52 (0.92)
Subjective assessment of the typology of one's own personality			
Sanguine	355 (37.2)	5.30 (1.09)	4.72 (0.84)
Choleric	178 (18.7)	4.36 (1.17)	4.25 (1.07)
Phlegmatic	148 (15.5)	4.91 (1.12)	4.58 (0.90)
Melancholic	273 (28.6)	4.02 (1.34)	3.99 (1.16)
Conception of happiness/satisfaction			
Hedonism	220 (31.6)	4.61 (1.26)	4.29 (1.10)
Eudaimonia	477 (68.4)	4.46 (1.29)	4.21 (1.01)

Table 2: Measurement values on the Subjective Happiness Scale (SHS) and Students' Life Satisfaction Scale (SLSS), 2022 (source: own calculation)

Taken together, the predictors in the regression model (Table 3) explained more than 30% of the variance of the dependent variable ($R^2 = 0.320$, $F = 20.022$, $p < 0.001$). The substantive significance of the model was assessed using the Cohen index f^2, the value (0.47) of which indicates that the effect size was large (Cohen, 1988). Other calculations show that age, childhood environment, the feeling of acceptance by the caregiver, and the respondents' subjective assessment of their own personality typology had substantively significant effects on the level of happiness/satisfaction. The children who described themselves as 'melancholic' also declared significantly lower levels of happiness/satisfaction than other children. This predictor had the most significant effect in the regression model ($\beta = -0.334$, $p < 0.001$; ^{2} 0.292). If the children did not feel accepted by their caregiver, this had a clearly negative effect on their level of happiness/satisfaction ($\beta = -0.249$, $p < 0.001$; $r_s^2 = 0.354$). These two predictors were the most powerful. An evaluation of the effect of other variables in the model showed that the level of happiness/satisfaction is lower for older children ($\beta = -0.126$, $p < 0.001$). Compared to the children from complete families, the children who spent their childhood at home in a single-parent family ($\beta = -0.158$, $p < 0.001$) or in institutional care ($\beta = -0.158$, $p < 0.001$) showed substantively far lower level of happiness/satisfaction. The regression model also shows that the following factors did not have substantively significant effects on the level of the children's happiness/satisfaction: gender, the children's subjective evaluation of the safety and stimulation of environment, subjective evaluation of their own spirituality, and whether they associated happiness/satisfaction with the eudaimonic or hedonic paradigm.

Predictors	B	SE	β	r_s	r^2_s
Constant	6.368	(0.309)***			
Gender (ref. male)	0.006	(0.070)	0.003	-0.120	0.014
Age	-0.089	(0.023)***	-0.126	-0.328	0.108
Environment in which children spent their childhood (ref. at home in a complete family)					
At home in a single-parent family	-0.424	(0.087)***	-0.158	-0.275	0.076
In institutional care	-0.535	(0.113)***	-0.158	-0.316	0.100
Subjective assessment of the feeling of security in the environment in which children spent their childhood (ref. safe)					
Unsafe	-0.248	(0.136)	-0.063	-0.347	0.120
Does not know	-0.250	(0.136)	-0.060	-0.131	0.017
Subjective assessment of the stimulating nature of the environment in which children spent their childhood (ref. stimulating)					
Non-stimulating	-0.186	(0.114)	-0.057	-0.294	0.087
Does not know	-0.035	(0.075)	-0.016	-0.022	0.000
Subjective evaluation of the feeling of acceptance by the caregiver (ref. feels accepted)					
Does not feel accepted	-1.114	(0.156)***	-0.249	-0.595	0.354
Does not know	-0.650	(0.162)***	-0.128	-0.240	0.057
Subjective assessment of spirituality (ref. considers him/herself spiritual)					
Does not consider him/herself spiritual	0.024	(0.071)	0.012	0.005	0.000
Does not know	0.067	(0.126)	0.018	0.027	0.001
Subjective assessment of the typology of one's own personality (ref. sanguine)					
Choleric	-0.453	(0.096)***	-0.168	-0.178	0.032
Phlegmatic	-0.167	(0.102)	-0.057	0.136	0.019
Melancholic	-0.778	(0.085)***	-0.334	-0.540	0.292
Eudaimonian paradigm (ref. hedonic)	-0.101	(0.073)	-0.044	-0.080	0.006

*Note: *p < 0.05; **p < 0.01; ***p < 0.001. R2 = 0.320.*

Table 3: Variables predicting the degree of children's happiness/satisfaction (SHS/SLSS scale), 2022 (source: own calculation)

DISCUSSION

In this research study, the preconceptions of children regarding their own happiness and satisfaction were investigated. These preconceptions were analysed as multidimensional entities consisting of cognitive, affective, and structural dimensions, i.e., with this research we sought to determine what children aged 10–15 years associate happiness/satisfaction with, and which sociodemographic characteristics and psychosocial factors are related to their experiences of happiness and overall satisfaction. The research was conducted with 954 Czech primary school children using the incomplete sentence method and the Subjective Happiness Scale (Lyubomirsky and Lepper, 1999) and the Students' Life Satisfaction Scale (Huebner, 1991). As in other studies (Leto, Petrenko and Slobodskaya, 2019), both scales used in this study showed strong psychometric properties, and both met the conditions for use in the Czech cultural context and for the given age group in terms of adaptation and validation.

The theme of the preconceptions of pupils regarding their own happiness and satisfaction has been relatively neglected in the Czech research context. In addition, in the Czech educational context there is currently no targeted strategy or systemic support directed at strengthening and supporting the subjective well-being and mental health of pupils or teachers. We can contrast this with the situation in Ireland, for example, where this issue is a key educational priority. In Ireland, the "Well-being Policy Statement and Framework for Practice" has been adopted, a document which offers schools and educational institutions recommendations based on international research findings and practice in the area of support and evaluation of subjective well-being. As evidenced by a number of studies in various regions, the experience of happiness and overall satisfaction of children is a key predictor of their mental health, especially in the adolescent period. From the point of view of psychosocial development, adolescence is a dynamic, sensitive and vulnerable period. It is therefore particularly important to devote attention to the mental health of children in terms of psychological, pedopsychiatric, pedagogical as well as research work. This should include research on the early identification of difficulties that may lead to the development of more serious problems in later adulthood, as well as personality, social, contextual and other factors which affect the well-being of children.

The results of the present research show that almost one third of the children could not (or did not wish to) specify what they associate happiness/satisfaction with. For some children, this topic may have been too sensitive (the research was conducted on a sample that included children who are in institutional care); this may have been a factor influencing the children who

chose not to answer. It is also possible that the construct of happiness/satisfaction may be too abstract for these children, i.e., some children may not have been able to properly conceptualise the topic or to express in one word what they associate happiness/satisfaction with. An interesting finding of this research is that those who seemed able to conceptually grasp these constructs associated happiness/satisfaction mainly with interpersonal aspects of life and the need for personal development (e.g., in terms of success in school) rather than with material well-being or pleasure and leisure activities (travel, sports, etc.). The phenomenon of happiness/satisfaction was therefore viewed by the children mainly in accordance with the eudaimonial paradigm rather than the hedonic one. These findings echo those of López-Pérez, Sánchez and Gummerum (2016), who also found that Spanish adolescents aged 14–16 associated happiness mainly with the need for personal goals (to prove something or be someone).

Regardless of the effect of the analysed factors, the child respondents from Czech primary schools described themselves as relatively happy and satisfied. In terms of sociodemographic characteristics such as gender and age, the boys and girls did not differ significantly in their levels of happiness and satisfaction. Although some research studies on the adult population have found a minimal influence of age on life satisfaction and happiness (Diener, Lucas and Oishi, 2002), the situation appears to less equivocal for children/adolescents. The findings of our research are also in line with other research documenting that as children age, their happiness/satisfaction level tend to decline (Proctor, Linley and Maltby, 2009; Shek and Liu, 2014). Lower level of happiness/satisfaction with increasing age may be caused by societal pressure as well as by individual psychological factors and developmental specifics typical for the period of older school age. In terms of cognitive development, abstract thinking begins to develop at about age 11, with this development later accompanied by a number of changes characteristic to biological and sexual adolescence which are linked, for example, to hormonal changes. These changes can lead to emotional instability, and thus to lower levels of happiness and satisfaction. The period of older school age and adolescence is also significantly associated with hope, aspirations, and finding one's place in school and society, all of which are related to performance in school or at work as well as relationships with peers, often including comparisons with them. Level of happiness/satisfaction during this period also depend on how children/adolescents perceive, evaluate, and relate to themselves (self-image vs. ideal) (Povedano-Diaz, Muñiz-Rivas and Vera-Perea, 2020).

Our analyses of the empirical data showed that the most important predictors of the children's happiness/satisfaction, i.e., those which showed a more significant impact than did the measured sociodemographic characteristics (especially gender), include socialisation in the childhood environment, acceptance by their caregivers, and personality typology. By contrast, our research did not find a link between spirituality and the children's happiness/satisfaction. Further, no link was found between levels of happiness/satisfaction and whether the children consciously associated these constructs with the hedonic or eudaimonic paradigm.

Data from our research shows that children who have spent their childhood in a two-parent family were happier and more satisfied than children from single-parent families and those in institutional care. Socialisation in an environment that was assessed as unsafe and non-stimulating had a negative effect on the respondents' subjective assessment of happiness/satisfaction. The negative impact of a non-stimulating family environment and institutional care facilities on happiness/satisfaction as well as on the overall quality of life of children/adolescents has been demonstrated in a number of studies (Schütz et al., 2014; Leto, Petrenko and Slobodskaya, 2019; Delgado et al., 2020). Other research has also found that children/adolescents with this kind of socialisation experience are at a significantly higher risk of developing socially undesirable behaviour. For such individuals, the likelihood of receiving less social support from adult caregivers (including parents, educators, social workers in collective settings) is also higher, and they are more likely to be less well-placed in society. Among other applications, the results of our research can be useful for policy makers who make decisions regarding the implementation of actions to strengthen well-being strategies in education and to thus improve care for vulnerable groups of children. This is even more vital in countries such as the Czech Republic, where the policy of placing children at risk in institutional settings is still highly prevalent. As outlined in this study, the consequences of institutionalisation are associated with negative impacts on the well-being of these children.

In our study, the feeling of acceptance from the caregiver also showed a significant link to the subjective assessment of happiness/satisfaction, with the data showing that the children who did not feel accepted by their caregiver reported significantly lower levels of happiness/satisfaction. As Lausten and Frederiksen (2016) as well as Leto, Petrenko and Slobodskaya (2019) point out, family cohesion and family organisation – including the relationships among family members – are important factors related to subjective feelings of happiness/satisfaction. Among other effects, a positive relationship between the parent and child acts as a 'buffer' against the negative influences and stressful events that children face; positive relationships also help to promote in the child an overall positive perception of life (Shek and Liu, 2014). Establishing this kind of constructive relationship between a carer (e.g., educator or teacher) and a child in institutional care, however, is quite difficult. Research in this context has shown (Schütz et al., 2014) that a combination of factors, such as a weak feeling of acceptance by the caregiver as well as spending childhood in a non-stimulating environment, in an environment where conflicts are common and/or in institutional care can significantly increase the likelihood of emotional/social instability, stigmatisation and social exclusion.

The self-assessment of personality typology and the feeling of acceptance by the caregiver proved to be the two most important predictors of the happiness/satisfaction of the children in this research. Analyses showed that children who described themselves as having a 'cheerful personality [and] often laughing (sanguine)' were significantly happier/satisfied than children who categorised themselves as 'quick-tempered (choleric)', a 'calm person who does not often get

thrown off (phlegmatic)', or 'very thoughtful, rather reserved (melancholic)', with the 'melancholic' considering themselves the least happy and satisfied. The personality traits of melancholy are most associated with traits of neuroticism, while anxiety, clumsiness, sadness, anguish, depression or pessimistic behaviour, including lower adaptability, predominate in terms of emotional experience. The child's temperament may change during the periods of personality development, thus some of the traits which determine the emotionality of the personality may not yet be fully developed in the respondents of this research. Although from a psychological point of view it is necessary to view the development of personality in children/adolescents as a relatively variable construct, research in both the adult population and children shows that an individual's personality and happiness/satisfaction level are closely related. In the literature, views have been expressed intimating that satisfaction and happiness are determined primarily by predispositions (Keyes, Myers and Kendler, 2010), although other authors do not fully agree with this assessment and emphasise the effect of other factors. It appears that neuroticism is the major negative predictor of happiness/satisfaction and, conversely, extraversion is associated with a higher degree of happiness/satisfaction (Proctor, Linley and Maltby, 2010; Leto, Petrenko and Slobodskaya, 2019; Stavrova, 2019). Two theories may explain these associations. One theory is that extraverts are predisposed to experiencing more positive emotions, while neurotics are predisposed towards more negative emotions. The second purports that extraversion and neuroticism predispose individuals to experience certain situations that affect feelings of happiness. For example, extroverts may subconsciously seek out social situations that increase their feelings of happiness. Both theories have found support among particular groups of scientists (Holder and Klassen, 2010).

LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

Certain limitations of our research should be mentioned. First, it can be argued that the research sample used was not representative, and therefore the degree of generalisation of the research results is debatable and rather limited, i.e., the results are merely indicative in nature. The use of the self-assessment scales in the questionnaire could also be considered problematic. Young children may have a lower ability to appropriately and objectively assess their own spirituality or personality typology, a possibility which could have influenced the results of this research. In this respect, it would be more appropriate to use a standardised multi-item tool (e.g., Piers–Harris 2 Children's Self-Concept Scale, ver. 2), despite the fact that these instruments come with their own sets of limitations. In this study, we used an analytical strategy that takes into account the strong relationship between happiness and satisfaction. In this regard, future studies should use more specific research instruments that can more precisely measure the individual domains of life satisfaction and happiness in more detail (e.g., assessment of satisfaction in relationships, with family background, school, etc.), i.e., not instruments that focus more on a general (global) rating of happiness and satisfaction.

The research conducted in the present work has focused on the analysis of a relatively small number of psychosocial factors. Nevertheless, the results of the research have revealed some interesting conclusions that could well present a promising subject for further analysis. Future work could focus on analysing related and insufficiently researched factors that may have an impact on the happiness/satisfaction of children in institutional care (e.g., the effect of the size and location of institutional care facilities, the effect of social inclusion, or the length of client stay in such a facility). In addition, the relationship between the happiness of primary school children and their overall satisfaction with their social relationships (especially the relationship with parents, siblings, peers, teachers, or with other important persons for children/adolescents) has received scant attention in research. Similarly, insufficient attention has been devoted to the long-term effects of childhood circumstances on happiness/satisfaction in adulthood.

In addition, the unfavourable situation associated with social lockdowns and school closures due to the spread of the SARS-CoV-2 virus only underscores the urgency of dealing with the concept of happiness and well-being in children. Although pre-pandemic results are reported in this study, follow-up work may also use the SHS and SLSS scales to provide empirical evidence to determine, for example, the extent to which subjective levels of happiness/satisfaction in children in other circumstances differ in comparison with the results presented in this study.

In relation to the structural dimension of preconceptions of children from Czech primary schools, this research has attempted to point out what happiness/satisfaction is most often associated with. In this study, only one sentence prompt to be completed with information from the respondent was used to identify the structural dimension of the subject's preconceptions. A limitation of this method is that these results in the form of associated terms may not capture the ideas of pupils about happiness/satisfaction to a sufficiently robust degree, i.e., the concepts identified can provide only a rather rough depiction of what pupils associate happiness/satisfaction with. Although this method has been used relatively often in the research context, it should be supplemented with another set of sentences or possibly with other techniques. Nevertheless, our findings can be used in follow-up studies as well as to compare and contrast work in areas related (both directly and indirectly) to the variables and population examined here, for example, using different research/diagnostic techniques. Other sets of preconceptions of children could be analysed in greater detail, for instance, through the technique of free writing or through phenomenographic interviews. Future studies might also devote attention to a deeper comparison of the perceptions of children with regard to happiness/satisfaction to investigate differences in terms of the effects of various personal or social factors, and/or with regard to the specific contextual conditions that affect children. In this sense, follow-up research might focus in more detail on different age cohorts, on children from different socio-cultural backgrounds as well as on groups of children with disabilities or who are otherwise disadvantaged. Longitudinal research in particular could prove quite useful to fulfilling the goal of providing empirical data from a sample of the child population over a longer period of time.

Perhaps most importantly, the knowledge and insights created through this research as well as by studies on similar themes

connected to the preconceptions of happiness and satisfaction of children is beneficial not only theoretically, but practically in the context of the inclusive education of diverse groups of children. Not only does such background and contextual information greatly help teachers and other school actors to fulfil their roles more effectively, but experts in pedagogical and/or psychological diagnostics would benefit as well from the additional knowledge as they advance their methods.

CONCLUSION

The study described in this paper analysed the preconceptions about happiness/satisfaction among pupils in Czech primary schools in a multidimensional perspective. We sought to explore both the structural dimension of the children's preconceptions (ideas about happiness/satisfaction) as well as the affective (measurement of happiness experienced) and cognitive (self-assessment of satisfaction with life) dimension. The learners most often associated happiness/satisfaction with interpersonal aspects of life and with the need for personal growth. Almost one-third of the pupils, however, mentioned no specific concept through which they could specify their own ideas about happiness/satisfaction. Through the Czech version of the SHS and SLSS questionnaire, a relatively high level of experienced happiness/satisfaction was identified among the respondents. Happiness/satisfaction was lower in children who described themselves in the following ways: 'melancholic', unaccepted by the caregiver, coming from a single-parent family, and spending their childhood in an institutional setting. These four personality and contextual factors contributed very significantly to the prediction of happiness/satisfaction. In contrast, weak effects were found for gender as well as subjective ratings of spirituality, with these factors overall contributing only marginally to the prediction of happiness/satisfaction.

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Full research paper

SELF-COMPASSION AS A NEWLY OBSERVED DIMENSION OF THE STUDENT'S PERSONALITY

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ABSTRACT

The mindfulness-based methods are on the rise in the mental health care of students as well as employees. Therefore, the research on self-compassion is necessary to explore abilities and personality traits that are cultivated by the mindfulness approach. Our research deals with the assessment of the level of self-compassion by the students of the Faculty of Economics and Management at the Czech University of Life Sciences to precise the planned mindfulness-based intervention. Further, the gender and personality specifics as well as a connection to academic achievement are examined. For this purpose, the Self-compassion Scale, and the NEO-PI-R were used. The results proved insignificant correlations between the self-compassion subscales and self-reported grades, but also subtle differences in the structure of the self-compassion by males and females. Further, correlations between the neuroticism and the Self-compassion Scale and its subscales were revealed. Structural equation modeling was involved to gain more complex insight in the researched area.

KEYWORDS

Academic achievement, Big-5, mindfulness-based intervention, self-compassion, self-efficacy, university students

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Highlights

- *Self-compassion does not relate to the self-reported academic achievement.*
- *Females are more self-kind but also suffer from more feelings of isolation and over-identification with their emotions in comparison with males.*
- *The only Big 5 personality trait correlated with the Self-compassion Scale and its subscales was neuroticism.*

INTRODUCTION

The mental health of the population has been a research topic for decades. Also, it is one of the crucial conditions of efficient education (Cornaglia et al., 2015; Mahdavi et al., 2021). A student with considerable mental problems loses attention, general cognitive capacity, and – unfortunately – loses interest. Sadly, the recent pandemic situation brings general impairment of mental health issues, although it evokes some positive changes in educational processes (Dvořáková et al., 2021; Kotera et al., 2021). One of the recent trends that seek for improvement of the well-being in population is the expansion of the mindfulness-based interventions (Carmody and Baer, 2008) that are successfully applied at various levels of the educational system (Altner et al., 2018) including university students (Medlicott et al., 2021).

To support an empirical validity of the mindfulness-based intervention programs, it is necessary to identify personality traits and abilities that are cultivated by these training and mediate the impact on general well-being. According to the research, the core concept of these processes is the self-compassion (Neff, 2015; Kirschner et al., 2019; Medlicott et al., 2021) understand as emotionally positive, caring, and concerning attitude towards self especially in challenging or critical situations. Based on the philosophy of Buddhism, this construct refers about noncritical perception and experiencing of own's inadequacies and failures, which has a protective impact on well-being (APA dictionary of psychology, 2022). It 'entails three basic components: (a) self-kindness - extending kindness and understanding to oneself rather than harsh judgment and self-criticism, (b) common humanity - seeing one's experiences as part of the larger human experience rather than seeing them as separating and isolating, and (c) mindfulness - holding one's painful thoughts and feelings in balanced awareness rather than over-identifying with them' (Neff, 2003a:89).

In the population of university students, the self-compassion not only increases the general well-being, but also the study engagement, because it supports a transfer from extrinsic motivation to intrinsic motivation (Kotera et al., 2021). Thus, the self-compassion also contributes to better academic performance, which is associated

with a higher intrinsic motivation (Fortier et al., 1995). An inherent connection between self-compassion (SC) and educational processes is mirrored also in the correlation between the SC and self-efficacy (Liao et al., 2021). This attitude of belief in capacity to manage own life events (Bandura, 1986) was further specified in education as the academic self-efficacy manifesting in specific achievement strategies (self-enhancing attributions, failure expectation, task relevant behavior or activity vs. passivity) (Pajares, 1996). Similar impacts of SC were studied by Zhang et al. (2021) who proved a positive correlation between SC growth mindset and intelligence growth mindset by university students. Aside from academic-specific self-compassion that reflects feelings in academic difficult situations and predicts university adaptation (Martin et al., 2019), the general self-compassion influences the educational achievement of the individual also in the field of ethical judgment, improving the outcomes from the ethical training (Conway and Kotera, 2020).

Apparently, the SC affects academic achievement at many levels and significantly influences the mental health of students. According to Lee and Lee (2020), students with the high level of self-compassion may experience feelings of burnout because of the academic demands, nevertheless, they are at a lower risk of depression in comparison with their less self-compassionate peers. This finding is supported by results of Poots and Cassidy (2020) who revealed that SC, psychological capital, and social support mediate the relationship between academic stress and well-being. The strong potential of SC and its influence on well-being was not proved by the study of Kroshus et al. (2020). According to their results, not SC nor coping strategies buffered effects of chronic stressors on negative outcomes. However, the SC was the strongest and most consistent predictor of a successful transition to college in their study. Interestingly, the level of self-compassion may be specific for the area of study. In the research of Kotera et al. (2019), students of business in the United Kingdom scored lower in self-compassion than students of social work.

Further, the level of SC and its elements seem to be gender-sensitive to a certain extent. The meta-analytical study by Yarnell et al. (2015) refers to a slightly higher level of self-compassion by males in comparison with females, especially by the non-caucasian population. Neff et al. (2005) observed lower level of female self-compassion in her study of achievement goals and coping with academic failure. Based on this knowledge, Smeets et al. (2014) researched the impact of self-compassion-directed intervention on the resilience and well-being by female university students. The results proved an increase in SC, mindfulness, self-efficacy, and optimism, whereas tendencies to ruminate decreased in comparison with a control group undergoing the course of time management.

The lower level of the SC in females is not surprising because it relates to generally higher vulnerability to stress and, consequently, higher prevalence of difficulties such as anxiety and depression (Grevenstein et al., 2017; Marsh et al., 2018; Gutiérrez-Hernández et al., 2021). However, the interpretation of the females' SC as generally lower may be simplifying and even misleading according to some authors (Muris and Otgaar, 2020) because it ignores subtle differences between the SC components. Further, a mere interpretation of the SC as lower by females may overshadow the fact that the support of self-compassion turns out to be beneficial also for males, e.g., for lowering self-coldness associated with the gender role-specific stigma for seeking help (Booth et al., 2019).

In the previous research (Krejčová and Chýlová, 2022), we observed more intensive isolation and over-identification but also a higher level of self-kindness by females using the Self-compassion Scale (Neff, 2003a). A former study of the SC in the Czech environment (Benda and Reichová, 2016) proved better values of mindfulness, over-identification, isolation, and self-judgement in the male sample and a higher level of self-kindness and common humanity in the female sample. However, the results are not fully comparable with our study because the authors decided to exclude some items from the questionnaire (Benda and Reichová, 2016).

Our results are in partial correspondence with the study by Cunha et al. (2016) noticing better scores in isolation and over-identification by males. Nevertheless, they obtained better results by males also in subscales of self-kindness, self-judgment, and mindfulness. Bluth and Blanton (2015) observed higher scores in all negative subscales by females but no gender differences in positive subscales. This result may mirror the fact that females are more self-uncompassionate, but they are not less self-compassionate at the same time (Muris and Otgaar, 2020).

Based on the described studies, the goal of our research is to assess the level of self-compassion by bachelor students of the Faculty of Economics and Management at the Czech University of Life Sciences (FEM CZU) and reveal possible gender-related specifics and connections to the self-reported academic success.

The grounds of these objectives reflect a planned involvement of the elements of mindfulness-based programs in the education of ethics at the Department of Psychology, as well as to the providing of Mindfulness Based Cognitive Therapy (MBCT) to clients of university counseling services. Research background for these interventions is observable e.g., in the study of Conway and Kotera (2020) referring to the impact of self-compassion on the efficiency of the ethical training or in the findings of Kotera et al. (2019) that point out to the lower level of self-compassion by the business students in comparison with the students of social work. Our results may support understanding to students' self-compassion at other Czech faculties dealing with business education as well as in international comparison. In the first step, our objectives were to measure the level of SC and its subscales and to observe gender specifics and relationships by the self-reported grade mean (Krejčová and Chýlová, 2022). In the current study, we intend to enrich our analysis with exploring the relationships of SC subscales to basic personality traits using the NEO Five-Factor Inventory. Using of this widespread personality questionary ensures comparability with the similar research by Neff et al. (2007).

Based on our objectives, we formulated this set of hypotheses:

H1: The self-grade mean does not correlate significantly with the level of the self-compassion.

H2: The gender of respondents does influence the level of the self-compassion.

H3: There are no significant correlations between Big-5 personality factors and the level of the self-compassion.

MATERIALS AND METHODS

In correspondence with our objectives, we used the Self-compassion Scale (Neff, 2003a) to assess the level of respondents' self-compassion score. Moreover, we added two demographical questions (age, gender) and one question on the Self-reported grade mode (SGM), meaning the most frequent grade by the exam at university.

The Self-compassion Scale consists of 26 items that cover 6 subscales of Self-kindness, Self-judgment, Common humanity, Isolation, Mindfulness, and Over-identification. The dimensions of Self-kindness vs. Self-judgment refer to feelings of understanding towards oneself in hard times vs. being roughly self-critical; Common humanity vs. Isolation relate to perception of own problems as a part of human experience; Mindfulness vs. Over-identification indicate acceptance of negative emotions vs. feeling consumed by them (Neff, 2003b).

The internal and test-retest reliability of the instrument was verified by the research, similarly as a good discriminative validity (Neff, 2015). The respondents answered on the 5–point scale from 1= 'almost never' to 5= 'almost always'. The negative subscales (self-judgment, isolation, and over-identification) were coded reversely for our purposes.

The NEO-PI-R is a 240-item measure of the five basic personality factors: Neuroticism (N), Extraversion (E), Openness to Experience (O), Agreeableness (A), and Conscientiousness (C). Each factor is represented by six 8-item facet scale. Items are answered on a five-point Likert scale from strongly disagree to strongly agree. Evidence on the reliability and validity of the instrument is given in detail in Costa and McCrae (1992). Cronbach's alphas of the Czech version are rather high (from .88 at agreeableness to.91 at Neuroticism and Conscientiousness). For more psychometric characteristics of the Czech NEO-PI-R see McCrae et al. (2004).

The research sample was constructed by the method of convenience choice and involved 206 respondents with mean age 21.639 (median 21, min 19, max 28) and the gender structure of 127 females and 79 males. All respondents were students of bachelor programs of FEM CZU.

For data processing, the software IBM SPSS 27 was used. The strength of association between the variables was tested by parametric measures, Pearson correlation coefficient, and the *t*-test for equality of means. The normality of the distribution of Self-Compassion was tested by Shapiro-Wilk test of normality (sig. 0.883).

Further, we used the Structural Equation Modeling (software IBM SPSS Amos 28) to gain a more complex output than the results of the classical methods of multidimensional statistics. This approach allows the representation of the causal processes as the series of structural equations and their representation in a visual form that enables better conceptualization of the studied phenomenon. The consistency of the theoretical model with the data undergoes statistical analysis (Byrne, 2010). In our case, the path analysis was used. The model fit was assessed with the Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI), the Root Mean Square Error of Approximation (RMSEA), and Akaike's Information Criterion (AIC). RMSEA is an absolute measure of the distance between the hypothesized model and a perfect model, whereas CFI and TLI are incremental indices comparing hypothesized model with a baseline model (Xia, Yang, 2019). For the interpretation, we followed the widely used cutoffs proposed by Byrne (2010): CFI and TLI with values close to .95 indicating superior fit; RMSEA < .05 good fit, < .08 reasonable errors of approximation in population; .08–.10 mediocre fit; > .10 poor fit.

RESULTS

The descriptive dimension of our results aims mainly at the identification of the general level of self-compassion and its dimension in our research sample. The Self- compassion Scale (SCS) lacks the clinical norms that would ascertain some desirable level of the characteristics. The tool is mostly used in a comparative way. Nevertheless, the author suggested an indicative rating of mean scores 1.0–2.49 to be low, 2.5–3.5 to be moderate, and 3.51–5.0 to be high (Neff, 2003a). According to this guideline, all subscales in our research sample have moderate value with highest value of Mindfulness by males (approaching the border of the higher rank) and lowest value of Overidentification by females (approaching the border of the lower rank) (see Table 1). Apparently, higher values of means by Self-kindness and Self-judgement are due to the higher number of items included in the questionnaire in comparison with other scales. Therefore, means of scores are more relevant for mutual comparisons.

Subscale	Gender	Mean/scale	Std. deviation	Mean/score
Self-kindness	M	14.19	3.32	2.84
	F	15.25	3.79	3.05
Self-judgment	M	14.70	3.08	2.94
	F	15.28	3.79	3.06
Common humanity	M	12.37	3.13	3.09
	F	12.53	3.23	3.13
Isolation	M	12.68	3.53	3.17
	F	11.59	3.70	2.90
Mindfulness	M	13.62	2.87	3.41
	F	12.95	3.13	3.24
Over-identification	M	11.63	3.67	2.90
	F	10.59	2.84	2.65

Table 1: Subscales of SCS – descriptive statistic, 2021 (source: own calculation)

H1: The self-grade mean does not correlate with the level of the self-compassion.

Using the measure of Pearson correlation coefficient, we revealed no significant correlations between the Self-reported grade mean (most frequent grade by exams at the university) and the subscales of SCS (see Table 2). Thus, the first hypothesis (H1) was not rejected. However, we found a significant correlation between the scales of the SCS which supported the inner consistency of the questionnaire as well as of the concept itself.

		Self-kindness	Self-judgment	Common humanity	Isolation	Mindfulness	Overidentification
SGM	Pearson Corr.	.112	-.013	.102	.111	-.001	.105
	Sig. (2-tailed)	.123	.859	.161	.127	.994	.148

Table 2: Correlation of the Self-reported grade means with the SCS subscales, 2021 (source: own calculation)

H2: The gender of respondents does not influence the level of the self-compassion.

Further, we observed the gender differences in our research sample. The Levene's test for equality of variances proved similarity/equality by vast majority of the subscales (Table 3). Thus, the *t*-test for equality of means was used. In terms of statistical significance, we found small but existing gender specificity by Self-kindness, Isolation and Overidentification (see Table 4). By the subscales with bordering values in Levene's test for equality of variances, the *t*-test values were similar even when the equality of variances was not assumed (Table 5). From the descriptive statistics (see Table 1), we can infer a higher level of self-kindness by females. The values of Isolation and Overidentification are higher by men. However, the negative scales of the SCS are reversely coded in our research, which means that both Isolation and Overidentification are stronger by females. The second hypothesis was rejected.

Subscale	*F*	Sig.
Self-kindness	1.883	.171
Self-judgment	4.597	.033
Common humanity	.039	.844
Isolation	.003	.957
Mindfulness	.813	.368
Overidentification	3.933	.049

Table 3: Gender differences; Levene's Test for Equality of Variances, 2021 (source: own calculation)

Subscale	*t*	*df*	Sig. (2-tailed)
Self-kindness	-2.050	204	.042
Self-judgment	-1.144	204	.254
Common humanity	-.351	204	.726
Isolation	2.096	204	.037
Mindfulness	1.536	204	.126
Overidentification	2.285	204	.023

Table 4: Gender differences; *t*-test for equality of means, 2021 (source: own calculation)

Subscale		*t*	*df*	Sig. (2-tailed)
Self-judgment	Equal variances assumed	-1.144	204	.254
	Equal variances not assumed	-1.200	189.74	.232
Overidentification	Equal variances assumed	2.285	204	.023
	Equal variances not assumed	2.155	135.34	.033

Table 5: Gender differences; *t*-test for equality of means by specific subscales, 2021 (source: own calculation)

H3: There are no significant correlations between Big-5 personality factors and the level of the self-compassion.

Further statistical analysis dealt with the relationships between the SC subscales and the Big 5 personality traits using the Pearson correlation coefficient (Table 6). The power of the correlations was assessed in line with Cohen (1998): r = .01–.03 small association, r = .03–.05 middle association, r > .05 strong association. The correlations on the required level of significance (α = 0.01) were observed namely between the SC and neuroticism with the largest effect size in the case of the total SC score and subscale Isolation. The middle strength of correlation was measured between the Neuroticism and Over-identification, Self-kindness, and Self-judgement. All observed correlation between Neuroticism and the SC and its subscales were negative. Besides, we found a weak but significant positive association between the Openness and Mindfulness subscale as well as between Extraversion and Self-kindness and the

total SC score. Generally, the third hypothesis (H3) can be rejected. We involved also the Self-reported grade in the correlational analysis, however, just a weak correlation (r = -.153, p = .034) with Conscientiousness was detected.

		Extroversion	Agreeableness	Conscientiousness	Neuroticism	Openness
Self-kindness	Pearson Correlation	.242**	.146*	.073	-.315**	.071
	Sig. (2-tailed)	.000	.036	.294	.000	.311
Self-judgment	Pearson Correlation	.143*	.004	-.068	-.398**	-.066
	Sig. (2-tailed)	.040	.949	.331	.000	.347
Common humanity	Pearson Correlation	.099	.059	.082	-.041	.071
	Sig. (2-tailed)	.156	.401	.241	.563	.311
Isolation	Pearson Correlation	.157*	.082	.040	-.561**	-.176*
	Sig. (2-tailed)	.024	.239	.565	.000	.012
Mindfulness	Pearson Correlation	.107	.094	.130	-.162*	.252**
	Sig. (2-tailed)	.125	.179	.062	.020	.000
Overidentification	Pearson Correlation	.084	.028	.013	-.470**	-.134
	Sig. (2-tailed)	.232	.690	.850	.000	.056
Total Score	Pearson Correlation	.234**	.115	.071	-.549**	-.005
	Sig. (2-tailed)	.001	.100	.309	.000	.946

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

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

Table 6: Correlation of the NEO-PI-R with the SCS total score and subscales, 2022 (source: own calculation)

Based on theoretical knowledge and previous research in this area, we created the theoretical model tested via the path analysis to validate and enrich the outputs of the multidimensional statistic (Figure 1). According to all used criteria, the model fits our data well (Table 7). Both incremental indices commonly used to measure data fit (CFI, TLI) demonstrate very good fit as they exceeded the level of .95. The absolute fit index RMSEA reaches an acceptable level approaching the critical value of .05. The AIC informational criterium proved the best comparability between saturated and tested models.

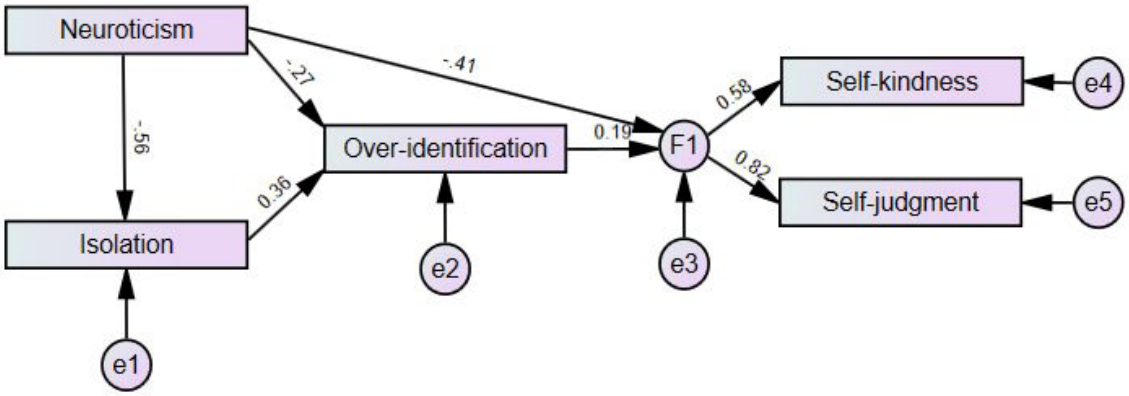

Figure 1: Results for theoretical model with standardized coefficients, 2022 (source: IBM SPSS Amos 28)

							Our model	Saturated model
	$\chi 2$	*df*	*p*	CFI	TLI	RMSEA	AIC	
Model	5.558	3	.135	. 990	.965	.065	39.558	40.000

Table 7: Fit indicies of the path analysis, 2022 (source: own calculation)

DISCUSSION

The first objective of our study was to assess a general level of the SC by students of FEM CZU to verify the relevance of using mindfulness-based methods in education and in the counselling center. For this purpose, the Self-compassion Scale (Neff, 2003a) was used. The mean scores in all subscales indicate that the level of SC is not literally low by our participants, however, there is still a space to support it.

Many papers (Medlicott et al., 2021; Lee and Lee, 2020; Kotera et al., 2019; Smeets et al., 2014) support the arranging of mindfulness-based interventions for students. We intend to use certain elements of mindfulness-based programs in the subject Psychology and Ethics in Business following a study by Conway and Kotera (2020). According to their results, the mindfulness-based methods support not only well-being, but also the ethical judgment. However, we do not plan to involve the whole mindfulness course in the education, because we appreciate the mandatory attendance in such activities. Thus, offering mindful training in university counseling services appears more relevant.

Our next research intention was to observe the relationships between the SC and academic achievement that was operationalized as the most frequent grade by exams at the university (Self-reported grade mean – SGM). Nevertheless, the correlations between the CGM and the SCS subscales were insignificant. This finding is in correspondence with the study by Neff et al. (2005) that found no significant correlations between the SC and Self-reported grade point average. We assume that the SC is not related to the academic achievement expressed by grades; however, the connections between the SC with other dimensions of educational achievement needs further research in the form of comparative analysis as in meta-analytical study by Liao et al. (2021) that revealed larger associations between SC and self-efficacy by non-student than by students.

Further, our study dealt with the gender specifics of the SC concept. This question is the subject of several research. Neff et al. (2005) proved slightly lower self-compassion by females in comparison with males, similarly to a meta-analytical study by Yarnell et al. (2015) that also assigned women as more compassionate to others than men. Our result correspondence with described studies only to a certain extent. The scores from negative subscales (Isolation, Overidentification) were significantly lower by females; however, the self-kindness was significantly lower by males. Although the significance of these differences is not high, they are in certain correspondence with cited studies as well as with findings by Booth et al. (2019) who referred about the male-typical self-coldness resulting in stigma for seeking help.

The next phase of the research deals with the relationships between the SCS subscales and personality traits measured by NEO Five-Factor Inventory. In the previous research, the total SCS score proved the strongest and negative association with Neuroticism. Further, significant positive correlation with Agreeableness, Extroversion and Conscientiousness was proved (Neff et al. 2007). The significant connection between neuroticism and self-compassion appears also in further studies (Neff, 2003a; Arslan, 2016; Pyszkowska, 2020; Tamcan and Dag, 2021). On the contrary, Di Fabio and Saklofske (2020) proved a significant relationship between compassion for others and agreeableness. This finding points out personality-related specifics of the self-compassion and compassion to others. Also, it brings a new viewpoint on the gender differences between these two concepts (Yarnell et al., 2015).

In correspondence with the cited studies, our research revealed a negative connection between self-compassion and neuroticism, correlations with other personality traits measured by the NEO-PI-R Inventory did not reach the border for a middle strength of power and/or statistical significance. In comparison with other research, our analysis goes deeper into the mutual differences between the SC subscales. The strongest association was observed between Neuroticism and Isolation, further by Over-identification and Self-judgement. The correlation of neuroticism with the self-kindness was also significant but weak (see Table 6). The connection between neuroticism and mindfulness/common humanity was insignificant. This observation has a substantial practical impact. The "pure" mindfulness intervention does not have to be sufficient for students with a high level of neuroticism or should also involve strategies that would relieve feelings of loneliness and being totally consumed by the suffering. For instance, the Mindfulness Based Cognitive Therapy (MBCT) could be beneficial for this kind of personality.

Armstrong and Rimes (2015) demonstrated significant reductions in rumination and increase in self-compassion and decentering in respondents with ahigh level of neuroticism after the MBCT intervention. This conclusion corresponds with our findings, namely with the in-depth analysis using the SEM approach (see Figure 1). Apparently, Neuroticism increases the "isolated" style of thinking such as being separated from the rest of the world with own problems which lead to Over-identification with negative emotions that is very close to rumination (fixation on everything that's wrong, etc.). In our model, the further direction of connections leads to the factor of the self-concept, composed of the Self-judgement and the Self-kindness. To understand our findings correctly, it is necessary to realize that the negative scales are reversely coded. Generally, the Over-identification, as well as Neuroticism, lead to the "less healthy" self-concept with the decrease in Self-kindness and the increase in Self-judgement.

Our model of connections between cognition, emotions, and consequences (self-concept) is in line with the classical paradigm of cognitive-behavioral therapy (Beck, 1976) and puts it into the new context of the SC and its element.

Further, our model brings impulses for the discussion about effectiveness of self-compassion-related therapies. A meta-analysis of this issue (Wilson et al., 2018) revealed certain (not statistically analyzed) tendency to greater improvement in the negative SC subscales than in positive ones. If we accepted this assumption, our model would speak for the effectiveness of these therapies in neuroticism (or anxiety-related disorders) because the negative subscales were identified as more relevant at this regard. This observation has a considerable practical impact as these disorders belong among the most frequently treated in counselling centers at universities (Barnett et al., 2021).

The future theoretical frame of this research could involve relationships between SC scales and six factors of the HEXACO model of personality. This issue was researched by a pilot study in depressed vs. non-depressed populations that brought important findings for lowering of the severity of depressive symptoms (Fadaei et al., 2019). The HEXACO inventory covers the same personality variance as the Big-5 and Dark Triad conceptions together (Ashton and Lee, 2009). Therefore, it is very relevant for university students of economy and management because of proven connection between Dark Triad personality traits and unethical behavior in the management profession (Mutschmann et al., 2022).

CONCLUSION

Mindfulness-based self-compassion-directed interventions belong to the current trends in the support of well-being. Nowadays, they become more urgent considering the negative impacts of the Covid-19 related restrictions especially by children and young adults. According to the cited research, the cultivation of self-compassion by university students appears more than relevant to support their well-being as well as ethical judgment. Its suitability for the students of FEM CZU is supported by our results, revealing also gender and personality specifics. Further research should concentrate on the relationship between self-compassion and non-grade indicators of academic achievement at different levels of the educational system. Also, subtle gender differences between dimensions of self-compassion should be further verified for possible gender-related adjustments of mindful-based interventions as well as analysis of further individual specifics that would establish the self-compassion between personality structures crucial for maintaining mental health.

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DROPOUT INTENTIONS IN HIGHER EDUCATION: SYSTEMATIC LITERATURE REVIEW

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ABSTRACT

College dropout proves to be a critical problem in undergraduate programs that directly affects students and the related community, due to direct economic losses and significant social costs. This article addresses a systematic review of the literature on predictors of student dropout intention in higher education, focusing on scientific production in Q1 and Q2 journals from 2018 to 2023, performing a bibliometric review and analyzing the available empirical and theoretical data on the phenomenon of college dropout intention and its affecting factors.

The bibliometric results and those related to predictors of dropout intention introduced in previous studies are presented. The largest number of researchers studying this phenomenon are from Germany, however, the United Kingdom is the country with the largest number of publications. Previous research can be grouped into two categories: studies analyzing psychological factors of dropout intention and those related to academic and social integration.

KEYWORDS

Dropout, intention, higher education

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Highlights

- *Student dropout is an issue of global importance that affects students, their families, labor organizations, universities, government agencies and therefore the country's economy.*
- *Dropout in higher education can be conceptualized as a decision-making process consisting of different phases, which include the following phases: perception of unsuitability, thoughts of dropping out/change, deliberation, information search and a final decision.*
- *Psychological predictors such as self-determination, self-efficacy, autonomous motivation, adaptability and resilience influence the intention to drop out of college.*

INTRODUCTION

Dropout intention is defined as a student's estimated probability of failing in school (Bean, 1985). It refers to students' reported intention to change majors or drop out of college and it is considered an early red flag of actual dropout. According to Mijoč et al. (2016: 334), the intention is 'especially suitable for investigating behaviors that are odd, difficult to observe, or include unanticipated delays'.

College student dropout, including its reasons and implications, is a phenomenon that has been studied since the 1930s (Bardach et al., 2020). Currently, the tendency to investigate college student dropout persists, as it is a complex phenomenon in which several academic and social variables interact (Bernardo et al., 2022). Likewise, higher education organizations strive to reduce dropout rates due to the high economic cost to families and states (Castro-Lopez et al., 2022), seeking to increase the number of academically qualified people in the labor market and decrease malinvestment (Bargmann et al., 2022).

From the position of Bäulke et al. (2022), college dropout can be conceptualized as a decision-making process consisting of different phases, which include: the perception of unsuitability, thoughts of dropping out/change, deliberation, information search and the final decision.

Research results have shown that there are multiple factors that affect such phenomenon in all the phases, including personal, socioeconomic, family, institutional, academic performance and behavioral aspects of students, as well as their personality (e.g., Scheunemann et al., 2021; Fourie, 2020; Respondek et al., 2017; Jeno et al., 2018; Bardach et al., 2019 and Truta et al., 2018). Also, Bean (1985) classifies the factors affecting the dropout intention, in: academic outcomes, academic variables, background prior to the start of college experience, and environmental variables.

Reducing dropout rates continues to be one of the main objectives for universities (Manrique et al., 2019) and the theoretical and practical development of knowledge

about this phenomenon is vital for the implementation of future strategies (Ameri et al., 2016).

In this systematic literature review, the following question is posed: what do scientific research articles published in the last five years in Q1 and Q2 journals report about predictors of intention to drop out in university higher education? What are the avenues for future research on these issues?

The article's structure is as follows: First, an introduction to college dropout intention is given; second, the methodology of the systematic review is presented. Third, the bibliometric results are shown. Fourth, the different predictors of students' intention to drop out of higher education from the most relevant articles found are presented and, finally, the results are discussed.

METHODOLOGY

A systematic literature review provides the foundation and consolidation of a summary of publications in a given field of study. Its main purposes are to define relevant concepts, synthesize evidence, identify previously used methodologies and distinguish research gaps in the area of interest (Baker, 2016).

The present study is based on the methodology proposed by the PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) (Liberati et al., 2009), in order to systematize in an organized way, the evidence found about dropout intentions in higher education.

For the development of the systematic review, the following stages were carried out: 1) the formulation of the research questions, 2) specification of the inclusion and exclusion criteria for articles, 3) formulation of the literature search plan, 4) the search for articles in the selected databases, 5) evaluation of the quality of retrieved articles according to established criteria, 6) systematization of the information, and 7) the interpretation and presentation of the results.

This bibliographic search considered publications on dropout intentions in higher education in the Web of Science (WOS) and Scopus databases, which were selected for being the most recognized and multidisciplinary at the international level (Alcántara and Márquez, 2017). The search formulas were constructed as follows:

Scopus: TITLE-ABS-KEY AND TOPIC (drop* AND intention* AND high* AND education) AND PUBYEAR > 2017 AND (LIMIT-TO (SRCTYPE, "j"))

Web of Science: TITLE-ABS-KEY AND TOPIC (drop* AND intention* AND high* AND education).

In the search formulas, the wildcard (*) was used in order to collect all possible options without omitting information. The inclusion criteria for the articles to be included in the review were: a) studies with a central theme or explicit relation to Dropout Intentions in Higher Education; b) research developed between 2018 and 2022, c) full-text articles in languages Spanish, English and/or German. As stated by González-Pereira et al. (2010: 12) 'a three-year citation window is wide enough to include most citations, and dynamic enough to measure the evolution of scientific journals'.

Duplicate articles in the databases were discarded and articles in the area of medicine were excluded from this literature review, as well as books, book chapters, working papers and conference proceedings. Also, we excluded articles related to secondary, higher technical or doctoral level education, as well as those linked to massive open online courses (MOOCs) and journal articles that are not in the Q1 and Q2 quartiles, since they have a low impact factor.

As expressed by Okagbue et al. (2019: 1), 'Both the impact factor and the CiteScore are used in the evaluation of the impact, prestige and quality of the journal', therefore for the present research we have as inclusion criteria the articles whose journals belong to the Q1 and Q2 quartile.

After applying the described criteria, the final selection comprised 72 scientific articles, constituting the body of data analyzed in this work. These articles, along with other important seminal or contrasting articles, were used to present predictors of dropout intention in higher education, such as the related variables and proposed approaches for future research.

As expressed before, the four-phase review procedure proposed by the PRISMA statement was implemented (see Figure 1).

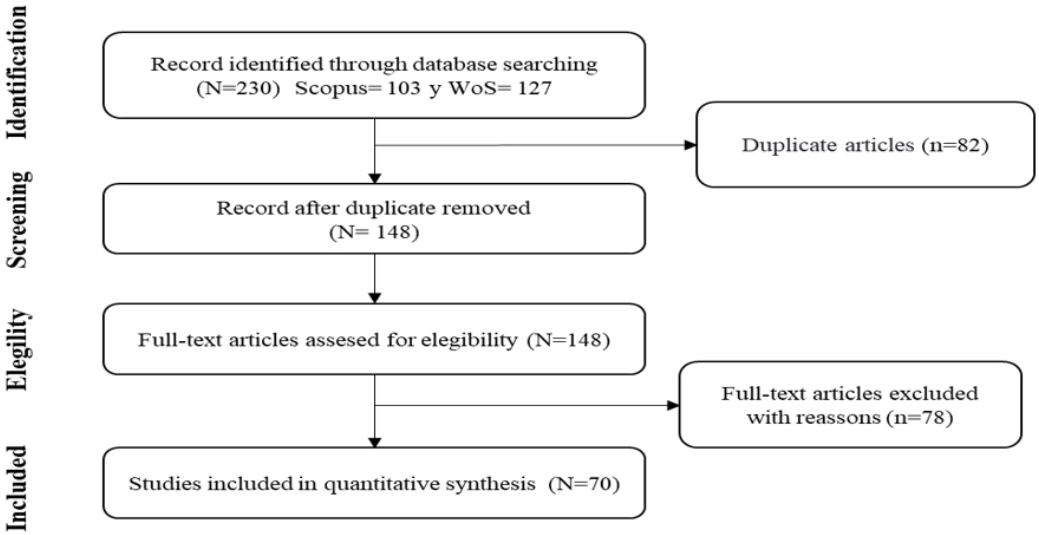


Figure 1: Flow Diagram Prisma

BIBLIOMETRIC RESULTS

The following section present the results of the bibliometric analysis on the articles about dropout intention.

In order to examine the countries with the most research on dropout in higher education, we used the country of affiliation of the authors. The academic articles are distributed over 18 countries. Table 1 shows that Germany contributes 29% of the articles related to dropout intention, followed by Spain with 16%.

Country affiliations	2018	2019	2020	2021	2022	Total	%
Germany		3	5	6	6	20	29%
Spain	1	2	1	2	5	11	16%
Norway	1		1	1	2	5	7%
Belgium		1		2		3	4%
Chile		1		1	1	3	4%
Romania	1			1	1	3	4%
United Kingdom	1	1	1			3	4%
United States	1		1	1		3	4%
Other Countries*	4	2	2	5	6	19	27%
Total	**9**	**10**	**11**	**19**	**21**	**70**	

Table 1: Countries of Affiliation the Journals from January 2018 to August 2022

Regarding the other countries, we grouped the records of the following countries: Finland, Italy, Australia, Austria, China, Croatia, France, Luxemburg, Netherlands, Peru, Portugal, Russia, Saudi Arabia, Slovenia, South Africa, Thailand and Vietnam, since they have only one research between the period 2018 to 2022.

Table 2 presents the origin countries of the journals and the United Kingdom, with 22 articles, is the country with the highest number of publications, followed by Switzerland, with 14. These two countries account for 51% of the total analyzed articles.

Source Country	2018	2019	2020	2021	2022	total	%
United Kingdom	3	2	2	7	8	22	31%
Switzerland	2	1	2	5	4	14	20%
United States	3	1	4	3	3	14	20%
Netherlands			1	2	4	7	10%
Spain	1	2	1	1	1	6	9%
Germany		3			1	4	6%
France		1				1	1%
Portugal				1		1	1%
Turkey			1			1	1%
Total	**9**	**10**	**11**	**19**	**21**	**70**	

Table 2: Origin Countries of the Journals from January 2018 to August 2022

Table 3 presents details about the ten main journals that contributed to this literature review according to their impact factor. Also, The Scimago Journal Ranking (SJR) is a bibliometric indicator that measures the influence of scientific journal. It is possible to observe that "Computers & Education" has the highest impact index, with an SJR of 3.676.

To analyze the impact of the articles and determine those that should receive more attention, we used the total number of citations according to the Social Science Citation Index (SSCI). In total, 4347 citations of the articles were analyzed. The most cited study, with 116 citations, was Maluenda-Albornoz et al. (2022), which focused on early and dynamic socio-academic variables related to intention to drop out of studies.

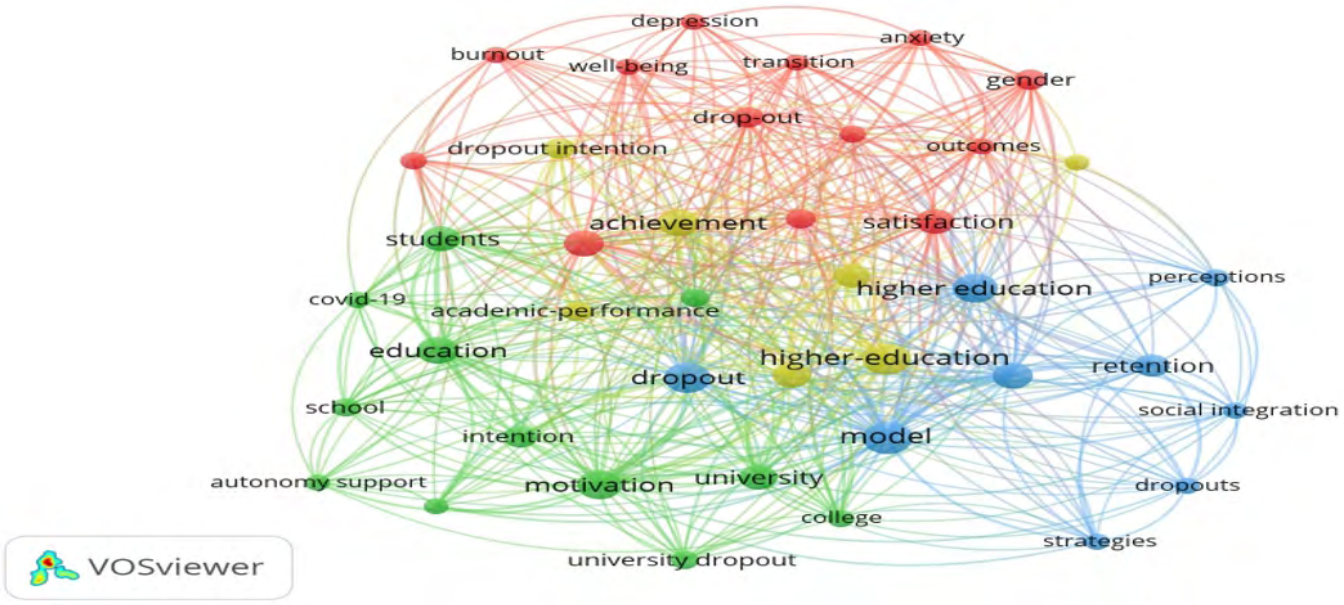
Figure 2 presents the key words network, which shows the connection between the topics associated with college dropout intention and the related variables, not only by considering the links within the same group but among them. The more outstanding, the closer are the nodes of the network, and the more corners they have, the greater the strength of the relation and the higher the number of documents with connecting keywords. As it can be observed, in the scientific literature the keyword *dropout* is strongly related to the words *higher education, model, persistence, engagement, achievement, self-efficacy, motivation,* and *performance*. Furthermore, Table 4 presents the clustered keywords indicating the persistent study topics.

Journal	Country Of Origin	Quartile*	SJR 2021**	H-index
Computers & Education	United Kingdom	Q1	3.676	197
Journal of Vocational Behavior	United States	Q1	2.805	161
Journal of Advanced Nursing	United Kingdom	Q1	0.774	161
Frontiers in Psychology	Switzerland	Q1	0.873	133
Journal of Economic Behavior & Organization	Netherlands	Q1	1.107	122
European Journal of Social Psychology	United Kingdom	Q1	1.497	120
Contemporary Educational Psychology	United States	Q1	2.651	113
Studies in Higher Education	United Kingdom	Q1	1.565	112
Higher Education	Netherlands	Q1	1.729	110
British Journal of Educational Psychology	United States	Q1	1.291	102

** Quartile based on 2021 SCImago*
*** SJR column based on 2021 SCImago*
Table 3: Journals with More Productivity from January 2018 to August 2022

Author	University	Published Documents	# Citations in Total Documents	H index
Da Silva Almeida, Leandro	Universidade do Minho, Portugal	174	2173	24
Vasalampi, Kati	Jyväskylän Yliopisto, Finland	32	496	14
Bernardo Gutiérrez, Ana Belén	Universidad de Oviedo, Spain	43	565	13
Cervero, António	Universidad de Oviedo, Spain	13	134	6
Casanova, Joana R.	Universidade do Minho, Portugal	15	97	6
Jeno, Lucas M.	Universitetet i Bergen, Norway	10	240	6
Danielsen, Anne G.	Universitetet i Bergen, Norway	11	593	6
López-Aguilar, David	Universidad de la Laguna, Spain	23	89	5
Bäulke, Lisa	Universität Augsburg, Germany	5	37	3
Galve-González, Celia	Universidad de Oviedo, Spain	6	12	2

Table 4: Authors with higher productivity



Note: Threshold=41 for the minimum number of occurrences of a keyword.
Figure 2: Network Map of co-occurrence of keywords

Cluster	Color	Keywords
1	Red	Well-being, depression, anxiety, burnout, gender, outcomes, satisfaction
2	Yellow	Dropout intention, academic-performance, higher-education, achievement
3	Green	Intention, autonomy support, covid-19, motivation, students
4	Blue	Dropout, model, retention, social integration, strategies, perceptions, higher education

Table 4: Key Words grouped according to Cluster

This analysis shows how, in relation to the dropout intention, cluster 1 is developed around psychological factors, cluster 2 is more associated with academic performance and student achievement within the academic program, while cluster 3 touches on issues related to covid-19, the autonomy required in this scenario, as well as the influence this has on student motivation. Finally, cluster 4 develops around the retention strategies out of the social integration of the student. Figure 3 shows the variables associated with the intention to drop out of higher education according to the analysis carried out based on all the articles included in this literature review. These factors have been classified into demographic factors, financial situation, academic integration, institutional integration, social integration and psychological conditions.

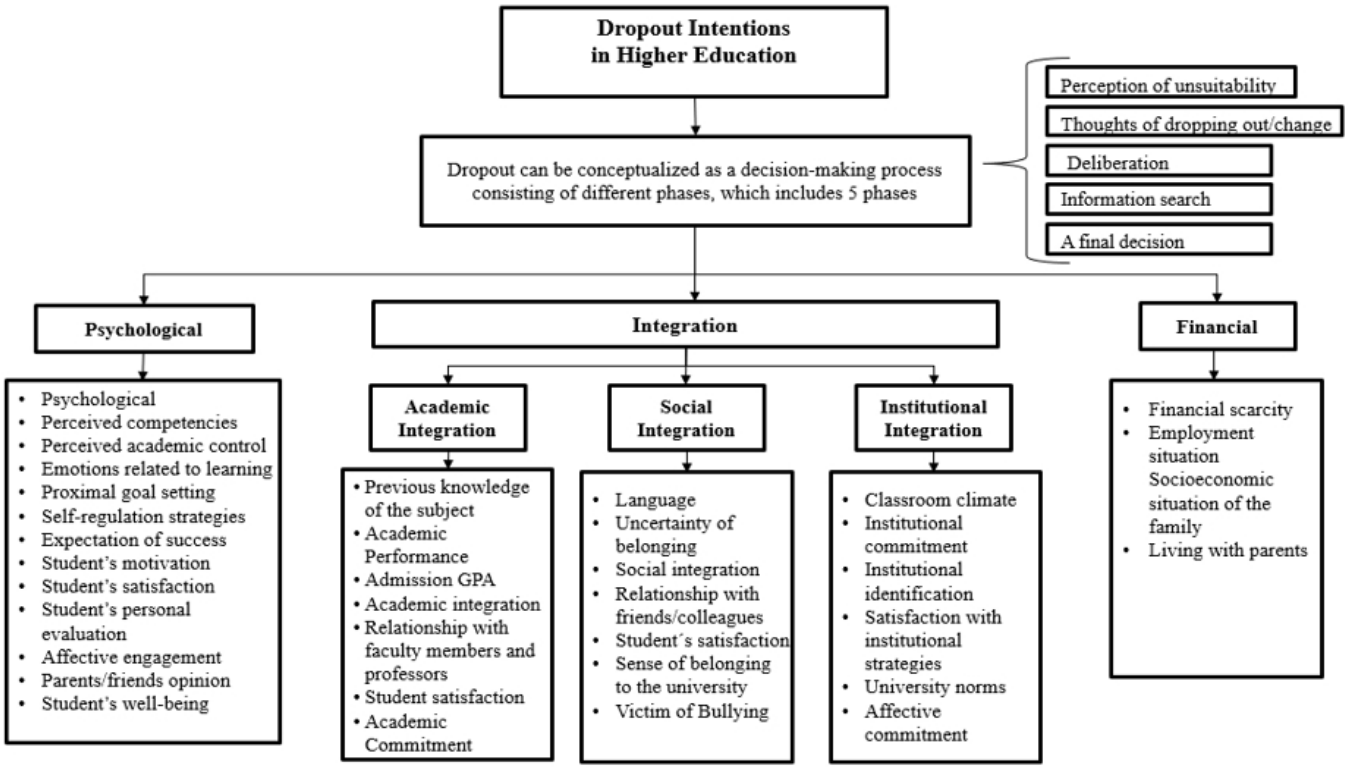


Figure 3: Conceptual map on dropout intention and related variables

PREDICTORS OF DROPOUT INTENTION

This section is dedicated to deepening the description of previous research findings, about the different variables affecting the dropout intention, as well as the different explanatory approaches for this phenomenon.

Psychological Factors

A group of explanatory studies of dropouts focused on the analysis and study of students' characteristics, personality, and their degree of intention to achieve a goal, giving rise to the psychological approach.

According to Díaz-Mújica (2019), motivation is an important individual variable affecting dropout. As stated by Bargmann et al. 2022, when students are firmly determined to study, they tend to drop out less frequently, however, when motivation decreases, it predicts the intention to drop out, as evidenced before in programs related to teaching (Hartl et al., 2022, Singh and Alhulail, 2022), biology (Jeno et al., 2023), nursing (Duprez et al., 2021), law and mathematics (Schnettler et al., 2020). Then, motivation is a cross-cutting factor to the careers being studied, without geographic delimitation (Toomsalu-Stefanova et al., 2020).

Research by Bardach et al. (2020) and Díaz-Mújica et al. (2019) evidenced that motivational regulation strategies will positively predict academic performance and negatively predict dropout intention through increased academic effort. According to Schnettler et al. (2020), intraindividual changes in intrinsic value, achievement and cost, but not expectancy and utility, were related to intraindividual changes.

Additionally, when college students' self-esteem is at a considerably lower level, it is a highly significant predictor of college dropout intention without distinguishing college major, especially for the case of health science, medical and/or nursing schools (Duprez et al., 2021; Dancot et al., 2021), as well as in engineering or STEM schools (Baltà-Salvador et al., 2022).

The research of Bargmann et al. (2022), showed that students' homework effort and interest values were indirectly related to dropout intention after the first year of higher education, while Jeno et al. (2018, 2023) found that autonomous motivation and perceived competence positively predict academic performance and negatively predict dropout intention. Moreover, as the authors said, controlled motivation is not related to academic performance but is a positive predictor of dropout intention.

According to Girelli et al. (2018), self-efficacy benefited from autonomy-supportive behaviors provided by teachers and parents, while external regulation did not significantly predict dropout intention. On the other hand, Deci and Ryan (2013) asserted that academic self-determination occurs when students succeed in regulating their own behavior to meet their intrinsically motivated goals based on their autonomy and competence, which impacts students' intention to drop out.

As argued by Perry et al. (2001), perceived academic control describes the personal internal faculty of outcomes and achievement and is a relatively stable psychological capacity, i.e., a person's belief in his or her influence on the success or failure of performance outcomes. Based on this concept, Respondek et al. (2017). endorses the important role of perceived academic control and anxiety toward academic success in college students

According to Tuero et al. (2018), the most relevant variables in the planning and consolidation of dropout, respectively, and in order of importance, are: the student's early performance, the non-academic work schedule (domestic and/or paid), the relationship with teachers, the expectations generated about the contents, the use of study techniques and the guidance received.

Two studies have been conducted with students at the University of Laguna, Spain, and the findings obtained were that students who have higher scores in the dimensions of adaptability (worry, control, curiosity and confidence) have a lower intention to drop out (López-Aguilar et al., 2022). On the other hand, in health sciences, medical and/or nursing schools, resilience was a factor found to predict academic success (Van Hoek et al., 2019).

Academic, Social and Institutional Integration

Evidence shows that the most recognized model in the study of student attrition and retention is the one developed by Tinto (1975). In particular, Tinto (1975: 78) stated that 'dropout represents the failure of individuals, given capacity and commitment to goals, to achieve desired educational goals'. According to this definition, student dropout is from an individual perspective associated with dysfunctional self-regulation (Bernardo et al., 2019). Heublein and Wolter (2011) extended this view to a perspective that also considers environmental factors, conceptualizing student dropout as a complex event where individual, institutional and social factors that affect study overlap. Consequently, student dropout can be seen as a continuous process of decision-making (see also Bäulke et al., 2022), resulting from the intention to drop out.

Tinto (2007) explains the process of permanence in higher education in relation to the degree of adaptation of the student based on the academic and social experiences with the institution and also details that the key factors for success lie in the development of learning communities and in the construction of a collaborative environment in the classroom. On the other hand, Lerdpornkulrat et al. (2018) stated that perceptions of the classroom environment and institutional goal structures are significantly related to students' motivational orientations and engagement levels and contribute to the intention to stay in college.

In their study, Piepenburg and Beckmann (2022) conducted a Multilevel analysis and corroborate Tinto's integration model by revealing that all subdimensions of academic and social integration predict dropout intentions, but also show that not all subdimensions are equally important. For example, the effect of academic and social integration is not highly dependent on students' family academic background.

According to Klein (2019), academic and social integration are negatively related to dropout intentions. Close relationships with faculty are positively related to students' intellectual development and negatively related to the perceived burden of performance requirements. Students benefit from contact with faculty only when they exceed a minimum threshold of academic integration. On the other hand, academic integration is related to lower dropout intention, regardless of students' social integration (Teuber et al., 2021; Sureda-García et al., 2021).

Another issue to consider in this field is the integration of transnational students. Immigrant student networks have been found to be distinguished by deep norms and aspirations, which are a shield against college dropout. In addition, students whose two parents are foreigners have a higher risk of dropping out than mixed students, where there is at least one resident family member (Mishra and Müller, 2022). In addition, transnational students score significantly lower than domestic students on social and academic integration, institutional commitment, and satisfaction. Integration and engagement significantly predicted students' persistence intentions (Steele and Douglas, 2021).

According to Höhne and Zander (2019), belonging uncertainty significantly predicts students' dropout intentions above other relevant predictors: academic self-efficacy, the expectation of success, the perceived future utility value of the subject, and prior academic performance.

Other factors that predict college dropout intention are gender, family, socioeconomic status, and perceived barriers to degree completion (Cocoradă et al., 2021; and Bernardo et al., 2019). Specifically in STEM (science, technology, engineering and mathematics) majors, prior knowledge related to the subject matter, mathematical knowledge, specific interest in the field, first-year students face a cognitive and social challenge due to the need to integrate into a new environment. In engineering students, social roots such as group awareness predict success in seeking academic help, this mediates the intention to drop out (Schlusche et al., 2021).

In their study, Dewberry and Jackson (2018) compared the student dropout model based on student integration theory with a psychological model based on the theory of planned behavior (TPB). A model that included TPB variables and two key variables from student integration theory (academic integration and social integration) showed a good fit to the data, although all three TPB variables predicted dropout intention, while neither of the two variables from student integration theory did. The TPB variables explained more than 60% of the variance in students' intention to voluntarily drop out of college before completing their studies, and intention to drop out was associated with actual dropout behavior.

An important aspect to consider is that violent behavior in college classrooms has increased over the past few years. From the position of Bernardo et al. (2020), students who were victims of bullying or cyberbullying were more likely to consider dropping out of college. Likewise, those who feel perceived discrimination follow the same trend (Baltà-Salvador et al., 2022).

Financial Factors

According to Breier (2010), financial considerations may more decisively affect student dropout in underdeveloped and developing countries, which present greater challenges in relation to the purchasing power of their inhabitants, but financial considerations are now also a factor that can play an important role in developed countries because of the credit crunch.

Bean's (1985) study indicated that among the most important factors for dropout are the financial situation of the student and his or her family, as well as the student's own responsibility for a job (hours of employment) and family obligations. However, it is important to clarify that the statements of these studies are the opposite of those of Abarca Rodríguez and Sánchez Vindas (2005) and Tinto (2007), who stated that the financial situation is not a determinant or a crucial factor for dropout, given that there is financial aid in universities and other alternatives.

In this regard, according to Chen (2008), in several previous studies, the financial factor has been shown to influence both the decision to study and the decision to drop out, which is why the current models that study this phenomenon add the financial factor to the analysis, to the traditional approaches from the psychological, social, organizational and interaction perspectives. Tthe inclusion of the economic aspect in the analysis of the phenomenon is vital to promote aspects related to public investment in economic support, subsidies and financial aid to underprivileged students in order to balance the opportunity of access and permanence in education, as noted by Chen.

DISCUSSION

This study aimed to review the literature published between 2018 and 2022 in quartiles Q1 and Q2 on higher education dropout intention, in order to understand the theoretical and practical development of the theme, its conceptual evolution and the different factors considered in the literature in relation to this phenomenon.

The content of the multiple studies reviewed, although with few non-consensus results, was systematized according to the PRISMA model, illustrating the potential to identify new reasons that could lead to higher education dropout intention or better models that help to understand this phenomenon in a holistic manner and to address it through the different factors that affect the process. Thus, we emphasize the need to provide answers to the procedural nature of dropping out of higher education and to consider personal and contextual factors, whether in research or in institutional functioning, such as psychological intervention services (Tinto, 2007).

The present review suggests a greater incidence of literature on attributes prior to higher education entry, while studies at the level of goals and commitments before and after higher education entry and social/academic integration are still scarce. It can be found that variables related to academic performance and higher education, to the economic situation of families and to goal setting are frequently investigated (Ekornes, 2022; Castro-Lopez et al., 2022; Bernardo et al., 2022; Jeno et al., 2018; Respondek et al., 2017). Many studies have also been found on factors related to social and academic integration and goals and commitments before and after entry, according to Tinto's (1975, 1993) model. Few longitudinal studies have been conducted, which could be useful in testing Tinto's (1975, 1993) model, while supporting and extending its practical utility for institutions of higher education (Tinto, 1982, 2010). It is also possible to observe how the psychological aspect has been extensively addressed in previous literature (Tinto, 2010). In this respect, psychologists in a higher education context should be attentive to signs of risk of dropping out of studies while planning psychological interventions that support students in their decisions and their respective implementation while verifying their effectiveness.

It should be noted that the research so far has a greater orientation towards studying the actual behavior, which would be more difficult to reverse and causes all the related problems described above, i.e., when the dropout occurred. It is suggested for future research to investigate the intention to drop out, understanding it as a complex process, covering the academic and professional trajectories of students, and privileging the individual, institutional, family, social and cultural characteristics in the analysis. To deepen the research with the meta-analysis tool and to know which factors influence the intention to drop out. It is recommended to continue with more research on the subject that will make it possible to form a broader body of knowledge that integrates the new educational realities caused by the COVID-19 pandemic.

These studies also provide insights into the procedural nature of the intention to drop out of higher education and identify differences in the relationship between variables and in the weight of different factors in the explanation of this phenomenon (Ekornes, 2022).

Also, future research could help in the construction of tools for early identification of students at risk of dropping out of the education process. Given the results of this literature review, we note how it is pertinent that such tools include psychological factors, those associated with the integration of the student as well as the risks derived from his or her financial situation. These types of integrative tools and methodologies to understand and observe the dropout intention not only represent

a theoretical advance in this topic but also in terms of their managerial contributions, as they would be useful to detect in which cases the students could benefit from organizational measures oriented to early attention to the dropout intention, such as psychological interventions and other support tools from the academic and institutional perspective.

Thus, it is important to establish national and international recommendations on how to operate to support students at risk of dropping out of higher education. In light of these recommendations, it is necessary for each institution to develop its own pedagogical philosophy and policies and plan measures to manage the risk and/or intended dropout situations. Educational and school psychologists can play an essential role in institutions of higher education, providing support for the planning of life projects for each student and providing services compatible with governmental and institutional concerns. Therefore, they can contribute to the appropriation of an integrative vision on the intention to drop out of higher education, respecting both the priority socio-political axes such as the educational mission of higher education institutions, as well as the objectives and needs of their target audience.

CONCLUSION AND FUTURE RESEARCH

Different authors (e.g., Munizaga Mellado et al., 2018; Dewberry and Jackson, 2018; Truta et al., 2018) comment that student dropout is an issue of global importance that affects not only the individual and his or her family but also a variety of actors, such as labor organizations, universities and government agencies, given its multiplier effect on employment and on the country's economy in general, while also generating social immobility.

Hence there is a need for studies that go beyond statistics, looking for the impact of questions such as the cultural context, the perception of the value of education. Nowadays, the new ways and opportunities to access knowledge and the difficulties that young people experience in adapting and integrating into university life and dynamics. A prominent aspect observed in studies on dropout intention is the deterministic view that invites to analyze the problem as an outcome, whereas this phenomenon is clearly related to the entire educational process (i.e., the dropout phenomenon begins and develops from basic education).

In that sense, for Fleischer et al. (2019), the low quality of education in countries does not predict the future difficulties of students who are academically disadvantaged for educational achievement; however previous studies tend to confirm that deficiencies in basic education can generate gaps that can later manifest later in poor academic performance, psychological problems or integration difficulties, all of which affect students' intention to drop out of higher education.

Literature reviews also suggest that the internal strategies that schools can formulate and implement are not enough, as it is equally important to influence educational policy to improve the quality of education as a whole, which would be an essential factor in preventing this phenomenon.

Considering the aspects found in the previous research, future studies could lead to a holistic understanding of the causes of the intention to dropout, and deepen the managerial implications, so that all the actors involved in the phenomenon can take actions that contribute to the intervention of this problem, through the registration, analysis, monitoring and intervention of risk factors, as well as the implementation of positive actions to reinforce the permanence and successful completion of studies.

Regarding the study limitations, this systematic literature review has considered only articles published between 2018 and 2022, and the search has been restricted to Scopus and Web of Science databases. However, this time frame is given in line with previous recommendations by González-Pereira et al. (2010) and enables sufficient analysis to consider the most relevant variables at present. This literature review offers theoretical contributions insofar as it is important for any researcher who intends to understand the phenomenon of student dropout from its causes and associated factors and identify the variables that have been considered in previous analyses, the contexts related to each variable, and how they can be grouped according to existent studies, in order to formulate interesting questions, explore new avenues and contribute to the development of the subject from new perspectives that can genuinely contribute to its advancement in theoretical and practical terms. Understanding the state of the art of scientific knowledge on this topic and introducing the discussions around new variables (e.g., violence in college classrooms, COVID-19 and quarantine effects), will allow researchers to visualize bolder and more pertinent paths for future research.

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