

E-učenje u krizi: hrvatsko akademsko iskustvo

E-learning under crisis: Croatian academic experience

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Abstract

The purpose of this study is to examine the differences in perception, experience, and acceptance of e-learning between professors and students within the Croatian higher education system during the COVID-19 pandemic. The findings of the research remain relevant today, given the continuous growth of online study programs and the increasing need for sustainable digital education solutions. Therefore, the study focuses on factors such as gender, technology acceptance, motivation, assessment practices, e-learning skills, self-confidence in using digital tools, and the perceived importance of a code of conduct in online education. Data were collected through an online survey conducted at the end of 2021, involving 118 professors and 708 students. Respondents answered statements using seven-point Likert scales, and the results were analyzed using SPSS software, including t-tests and linear regression models. The results show that there are no significant gender differences in the perceived usefulness of e-learning, leading to the rejection of hypothesis H1. Statistically significant differences between professors and students were found in levels of perceived stress, self-confidence, perceived usefulness of e-learning, and in e-learning skills before and after the digital transition, as well as in the importance attributed to the code of conduct (H2a, H2c, H2e, H2h, H2i, and H2j confirmed). Hypotheses H3 and H4 were also confirmed, indicating a positive influence of e-learning skills on satisfaction and future intention to use e-learning. Regression analysis confirmed that limited prior experience, low self-confidence, and high perceived importance of the code of conduct increase stress levels (H5, H6, H7 confirmed). The findings highlight the need for targeted support and training in the use of e-learning tools, especially for teaching staff, as well as the importance of balancing academic integrity with stress management in digital learning environments.

Keywords

Academic stress, Digital skills, E-learning, Netiquette, Self-confidence

Introduction

The rapid adoption of e-learning in higher education has highlighted significant differences between professors and students in their perceptions, experiences, and acceptance of this mode of instruction. This study aims to investigate these differences in the context of the Croatian higher education system, focusing on factors such as technological acceptance, motivation, assessment practices, gender, e-learning skills, self-confidence in using e-learning tools, and the perceived importance of the code of conduct. Previous research suggests that professors tend to have medium to high levels of perception and acceptance of mobile learning, while students generally show high acceptance towards e-learning systems. Cultural backgrounds and gender differences also influence the motivation and perceived usefulness of e-classrooms. E-learning skills are crucial in determining student satisfaction, with case-based learning modules enhancing learner satisfaction and knowledge acquisition. Educators' self-confidence in using e-learning tools is closely linked to their perceived stress levels, with adequate support and training being essential to boost confidence and reduce stress. The perceived importance of the code of conduct in e-learning environments may exacerbate academic stress levels due to challenges in maintaining academic integrity. Based on the reviewed theoretical background, this study derives hypotheses to gain deeper insights into the state of the higher education environment in Croatia, addressing the multifaceted challenges and opportunities presented by the widespread adoption of e-learning.

1. Theoretical background

E-learning has become an integral part of higher education, with professors and students adapting to this new mode of instruction. This topic became even more critical after academics were forced to adapt to the e-learning environment during the Covid-19 crisis. However, significant differences exist between these two groups in their perceptions and experiences of e-learning. One key difference lies in the acceptance and motivation levels towards e-learning. While instructors tend to have medium to higher levels of perception and acceptance of mobile learning (Chen, 2016), students generally show high acceptance towards e-learning systems (Nurhafizah et al., 2020). This disparity may be attributed to the generational gap and familiarity with technology. Furthermore, cultural backgrounds can influence motivation in online

learning environments, with significant differences observed between American and Chinese online learners (Zhao and Mei, 2016).

The differences between professors and students in e-learning contexts are multifaceted, encompassing technological acceptance, motivation, and assessment practices. To bridge these gaps, higher education institutions should focus on providing training for professors on using online technologies and building interactive courses (Agrawal and Ting, 2023). Additionally, promoting effective interactions between students and professors in online classes can significantly impact students' cultural understanding and interest (Chong 2023), potentially leading to improved learning outcomes for both groups.

The perceived usefulness of e-classrooms also varies between genders, with several studies revealing interesting insights into this topic. Research has shown that both male and female students generally recognise the benefits of e-learning, but there are some notable differences in their perceptions and experiences.

A study conducted on undergraduate college students in Calcutta found that the perception of e-learning partially varied according to gender, among other factors such as residing areas and academic years (Manna and Basak 2020). This suggests that male and female students may have different views on the usefulness of e-classrooms. Similarly, a more extensive study revealed that gender, learning styles, and professional experience affect the perceived usefulness of different forms of e-learning (Toni Mohr, Holtbrügge and Berg, 2012). These findings highlight the importance of gender differences when designing virtual learning environments. Interestingly, some studies have found no significant gender differences in the perception of e-learning usefulness. For instance, a survey conducted during the COVID-19 pandemic showed no significant difference in the perception of e-learning between male and female students (Meinam, 2023). However, this study found significant differences based on educational level and urban-rural residency, suggesting that other factors may play a more prominent role than gender in some contexts. It is crucial for educators and curriculum designers to consider these potential differences when developing e-learning programs to ensure that they are equally effective and engaging for both male and female students.

Skills are another essential factor to consider when speaking about e-learning environments. E-learning skills are crucial in influencing student satisfaction with the e-learning environment. Developing these

skills enables learners to navigate online platforms effectively, engage with course content, and achieve desired learning outcomes (Gupta and Prashar, 2024; Jeong Kim, Pederson, and Baldwin, 2012). E-learning environments that incorporate case-based learning (CBL) modules have been found to enhance learner satisfaction and knowledge acquisition. Students who participated in tutorial sessions with CBL modules reported higher ease of use, satisfaction, and usefulness compared to those who only used tutorials (Jeong Kim, Pederson and Baldwin, 2012). This suggests that interactive and supportive e-learning environments catering to learners' needs and motives can increase satisfaction and better learning outcomes.

E-learning skills are found to be essential for maximising satisfaction with the e-learning environment. Developing competencies in online learning, self-efficacy, self-regulated learning, and technological proficiency can lead to improved engagement, better learning outcomes, and higher levels of satisfaction (Gupta and Prashar, 2024; Jeong Kim, Pederson and Baldwin, 2012; Saleeb and Dafoulas, 2010).

Besides skills, E-learning tools have become increasingly prevalent in academic settings, particularly during the COVID-19 pandemic. The relationship between educators' self-confidence in using these tools and their perceived stress levels is one of the most complex and multifaceted issues. Research suggests that teachers' self-efficacy beliefs and perception of e-learning system quality significantly influence their commitment to using these tools (San-Martín et al., 2020). When instructors feel confident in navigating and utilising e-learning platforms effectively, they are likelier to experience lower stress levels and higher job satisfaction (Islam, Beer and Slack, 2015). This is further supported by findings that indicate perceived usefulness and ease of access are key drivers of educators' intention to continue using e-learning systems (David and Lawal 2018).

However, it's important to note that the relationship between e-learning tool self-confidence and perceived stress is not always straightforward. While increased self-efficacy can reduce stress, implementing new technologies can also be a source of stress for some educators. For instance, Çetin and Dede (2018) reveal that perceived insufficient self-efficacy is positively correlated with job burnout among teachers (Çetin and Dede, 2018). This suggests that educators who lack confidence in their ability to use e-learning tools may experience higher stress levels and burnout. The COVID-19 pandemic has

further complicated this relationship. The sudden shift to online learning has caused fear and unrest in the education sector, with educators and students experiencing increased stress due to the rapid transition and the need to adapt to new teaching and learning modalities (Jamil, Him, and Yoke 2021). The stress experienced by educators in e-learning environments is not limited to the pandemic context. Online learning applications have increased academic workload over the last two decades even before 2019 pandemic (Islam, Beer and Slack, 2015). This underscores the importance of providing adequate support and training to boost educators' confidence in using e-learning tools, particularly during times of crisis or significant change.

The code of conduct is another new factor that academics have to face. The perceived importance of the code of conduct during e-learning can significantly influence stress levels and efficacy among academics, as they navigate the challenges of online education and maintain academic integrity. Research indicates that the rapid shift to remote teaching due to the COVID-19 pandemic has drastically impacted teaching, learning, and assessment methods (Vellanki, Mond and Khan, 2023). Many educators found themselves unprepared for this sudden transition, lacking experience in online teaching and assessment. This situation led to concerns about academic integrity, prompting the trial of new pedagogical concepts and modes to address perceived inadequacies (Vellanki, Mond and Khan, 2023). The pressure to adapt quickly while maintaining academic standards likely contributed to increased academic stress levels.

The perceived importance of the code of conduct in e-learning environments may exacerbate stress levels among academics due to the challenges in maintaining academic integrity. Educators face technical difficulties, problems due to lack of physical presence, student behavioural issues, and concerns about assessment design and process in online settings (Vellanki, Mond and Khan, 2023). These challenges can increase the pressure on academics to uphold ethical standards and ensure fair assessment practices, potentially leading to higher stress levels.

Based on the given review of the existing theoretical background, we derived hypotheses in the present research with the aim of gaining a deeper insight into the state of the higher education environment in the Republic of Croatia.

2. Hypothesis development

The willingness to use e-classrooms has been a frequently researched topic in recent years. The topic is all the more interesting during the Covid crisis, when users are more or less forced to use e-classrooms, which become the only available form of program implementation. Within these frameworks, it is definitely useful to distinguish between genders as well. Previous research has shown, that there was no significant difference between male and female undergraduate students in terms of their perceived ease of use and perceived usefulness of e-classroom for learning (Aderole and Sanni, 2022). The study indicated that both male and female students had positive perceptions of the ease of use and usefulness of e-classroom, with no notable variations based on gender. On the other hand, Amosa et al. (2020) conducted a study on breaking gender digital division through the use of virtual classrooms in the context of mathematics education. The study found that the majority of both male and female lecturers had a positive attitude towards the use of virtual classrooms for bridging the gender gap in the teaching-learning process. This suggests that there may be differences in the perceived usefulness of e-classrooms between genders (Amosa, Ogunlade and Obielodan, 2020). Based on these findings, we checked the gender difference in our population during the Covid crisis. With this goal in mind, we set up hypothesis H1.

H1: Perceived usefulness of e-classroom differs between genders.

As part of the research, we are interested in the differences in perceptions between students and professors. This issue also becomes particularly interesting in times of crisis, when the e-learning system is introduced suddenly, without prior preparation. It is precisely for this reason that the existing studies call for a comparison of the mentioned two populations since by examining both sides of the e-learning experience, institutions can better understand the needs and concerns of both professors and students, leading to more effective and inclusive online learning environments (Abbasi et al., 2020). Past research in other regions has shown

that students had a positive perception towards e-learning, with a majority of them expressing satisfaction with the online learning system adopted by their universities. However, professors had a more mixed perception, with some expressing concerns about the effectiveness of online teaching and the lack

of face-to-face interaction with students (Khan et al., 2021). Mentioned study highlights the need for universities to address the concerns of professors and ensure that they are adequately supported in delivering online courses. It also emphasises the importance of continuously assessing and improving the e-learning system to meet the needs and expectations of both professors and students during the ongoing pandemic.

Another study found that students had mixed attitudes towards e-learning, with some expressing concerns about the quality of education and lack of practical skills development. Professors, on the other hand, may have different perceptions based on their experiences and teaching styles (Puljak et al. 2020). That is why further research could investigate the specific differences in perceptions between professors and students in the context of e-learning during the COVID-19 pandemic, which was our goal. On this basis, we set up the hypothesis H2 with the corresponding sub-hypotheses.

H2: There are significant differences between professors and students observing:

H2a: Percieved stress levels in e-learning environment

H2b: E-learning experience before crisis

H2c: E-learning tools self-confidence

H2d: Percieved satisfaction with e-learning environment

H2e: Percieved usefulness of e-learning

H2f: Intention of using e-learning tools in the future

H2g: Percieved effectiveness of e-learning

H2h: E-learning skills before crisis

H2i: E-learning skills after crisis

H2j: Percieved importance of the code of conduct in e-learning environment

The research results provided by Almaiah, Al-Khasawneh and Althunibat (2020) focuses on exploring critical challenges and factors influencing e-learning system usage during the COVID-19 pandemic. While the research does not directly address the influence of e-learning skills post-COVID on future e-learning intentions, it sets the stage for understanding the complexities of e-learning adoption during crisis situations. By extrapolating from this study, one can infer that factors influencing e-learning system usage during the pandemic may also impact individuals' e-learning skills development and subsequent intentions for future e-learning use (Almaiah, Al-Khasawneh and Althunibat, 2020). Understanding the challenges and facilitating factors could therefor provide valuable insights into how e-learning experiences during

COVID-19 shape individuals' attitudes towards and readiness for continued e-learning engagement in the post-pandemic era.

Another study incorporated the Unified Theory of Acceptance and Use of Technology (UTAUT) model with the moderating variable of experience in e-learning. By examining how e-learning skills acquired during the pandemic impact future intentions for e-learning use, the research sheds light on the role of experience in shaping individuals' acceptance and adoption of technology in educational settings (Astuti, Otok and Wiguna, 2023). Factors such as adaptability, technological proficiency, engagement with course materials, and comfort with online platforms developed during the pandemic may play a crucial role in shaping students' satisfaction with e-learning (Makhlouf and Alani, 2022).

Some research has focused on skills acquired during a crisis and their impact on satisfaction with e-learning and their intention to continue using online education platforms. They reveal that students' satisfaction with e-learning courses had a significant correlation with their intention to continue e-learning, indicating a positive relationship between satisfaction levels and the desire to engage in online education. Additionally, factors such as information applicability and user satisfaction were identified as key drivers of e-learning continuance intention among students (Ghalavand, 2024). The results suggest that students' preparation, performance, and satisfaction with e-learning play a crucial role in shaping their willingness to continue using online learning platforms.

Understanding the impact of e-learning skills on satisfaction with online learning is essential for educators and institutions to enhance the effectiveness of e-learning platforms and improve students' overall learning experiences. By identifying and addressing the factors that contribute to students' satisfaction with e-learning, educators can create a more supportive and engaging online learning environment post-COVID-19. By studying differences in skills before and after crisis, we can gain insights into how e-learning skills acquired after COVID-19 may influence students' satisfaction with online learning. On this basis, we set up hypotheses H3 and H4.

H3: E-learning skills before crisis influence satisfaction with e-learning environment.

H4: E-learning skills after crisis influence intention for future use of e-learning environments.

In addition to the aforementioned questions, previous researches in connection with the Covid crisis

have highlighted the level of stress, which is influenced by various factors, such as experience with e-learning, self-confidence in using e-learning tools and the perceived level of importance of the code of conduct.

The study by Siron et al. (2020) highlights the importance of various factors influencing the adoption of e-learning, including perceived self-efficacy. In the context of e-learning stress levels, self-confidence, a component of self-efficacy, can significantly impact how individuals navigate and cope with the challenges of online learning environments. High levels of self-confidence may lead to reduced stress levels as learners feel more capable and empowered to handle the demands of e-learning. Additionally, the code of conduct (netiquette), encompassing behaviors such as respect for others, effective communication, and professionalism in online interactions, can also play a crucial role in mitigating stress levels. Proper etiquette fosters a positive learning environment, reduces conflicts, and enhances collaboration, ultimately contributing to a more supportive and less stressful e-learning experience. By understanding and promoting self-confidence and etiquette in e-learning settings, educators and institutions can help create a conducive and less stressful online learning environment for students (Siron, Wibowo and Narmaditya, 2020).

Some other studies have also shown that factors such as netiquette and self-confidence, influenced by the e-learning environment, can enhance students' enthusiasm for learning, potentially reducing stress levels associated with online education (Yang et al., 2021). The study that delves into the impact of the COVID-19 pandemic and e-learning implementation on the mental health status of university students in Malaysia. The research highlights the association between positive perception towards e-learning and COVID-19 with reduced levels of stress, anxiety, and depression among students (Moy and Ng, 2021).

In the context of e-learning environments, netiquette and self-confidence play crucial roles in influencing stress levels among learners (Malureanu, Panisoara and Lazar, 2021). Netiquette in online interactions encompasses behaviours such as respectful communication, adherence to academic integrity, and effective collaboration with peers and instructors. Maintaining proper etiquette fosters a positive learning environment, reducing potential stressors related to miscommunication or conflicts in virtual settings (Soler-Costa et al., 2021). Moreover, self-confidence significantly impacts how individuals engage with e-learning platforms and course materials. Students with high self-confidence are more

likely to approach online learning tasks with a positive mindset, resilience in the face of challenges, and a belief in their ability to succeed (Malureanu, Panisoara and Lazar, 2021). This self-assurance can mitigate feelings of inadequacy or anxiety commonly associated with e-learning, thereby reducing overall stress levels.

When considering the interplay between netiquette, self-confidence, and stress levels in e-learning, it becomes evident that cultivating a supportive and respectful online culture while nurturing students' self-belief can contribute to a more positive and conducive learning environment (Yaniawati et al., 2020). By promoting netiquette and fostering self-confidence in e-learning settings, educators and institutions can help alleviate stressors and enhance the overall learning experience for students. Based on these previous research findings, we constructed our hypotheses H5, H6 and H7.

H5: E-learning experience before crisis influence perceived stress level among academics.

H6: E-learning tools self-confidence influence perceived stress level among academics.

H7: Percieved importance of the code of conduct influence perceived stress level among academics.

3. Research

3.1. Methods

For the purpose of this research we gathered data from Croatian Universities and independent higher education institutions. Data were collected using an online survey running between 10th of November 2021 and 10th of December 2021. We asked participants to provide personal data such as gender, work status, age, and to answer the questions regarding the impact of the distance learning during COVID-19 pandemic on stress. The questionnaire was sent to a total of 123 addresses: universities, higher education institutions and higher vocational colleges.

We collected data using 7-point multi-item Likert scales. Participants were asked to express their agreement with statements where »1« is used for »I strongly disagree« while »7« means »I strongly agree«. All items were positively worded. The data was statistically analysed and tested using SPSS 22 software package.

3.2. Sample

For the purposes of the research, we observed two samples. Table 1 shows the age structure of both samples.

TABLE 1. SAMPLE DESCRIPTIVE

Sample	Gender/ years old	Percent
Professors N=118	Male	35,7
	Female	64,3
	26 – 40	38,0
	41 – 60	52,0
	> 61	10,0
Students N=708	Male	24,1
	Female	75,9
	< 25	78,8
	26 - 40	15,5
	41 - 60	5,7

Source: authors

The first is a sample of 118 professors, of whom 35.7% are men and 64.3% are women. The student sample consists of 708 students, of whom 24.1% are men and 75.9% are women.

3.3. Results and discussion

The results of this study indicate that there is no statistically significant difference in perceived usefulness of e-learning between the genders among professors ($t=-1,77$; $p=0,081$) nor among students ($t=-1,51$; $p=0,133$). On this basis, our hypothesis H1 is rejected.

Testing of hypothesis H2 consists of testing sub-hypotheses H2a to H2j. Table 2 shows the results of the parameter comparisons between the student and faculty populations. The table shows the statistical characteristics of the differences, the size of the difference and the Cohen's d effect size factor

TABLE 2. HYPOTHESIS TESTING RESULTS H2 (H2A–H2J)

Hypothesis	t	df	Sig.	mean diff.	Cohen's d
Percieved stress levels in e-learning environment H2a	2,527	169,8	0,012	3,558	0,244
E-learning experience before crisis H2b	-1,144	824,0	0,253	-1,075	-0,114
E-learning tools self-confidence H2c	2,612	184,2	0,010	1,047	0,232

Perceived satisfaction with e-learning environment H2d	1,704	193,7	0,090	0,946	0,151
Perceived usefulness of e-learning H2e	2,136	185,3	0,034	0,835	0,193
Intention of using e-learning tools in the future H2f	0,008	191,6	0,994	0,003	0,001
Perceived effectiveness of e-learning H2g	0,603	630,0	0,546	0,356	0,064
E-learning skills before crisis H2h	8,296	176,2	0,000	9,761	0,785
E-learning skills after crisis H2i	9,356	227,9	0,000	9,497	0,744
Perceived importance of the code of conduct in e-learning environment H2j	14,671	183,0	0,000	13,915	1,347

Source: authors

We found that the level of perceived stress among professors is significantly higher than among students. The effect size is still low (0.244). Hypothesis H2a is thus confirmed. The transition to the online environment proved to be more demanding for professors, primarily as a result of the increased responsibilities associated with the preparation and delivery of teaching under the new circumstances. We did not detect statistically significant differences between the groups in terms of experiences with e-learning, the perceived level of satisfaction with e-learning, the intention to use e-learning in the future, and the perceived level of effectiveness of e-learning. Hypotheses H2b, H2d, H2f and H2g are thus rejected.

Hypotheses H2a, H2c, H2e, H2h, H2i and H2j are confirmed. In the case of H2c, students reported a higher level of self-confidence in using e-learning tools. This may be because students perceive the use of digital tools as less risky, since errors in working with technology have fewer consequences for them, unlike professors who view their work through the lens of responsibility towards students and the quality of teaching, which may reduce their sense of security in applying these tools. In the case of H2e, students evaluated e-learning as more useful, while professors expressed a more cautious attitude, likely due to

concerns about the quality of instruction in the digital environment. The most significant ($p=0.000$) differences between the groups were detected in skills before (H2h) and after the Covid crisis (H2i) and in the perceived level of importance of behavior protocols when using online tools for mutual communication (H2j). As a result, a high effect size is naturally detected for the three parameters mentioned. Students demonstrated stronger digital skills both before and after the crisis. Professors made significant progress during the pandemic, indicating that the crisis acted as a strong catalyst for the accelerated development of their digital competencies. This progress is particularly important as it reflects the increased adaptability of academic staff and their willingness to adopt new technologies, despite having weaker starting positions compared to students. Unlike students, professors place greater emphasis on maintaining professional and ethical standards of communication in the online environment. This stems from their role as authority figures and their responsibility to uphold academic culture and discipline. For students, who often perceive online interaction as more informal, this aspect may appear less critical. However, the emphasis placed on this issue by professors points to a growing need for clear rules of digital communication in higher education.

Hypotheses H3 and H4 were tested in both observed groups with linear regression models. Results are presented in table 3.

TABLE 3. REGRESSION TESTING OF HYPOTHESES (H3 i H4)

E-learning skills		B	Std. Err.	t	Sig.
Students	After crisis influence intention for future use	0,154	0,015	10,270	0,000
Professors		0,138	0,052	2,648	0,010
Students	Before crisis influence satisfaction	0,136	0,022	6,068	0,000
Professors		0,172	0,052	3,325	0,001

Source: authors

The resulting regression coefficients are highly statistically significant in all cases. Such a result confirms the findings of related research, as it confirms the positive impact of mastering e-learning skills both on the intention of future use and on satisfaction with use. This applies to both professors and students. Hypotheses H3 and H4 are thus confirmed in both observed groups.

Hypotheses H5, H6 and H7 were also tested using the regression model. In this case, we are interested in the influence of the observed factors on the level of stress among all stakeholders of the study process. For this reason, we observe professors and students as one group. Table 4 shows the results of the regression model.

TABLE 4. REGRESSION TESTING OF HYPOTHESES (H5, H6 i H7)

	B	Std. Err.	Beta	t
(Constant)	57,606	3,236		17,800
E-learning experience before crisis.	-0,167	0,062	-0,103	-2,709
E-learning tools self-confidence.	-1,864	0,133	-0,557	-13,989
Perceived importance of the code of conduct in e-learning environment.	0,164	0,048	0,129	3,393

Source: authors

The expected lower level of mastery of e-learning skills and a lower level of self-confidence in using e-learning tools significantly increase the level of perceived stress. The lack of digital competencies and insecurity in handling tools represent a major source of stress in online education. This highlights the importance of developing digital skills in order to reduce the emotional burden on participants. Thus, hypotheses H5 and H6 are confirmed. The confirmation of these hypotheses further emphasizes that digital competence and self-confidence are important psychological factors that directly affect well-being and stress levels in e-learning. We can also confirm hypothesis H7 with a high level of statistical characteristics, as the results show that the more an individual stakeholder perceives the importance of the code of conduct, the more he is exposed to stress when using e-learning tools. Although awareness of the importance of the code of conduct contributes to professionalism in the online environment, it can also generate additional stress. This is particularly evident among participants who feel a strong responsibility for maintaining academic and ethical standards in the virtual space.

4. Limitations and recommendations for future research

When interpreting the findings of this study, we must, of course, also bear in mind its essential limitations. A key restriction stems from the survey's time frame: it was conducted during the COVID-19 pandemic. The findings are therefore strongly tied to

the experience of a forced, rapid transition to online learning, which may not reflect perceptions in today's calmer, planned, and long-term-established online programs. This fact, therefore, makes it difficult to compare with today's times and requires caution in applying the findings today. Furthermore, the research is geographically limited to the Croatian higher education system, which limits the possibility of direct generalisations to other cultures and educational systems. Also, the use of a cross-sectional survey and self-assessment on a Likert scale represents a methodological limitation, as it relies on participants' subjective perceptions and does not capture long-term dynamics of change.

Future research could certainly build on this study with longitudinal follow-up, which would be aimed at determining whether increased digital literacy of professors and lower levels of stress in students persist well into the post-pandemic period. It is imperative to include an analysis of the impact of new technologies, such as artificial intelligence (AI), on the distance learning process. It would be necessary to investigate how AI affects academic integrity and netiquette – factors that proved to be a significant source of stress in this study. We also believe that future comparative studies with other countries could enrich the understanding of the cultural and systemic dependence of our findings.

5. Conclusion

Based on the research sample, which included 118 professors and 708 students from Croatian higher education institutions, it can be concluded that professors experienced a higher level of stress during the transition to the online environment, but at the same time achieved significant progress in digital competencies and placed greater emphasis on the importance of academic integrity and netiquette. Students, on the other hand, demonstrated greater self-confidence in using digital tools and more advanced digital skills, perceiving e-learning as a more useful and less stressful form of education. The results indicate that digital competencies and self-confidence in applying tools represent key factors of satisfaction and future intention to use e-learning, while limited prior experience and insecurity in working with technology increase stress levels. At the same time, the emphasized importance of netiquette contributes to the professionalism of online interactions but can also generate additional stress among participants who feel a strong responsibility to maintain academic integrity. In addition to technical and organizational aspects, e-

learning also opens psychological challenges related to motivation, stress, and adaptation to new forms of teaching and learning. Given that the present time is characterized by the growth of online study programs and the increasing need for the development of sustainable digital education solutions in higher education, the findings of this study from the crisis period can provide valuable insights for the development of online programs. The focus should be on systematically strengthening digital skills, supporting professors in building self-confidence in the use of tools, and applying a balanced approach to academic integrity and netiquette in order to reduce stress and ensure the quality of education. For higher education institutions, this means providing targeted training, developing students' digital and metacognitive skills, and establishing clear rules of online communication. The successful implementation of e-learning requires a holistic approach that integrates the technical, pedagogical, and psychological dimensions of digital education, which is fundamental to shaping sustainable and high-quality online study programs. In addition to technical and organisational aspects, the findings therefore show that e-learning also raises psychological challenges related to motivation, stress and adaptation to new forms of teaching and learning. Given that the current era is marked by the growth of online degree programs and the growing need to develop sustainable digital education solutions in higher education, the findings of this crisis-era study can offer valuable insights that are certainly a helpful tool in the development of current online programs. The findings show a need to strengthen digital skills systematically, support professors in building self-confidence in using tools, and adopt a balanced approach to academic integrity and netiquette. In this way, it is possible to reduce stress while simultaneously increasing stakeholders' motivation. For higher education institutions, this means providing targeted training, developing students' digital and metacognitive skills, and establishing clear rules for online communication. The successful implementation of e-learning, therefore, requires an integrated approach that encompasses the technical, pedagogical, and psychological dimensions of digital education, which serves as the basis for the creation of sustainable, high-quality online study programmes. The findings of this study also help us to shape our attitude towards artificial intelligence, which has already become a permanent fixture in the education system. The future of digital education, enriched by AI tools, requires academic staff not only to have technical competence, but also the

mentioned metacognitive skills for critical evaluation and the ethical use of these technologies. The importance of academic integrity and netiquette, therefore, becomes even greater. This is one of the reasons why it is all the more critical for institutions to offer comprehensive, targeted training that improves the digital skills and self-confidence of all stakeholders, thereby creating a holistic, high-quality and psychologically supportive online study programme.

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