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Chapter

Social Media in Higher Education Research and Practical Insights

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Abstract

Social media enable students to learn in a way that is adapted to them; they started a virtual life on social media when they were growing up and do not know a world where computers, mobile phones, and social media do not exist. However, as numerous research showed before the COVID-19 pandemic, it is not them who are hesitating, but teachers and higher education institutions. The results of research conducted in 2019 and presented in this chapter showed that a positive impact on the teachers' use of social media for higher education purposes could have higher education institutions through the implementation of education for both teachers and students on the use of social media. The results of research conducted in 2021 showed that teachers consider easier and faster access to information, when and where it is needed, as the most important characteristic of social media usage for higher education purposes during the COVID-19 pandemic. Even before the COVID-19 pandemic and especially since, social media's impact on society has caused changes that necessitate a shift in the educational worldview from one that is rooted in the past to one that is forward-looking and progressive.

Keywords: social media, higher education, college teachers, students, COVID-19 pandemic

1. Introduction

Social media enable the creation and sharing of information, ideas, and interests through virtual communities and networks whose purpose is to turn communication into an interactive dialog. The students studying today are members of the generation that started a virtual life on social media when they were growing up and do not know a world where computers, mobile phones, and social media do not exist. Before the unexpected COVID-19 pandemic, numerous studies indicated a digital gap between students and their educational institutions, in the sense that students are willing to use them, and faculty employees are not, as well as that they are more inclined to think about disadvantages instead of advantages.

In this chapter, some lessons that the crisis caused by the COVID-19 pandemic has taught us, types of social media, and the possible purposes of using social media for the needs of higher education will be presented.

In the research part, two studies will be presented, before and after the Covid pandemic, on a sample of higher education teachers. The first research will show the

significance of the constructs that influence teachers' use of social media in the higher education process and the advantages and disadvantages of social media according to teachers' opinions. The second research will present factors that facilitated the use of social media for the purposes of higher education while performing mandatory online classes during the COVID-19 pandemic, characteristics of social media that have affected the reduction of teachers' stress during mandatory online classes during the COVID-19 pandemic as well as characteristics of social media that have affected the increase in teaching stress during mandatory online classes during the COVID–19 pandemic.

2. What can the crisis caused by the COVID-19 pandemic teach about teaching?

The year 2020 brought new challenges to all of humanity, the global economy, but also the entire education, which no one could even imagine just a few months ago. Higher education institutions faced a significant challenge as the SARS-CoV-2 coronavirus, also known as COVID-19, spread throughout the world: how to continue teaching if in-person lectures are forbidden per the directives of the government and the civil protection headquarters? Many colleges found themselves facing a test of their ability to function since they were unprepared for this task, particularly in the beginning, following the ominous prediction of Drucker in 1997 [1]: "Thirty years from now, the big university campuses will be relics. Universities won't survive." Drucker also claimed that video distribution may lower expenses and eliminate the need for school structures while expressing concern about the rising cost of education. "Already we are beginning to deliver more lectures and classes off campus via satellite or two-way video at a fraction of the cost. The college won't survive as a residential institution. Today's buildings are hopelessly unsuited and totally unneeded."

Of course, other higher education institutions were somewhat more prepared and started, immediately or shortly after closing, with online classes as a short-term solution. Teachers, as leaders of online classes, should have made additional efforts to familiarize themselves (in more detail) with technology and use the new digital tools through which a particular higher education institution conducted classes (screen sharing, presentations, chat, polls, even holding online exams, etc.), mostly with the help of technical support.

Numerous research are still ongoing, concerning satisfaction with online teaching, and judging by the current experience, teachers, and students who participated in this type of "forced" and "unprepared" or more precisely unexpected online teaching, believing that this online teaching was the best a possible solution at a given time and in given circumstances, but many agree that it cannot replace the face-to-face teaching experience. Very often, the results of studies on distance learning versus face-to-face learning, which have been carried out since the 2000s, have shown that (i) students prefer face-to-face classes, but also that students want to actively engage in their learning [2].

Extraordinary preventive measures due to the threat of infection with the SARS-CoV-2 coronavirus, in addition to fear and uncertainty, significantly changed the lives of individuals and the community, which then additionally caused stress and a threat to the mental health of the individual and the entire community [3, 4], and are numerous experts tried to communicate recommendations on how to preserve mental health and how to "manage" our experience of risk and fear. One of the most

important recommendations was "it is important to connect with each other and provide support and help while respecting all the recommendations of health and other competent institutions, especially social distancing. Modern technology can help us in this, that is, social media, e-mail, mobile phone, etc., which enable us to communicate with our loved ones, respecting the recommendations of experts about reduced direct contacts and social distance" [3, 4]. As a result, adaptation to the recently developed scenario was defined by the employment of (digital) interactive technologies, most frequently social media, through which a seemingly hopeless situation was changed into a surmountable one. These digital tools enabled at least the partial functioning of life as we knew it before and the continuation of studies instead of the complete cessation of "life," reducing not only the fear of the threat and the resulting uncertainty but also the social separation and distancing of people, which also negatively affect the psychological health of people. However, for example, the research "How we are - life in Croatia in the age of corona" showed that online teaching was a source of great stress [5], there were many challenges, and apart from working from home, where clear boundaries between business and private life most of them are related to everything mentioned so far in this doctoral thesis. Accordingly, the fundamental question is whether the stress caused by online teaching and the use of new digital tools would have been much milder if adaptation to the digital environment had started earlier, that is, if we had become more familiar with these digital tools before the extraordinary circumstances and before it became a kind of necessity and compulsion? [3].

3. Social media tools

Social media platforms make it possible to create and share content across virtual communities and networks with the goal of transforming communication into interactive discourse. There are 13 subtypes, including blogs, microblogs, social networking tools for business and networking, collaborative projects, forums, photo-sharing tools for business, product and service evaluations, research networks, social games, and virtual worlds [6]. They can be accessed from many devices and locations around the clock, 7 days a week. They are therefore solely dependent on the availability of the internet and the users' will. They have an impact on politics, the economy, science, and the educational system. There are many divisions of social media, and new subtypes are possible every day. The following typology, used according to Aichner and Jacob in 2015 [6], defines the scope and applicability or use of the proposed models. **Table 1** lists the types of social media with associated descriptions.

As a result of the emerging globalizing environment, various social, economic, cultural, and demographic changes require a long-term reflection on the position of education and science in society, especially because the capital of human knowledge in modern societies means an advantage over financial capital. Changes in that globalized world, thanks to the development of new technologies, are fast and difficult to predict, and education can play its role in the triangle of knowledge; lifelong learning, science, and innovation, to be fulfilled more permanently if the results of research and innovation have an adequate impact on educational processes. Consequently, educational environments must be improved by encouraging creative thinking and innovative action [7], and social media cannot be overlooked or neglected in this process. The following will explain the possible purpose of using social media for higher education.

Types of social media	Description
Blogs	An online diary, blog, vlog, or web blog is a chronological list of posts on the web that visitors can read and comment on, arranged so that the latest news/articles are at the top of the page. They are managed by individuals or companies, they can be personal, business, or thematic, in the form of a magazine.
Sharing photos	Web services for sharing photos provide their users with services, such as uploading, server services (hosting), sharing and managing photos: online editing, organization into albums, users can view them, comment on them, and the like.
Video sharing	Websites or software that allow their users to share, watch and search for videos. Some services offer private video-sharing options, as well as services for public posting of video content. Although they may charge for their services, they are generally available for free. They may have defined restrictions on the size of the record, duration, topic, or format, especially in connection with the publication of inappropriate content or restricting the access of minor users. Companies often use them for advertising (and thus to reduce costs which are much lower compared to TV advertising).
Social games	Networked social gaming enables or requires social interaction between players, as opposed to, for example, independent online gaming. They often involve multiple players, such as card games, board games (in which pieces or pieces are placed, moved, or removed on a predefined and marked surface according to a set of rules), role-playing games, alternate reality games, mass video games, and the like.
Social bookmarking	Online services enable organizing, saving links, and tagging on a centralized platform to share it with friends and other users to make the content more accessible and searchable, although some pages have the option of privately storing bookmarks. Social bookmarking websites are a valuable indicator of the popularity of websites and other web content.
Social networks	A type of internet service that serves to network/connect their users, get to know each other, share common interests, and participate in joint or similar activities. Users have their own individual profiles, which can be found by other users if they use their full (real) first and last name, and can upload and publish/share their thoughts, ideas, photos, and videos. They can also be used by companies to inform or provide support to existing or new users of their services and products.
Social networks of companies	Company social networks are open to employees of a specific company or group. Given that they have common business interests and/or activities, networking increases the efficiency of knowledge management within the company. They offer similar features as social networks, for example, personal profiles, profile photos, etc. They help to get to know each other and share experiences and ideas. Social software is used mainly in the context of a "company/enterprise" as a business or commercial tool, for example, an intranet, for organizing communication, collaboration, and other aspects of its business, but also for external social networking to increase the "visibility" of its companies.
Forums	An online forum that allows its users to exchange opinions and experiences via a web browser. It is easy to use because it resembles a message board, and participants can read and post messages on it (not in real-time, such as during chat). It is most often organized thematically for easier navigation. In a discussion on a certain topic, users can participate by posting anonymous messages ("post"), without revealing their real identity, but which are visible to all users until/if they are deleted by the moderator/administrator of the forum.

Types of social media	Description
Microblogs	Network microblog, a shorter blog that differs from classic blogs in that it contains only short messages of up to 200 characters, photos, videos, and other records, the length of messages on twitter is tentatively taken as a criterion (the limit is 140 characters). Users can subscribe (become "followers") to news/ announcements from other users, celebrities, companies, brands, and the like. They represent a combination of blogs and social networks.
Business networks	A complex network of companies that retain their autonomy but join together and act jointly to achieve certain strategic and operational business goals, and to increase competitiveness and innovation. They often include cooperation agreements to make it easier for companies operating in different countries/ regions to achieve common goals in the international market. The synergy of a business network is more than the sum of individual companies. It includes suppliers, distributors, customers, developers, and others to support the information and operational requirements of the business.
Overview of products and services	Websites that allow you to view products and/or services, provide information about them, and sell them. Users have the option of rating and commenting on products and services or their specific characteristics and attributes, such as quality, and can write or read existing reviews of them. This type of website is usually professionally designed, so often because of specialized marketing, the reviews are not objective. Likewise, there is a possibility that negative reviews may be written by competitors, disgruntled employees, or third parties with a negative and/or non-objective orientation.
Collaborative projects	Social media apps with two subcategories; research and development projects, which bring together users with a common interest or knowledge to plan, develop, research, and test technological, academic, scientific, or entertainment projects. They enable joint and simultaneous creation of, for example, programs, codes, discoveries, games, and achievement of results. They are usually distributed as open source and made available to the public free of charge.
Virtual worlds	Computer-supported social environments are designed and shared by users to interactively participate in a simulated and user-created world. They can create a personal avatar and simultaneously participate in the exploration of the virtual world, but also in communication and activities with other users, thus exploring human nature and user capabilities. Unlike video games, in virtual worlds, time continues even when the user is not present or logged in. Virtual currencies that have real values are often used. Their purpose is often entertainment, but they also have social, educational, and many other purposes.

Table 1.
Description of social media [3, 6].

4. The purpose of using social media in higher education

For educational environments to be improved by encouraging creative thinking and innovative action, state education strategies often foresee measures for the development and expansion of e-learning, the introduction of expert teaching systems and other modern teaching methods based on information and communication technology, the dynamic development and application of which radically change the paradigms of learning and education, with impacts and consequences that are difficult to predict on future ways of acquiring, transferring and applying knowledge, skills, values, and attitudes [7].

On the trail of such measures, the range of social media enables a wide range of possible purposeful ways of use, and in addition, they are constantly increasing and generating new possibilities of use. Some possible purposes are listed in the following **Table 2**.

The purpose of using social media in higher education	Areas of application
General information	• General informing. • To update upcoming and past events. • Monitoring of events in real-time. • Sharing presentations on special events. • Sharing of information related to studies.
Organization	• Organization of meetings. • Event organization. • Personal organization (both students and staff). • Class schedule.
Marketing	• Attraction of new students. • Promotion of higher education. • Promotion of quality and excellence.
Teaching	• Presentation of course content. • Informing students about courses. • Explaining to students about teaching literature. • Notifying students about exams.
Research work	• Research. • Finding sources and references. • Publishing magazines. • Libraries' purposes: publishing, visibility, metrics. • Publication of professional or scientific papers (both with students or with fellow teachers). • Conducting conferences or as part of presentations.
Project work	• Facilitating project work. • Encouraging work on projects. • Conducting workshops.
Student support	• Offering assistance to students outside their studies. • Counseling on the personal development of students. • Workshops on financial aid and scholarships. • Assistance with student retention. • Improving student satisfaction.
Help in learning	• Encouraging active learning. • Respect for different talents and ways of learning. • Workshops on easier learning. • Workshops on mental mapping. • Improving knowledge and skills in areas, such as science, technology, literacy, environment, humanities, STEAM, and other teaching areas and topics. • Inspiring writing and creativity. • Aggregation of applications on social media.
Community building	• Heightening student focus. • Encouraging connections between students and higher education institutions. • Improving communication between higher education institutions and students.

The purpose of using social media in higher education	Areas of application
	• Enabling feedback in all directions. • Building and strengthening the campus community. • Establishing and upholding individual learning settings, etc. • Giving online students more of a sense of community.
Creating connections with the wider community	• Supporting an event, team, and community support. • Encouraging students to participate in the activities of the wider community. • Recognition of the accomplishments and successes of the students. • Highlighting the successes of the teacher
Maintaining connections with almuni	• Maintaining connections with alumni. • Connecting enrolled students with alumni.
Professional orientation	• Informing students about practice. • Sharing of materials for professional development.

Table 2.
Purposes of using social media in higher education [3].

The globe has become smaller because of social media, according to Raut and Patil in 2016 [8]; people have access to more knowledge, information, and opportunities to apply it. With their aid, it is now feasible to process material that would have been too difficult for humans to understand just 20 years ago, and in addition to speeding up our education and training, talents are also identified more quickly [8]. They have also increased our ability to absorb information.

Social media use in higher education is subject to both pro and con arguments.

5. General implications of the use of social media in higher education

The main educational implication of social media is the seemingly changing nature of the relationship between students and information and knowledge. The epistemological tenets of formal education and tailored instruction are fundamentally different from the modes of knowledge generation and consumption that social media promote [9]. These changes are embodied in Thomas and Seely Brown's [10] description of a technology-enhanced "new culture of learning"—that is, learning based on the principles of collective inquiry, play, and innovation rather than individualized instruction. The generation of today's students has organically grown up with social media. Additionally, they have little knowledge of a world without computers, smartphones, or social media. A technology that has been widely embraced by students is social media, which has the potential to be a useful tool for boosting communication in the classroom and student cooperation with professors [11].

However, several studies show that there is a digital divide between students and their educational institutions; students are willing to use them, and faculty employees are not [12].

To investigate in practice whether this is the case, that is, what affects teachers" use of social media, a survey was conducted in 2019.

6. The teachers' attitudes about the use of social media in higher education

The research conducted in the Republic of Croatia, in the institutions Algebra University College and University of Applied Sciences Baltazar Zaprešić in the year 2019, on the convenient sample of 73 teachers in scientific-teaching and associate positions as shown in the until now partially published research [3, 13].

It was necessary to investigate teachers' perception of social media and whether and to what extent teachers use social media for higher education. The subject of this research was social media and whether teachers use it for higher education. The goal was to examine how teachers evaluate the role and importance of social media as a communication channel for the needs of higher education.

The study aims to ascertain whether teachers use social media for higher education and demographic factors like age, gender, and the scientific field of the teacher's primary teaching and/or associated profession affect their use of social media for higher education, as well as teachers' attitudes, social influence, and anxiety when using social media.

The specially constructed survey questionnaire was designed according to the adapted UTAUT model [14]. The use of technology, in general, can be influenced by numerous factors; therefore, in 2003, Venkatesh et al., based on a review of eight models of earlier theories and by consolidating constructs, created and empirically validated the unified theory of acceptance and use of technology (UTAUT). According to the UTAUT model [13], behavioral intention (intention to use in the next 12−24 months) and (actual) behavior, that is, technology use, are distinguished. It is assumed that behavioral intention is significantly influenced by:

- expected work performance (a person's degree of belief that the use of technology will help his work performance),

- expected effort (a person's degree of belief about the ease of using technology),

- social influence (the degree of a person's perception that important people believe that he should use new technologies).

While behavioral intention and facilitating conditions (a person's degree of belief that there is an organizational and technological infrastructure that supports the use of technology) significantly contribute to the actual use of the system.

The structure of the sample according to age was as follows: 0% of teachers were younger than 20 years of age, 8.2% were 21−30 years of age, and the same proportion of teachers was 61 years of age or older. The largest share is teachers aged 31−40, 39.7% of them, and teachers aged 41−50, whose share was 30.1%. 13.7% of teachers were in the age group 51−60.

The total ratio of participating teachers by gender was 56.2% of the male population and only 43.8% of the female population. The male gender was slightly more represented among teachers.

The results of this research showed that gender, age, and the scientific field of the teacher's profession do not significantly affect the actual use of social media by teachers, but there are statistically significant relationships between individual teachers' attitudes toward the use of social media, social influence, variations in anxiety during of social media use [13], expected work performance and teachers'

intention to use social media for higher education purposes on the frequency of teacher use of social media, as summarized in **Table 3**.

It is significant to notice that the results of this research showed that demographic characteristics of teachers such as age, gender, and the scientific field of the teacher's profession do not affect the frequency of teachers' use of social media for higher

Dependent variable	Independent variables	Explanation
Social media usage for higher education purposes	Gender	The connection is not statistically significant.
	Age	The connection is not statistically significant.
	Academic field	The connection is not statistically significant.
	Attitude toward using SNS for higher education purposes	The connection is not statistically significant: • Teachers should use social media more actively to teach students. • Higher education institutions should adopt a policy of using social media for study purposes. The connection is statistically significant: • Higher education institutions should educate teachers about the use of social media. • Higher education institutions should educate students about the use of social media.
	Social influence	The connection is not statistically significant: • College teachers use social media for higher education purposes. • Friends and close acquaintances of teachers use social media for higher education purposes. The connection is statistically significant: • Students who feel that teachers should use social media for higher education purposes. • Faculty management supports the use of social media for higher education purposes.
	Computer anxiety when using social media for higher education purposes	The connection is not statistically significant: • Feeling concerned about using social media for higher education purposes. • Feeling scared that she could / could lose a lot of information when using social media for higher education purposes if she did something wrong. • The hesitation to use social media for higher education purposes is for fear of errors that cannot be corrected. The connection is statistically significant: • The feeling that using social media for higher education purposes is a little scary.
	The self-confidence of teachers when using social media for higher education purposes	The connection is not statistically significant: • I could complete a job using social media for higher education even if there was no one to tell me what to do during the execution. • I could complete work using social media for higher education if I had professional help available when I got stuck.

Dependent variable	Independent variables	Explanation
		• I could complete work using social media for higher education purposes if I had enough time available. • I could complete work using social media for higher education needs if I had a built-in help system.
	Organizational factors	The connection is not statistically significant: • The higher education institution where I work is open and flexible to new ideas. • I believe that Croatian higher education institutions should adopt a policy of using social media for the needs of higher education. • I believe that Croatian higher education institutions should educate teachers about the use of social media for the needs of higher education. • I believe that Croatian higher education institutions should educate students about the use of social media for the needs of higher education.
	Facilitating factors (conditions) of using social media for higher education purposes	The connection is not statistically significant: • I have the resources needed to use social media for higher education purposes (for example, internet access, computer/tablet/ mobile device...). • I have the knowledge necessary to use social media for higher education. • The higher education institution where I work encourages the use of social media for higher education purposes. • Professional help is available to me for all questions concerning the use of social media for higher education purposes.
	Expected effort for using social media for higher education purposes	The connection is not statistically significant: • The use of social media is clear and understandable to me. • I am skilled in using social media. • I think social media are easy to use. • I easily communicate, collaborate through social media, share and search content, and use social media in other ways.
	Expected work effects of using social media for higher education purposes	The connection is not statistically significant: • Social media enable me to hold classes faster and easier. • Social media increases my effectiveness as a teacher. • The use of social media enables students to master the teaching material more easily and quickly. The connection is statistically significant: • The use of social media for study purposes enables students to achieve better results during their studies

Dependent variable	Independent variables	Explanation
	Intention to use social media for higher education purposes	The connection is not statistically significant: • I intend to use social media for higher education purposes in the next 12 months. The connection is statistically significant: • I intend to use social media for communication and cooperation with students. • I intend to use social media for educational and research purposes. • I intend to use social media for communication and cooperation with the higher education institution where I work

Table 3.
A summary of factors that (do not) influence the frequency of teachers' use of social media for higher education purposes; Pearson's chi-square test, N = 73 [3].

education, and this is also the case with individual attitudes toward use, social influences, and anxiety during use. However, it is not negligible that at the same time the frequency of teachers' use of social media for higher education would have a significant positive impact on higher education institutions through the implementation of education for both teachers and students on the use of social media, which could reduce their feeling that the use of social media is for higher education a little scary.

Likewise, regarding the frequency of teachers' use of social media for higher education, it is significant that students believe that teachers should use social media for higher education, as well as support the faculty administration regarding the use of social media for higher education.

Additionally, the research showed that there is no statistically significant relationship between teachers' self-confidence when using social media for higher education purposes, organizational factors, facilitating conditions for using social media for higher education purposes, and the expected ease (effort, effort) of using social media for higher education purposes. And the frequency of teachers' use of social media for higher education purposes. However, the results also showed that there is a statistically significant relationship between the expected work performance of using 'the use of social media for study purposes enables students to achieve better results during their studies and the teacher's intention to use social media for higher education in the next 12 months and the frequency of teacher use social media for the needs of higher education.

To gain an even deeper insight into teachers' attitudes about social media to the needs of higher education, teachers were asked to select which characteristics of social media teachers consider being advantageous. More than half of the teachers' survey point out easier and faster access to information, when and where it is needed, sharing ideas and experiences, photos and videos, flexibility in choosing technologies, quick feedback, and the possibility of creating digital content, as the main advantages of social media. While less than 20% of them pointed out reliability in continuous use over a longer period and the possibility of testing existing teaching models as advantages. The results are presented in percentages in **Table 4**.

Also, teachers were asked to select which characteristics of social media teachers consider disadvantaged. More than half of the interviewed teachers pointed out fewer

Characteristics of social media that teachers consider to be advantages:	
Easier and faster access to information, when and where it is needed	76.7%
Sharing ideas and experiences	64.4%
Sharing photos and videos	64.4%
Flexibility regarding the choice of technologies	57.5%
Fast feedback reactions	53.4%
The possibility of creating digital content	50.7%
Following current topics	49.3%
Marketing and recruitment of new students	47.9%
Expense reduction	45.2%
Strengthening ties with the wider local community, but also with people around the world/ international community	40.1%
Independence from a particular platform (e.g., computers, availability already with internet access and a browser)	39.7%
The possibility of integrating various web 2.0 technologies in learning and teaching activities	37.0%
Less time and effort needed to search for and manage information	37.0%
Optional access	35.6%
Maintaining existing contacts and connections	35.6%
Possibility of access control through user authentication	31.5%
Low level of complexity of use (minimum skills required)	31.5%
Focus on innovation in learning, not technology itself	31.5%
Acquisition of IT education	28.8%
The possibility of making new acquaintances	28.8%
Increasing the way of learning due to the variety of new technologies	27.4%
Strengthening self-confidence and motivation through interaction with other users	27.4%
Compatibility with fields of education	23.3%
Supporting existing or new businesses	23.3%
Reliability in continuous use over a long period	19.2%
Possibility of testing existing teaching models	15.1%
None of the above	2.7%

Table 4.
Characteristics of social media that teachers consider to be advantages, N = 73 [3].

characteristics as the main disadvantages than as advantages and that; neglecting direct communication (face-to-face), the possibility of false identities, and privacy issues (lack of privacy …), while less than 10% pointed out that they are monetarily quantified (everything becomes "business" and "numbers"), they hide behind technologies and concepts that have not yet been sufficiently defined/researched, become a type of used web, that is, a medium for people with a low level of digital skills, time and knowledge spent on using it, the speed of the program is incomparably lower than the speed of desktop programs, the content means nothing to itself, it is only electronic "waste." The results are presented in percentages in **Table 5**.

Characteristics of social media that teachers consider to be disadvantages:	
Neglecting direct communication (face-to-face)	58.9%
The possibility of false identities	57.5%
Privacy issues (lack of privacy...)	52.1%
Decrease in social skills	49.3%
They promote the offer of amateur content generated by users	39.7%
Stalking	38.4%
Electronic violence	34.2%
Information is offered in open sources with very unclear meaning and quality	34.2%
The possibility of developing an addiction	30.1%
They lead to low quality of the actual content	26%
They have limited security	26%
They give everyone a chance to complain, thus creating a community without rules	23.3%
They encourage negative behavior such as immorality and laziness	21.9%
Pedagogical expectations are reduced instead of the other way around	21.9%
Lack of systematic education on the use	20.5%
Scientific communication is becoming (too) informal	20.5%
Internet connection required (especially broadband connection)	16.4%
They negatively affect health (for example, diseases of the spine, and eyes...)	16.4%
They increase the gap between generations	16.4%
The extremely diverse offer of social media that can be used only makes it difficult to choose	11.0%
They are monetarily quantified (everything becomes "business" and "numbers")	9.6%
They hide behind technologies and concepts that are not yet sufficiently defined/researched	9.6%
They are becoming a type of second-hand web, that is, a medium for people with a low level of digital skills	6.8%
Time and knowledge spent on the use	6.8%
The speed of the program is incomparably lower than the speed of desktop programs	5.5%
The content means nothing in itself, it's just electronic "waste"	4.1%
None of the above	5.5%

Table 5.
Characteristics of social media that teachers consider to be disadvantages, N = 73 [3].

7. Post covid situation research results

The research was conducted in the Republic of Croatia, at the institution Algebra University College in the year 2021, on the convenient sample of 38 teachers in scientific-teaching and associate positions as it will be shown, not published by now.

After the forced and unexpected mandatory online classes during the COVID-19 pandemic, it was necessary to reinvestigate the perception of teachers about social networks and whether and to what extent teachers use social networks for higher

education. The goal was to examine how teachers evaluate the role and importance of social media as a communication channel for the needs of higher education during that period, and which circumstances they perceived as facilitating and which as aggravating.

Teachers were once again offered adapted constructs from the research conducted in 2019. The structure of the sample according to age was as follows: 0% of teachers were younger than 20 years of age, and 7.9% were 21−30 years of age, The largest share is teachers aged 31−40, 31.6% of them, teachers aged 41−50, whose share was 44.7%, teachers aged 51−60, whose share was 10.5%, and 5.3% teachers above 61 years of age. The total ratio of participating teachers by gender was 71.1% of the male population and only 28.9% of the female population. The male gender was more represented among teachers.

As the factor that teachers believe made it easier for them to use social media for higher education purposes during mandatory online classes during the COVID-19 pandemic, they singled out their self-confidence when using social media for higher education purposes, followed immediately by teacher training on the use of social media.

The questionnaire developed for the teachers was shared via a link to the online Google questionnaire form. The questionnaire contained questions related to demographic data (age, gender), statements about the existence of factors that facilitate the use of social media for higher education purposes during mandatory online classes during the COVID-19 pandemic, for which they could choose pre-offered answers of five degrees on a Likert scale of agreement, with one indicating that they do not agree at all, and five indicating that they agree, and finally, they could indicate which social media features they now consider advantages and which disadvantages.

The analysis was quantitative, and the results are presented descriptively below. From the results in **Table 6**, it can be noticed that the most significant factors that facilitated the use of social media for higher education while performing mandatory online classes during the COVID-19 pandemic, according to teachers were teachers' (own) self-confidence when using social media for higher education purposes, their training on the use of social media, fellow teachers who use social media for higher education purposes as well as the availability of professional (technical) support. It was of less importance to students' education on the use of social media, institution-level social media usage policy, students' expectations that teachers will use social media for higher education purposes (which happened by itself due to circumstances), or ease of use.

The teachers also singled out the characteristics of social media that have affected the reduction of stress during mandatory online classes during the Covid-19 pandemic, as shown in **Table 7**. They highlighted easier and faster access to information, when and where it is needed, as the most important characteristic of social media usage for higher education purposes during the COVID-19 pandemic, followed by sharing ideas and experiences, fast feedback reactions, and a low level of complexity of use. Under the given circumstances, stress reduction was least influenced by the characteristics of strengthening ties with the wider local community, and also with people around the world/international community, marketing and recruitment of new students, as well as the possibility of making new acquaintances.

During the Covid pandemic, it was most difficult for teachers to deal with the neglection of direct communication (face-to-face), while characteristics of social media that have the most affected the increase in teaching stress during mandatory online classes during the **COVID**-19 pandemic were a decrease in social skills and

Factors that facilitated the use of social media for higher education while performing mandatory online classes during the COVID-19 pandemic	Arithmetic mean of factor rating (M)
Teachers' (own) self-confidence when using social media for higher education purposes	4.02
Teacher training on the use of social media	4
Fellow teachers who use social media for higher education purposes	3.91
Availability of professional (technical) support	3.86
Education of students on the use of social media	3.84
Organizational factors (institution-level social media usage policy)	3.81
Students' expectations that teachers will use social media for higher education purposes	3.71
Ease of use (easy to communicate and collaborate through social media)	3.76
The intention of use (use has become an obligation)	3.76
Expected work effects (increase the achievement of better student results)	3.65

Table 6.
Factors that facilitate the use of social media for higher education while performing mandatory online classes during the COVID-19 pandemic, N = 38.

privacy issues (lack of privacy …). The speed of the program is incomparably lower than the speed of desktop programs, The content means nothing itself, it is just electronic "waste," the possibility to increase the gap between generations or social media becoming a type of second-hand web, that is, a medium for people with a low level of digital skills increased their stress during classes held online during the Covid pandemic at least. More details are shown in **Table 8** that follows.

8. Conclusion

The results of research conducted in 2019 showed that demographic characteristics of teachers, such as age, gender, and the scientific field of the teacher's profession, do not affect the frequency of teachers' use of social media for higher education, and this is also the case with individual attitudes toward use, social influences, and anxiety during use. At the same time, a significant positive impact on the teachers' use of social media for higher education would have higher education institutions through the implementation of education for both teachers and students on the use of social media, which could reduce their feeling that the use of social media is for higher education a little scary. Also, teachers' social media usage is significant and students believe that teachers should use social media for higher education, as well as support the faculty administration regarding the use of social media for higher education.

The results of research conducted in 2021 showed that teachers consider easier and faster access to information, when and where it is needed, as the most important characteristic of social media usage for higher education purposes, followed by sharing ideas and experiences, fast feedback reactions and low level of complexity of use which has affected the reduction of their stress during mandatory online classes during the **COVID**-19 pandemic. Under the given circumstances, their stress

Characteristics of social media that have affected the reduction of teachers' stress during mandatory online classes during the COVID-19 pandemic	
Easier and faster access to information, when and where it is needed	60.5%
Sharing ideas and experiences	44.7%
Fast feedback reactions	44.7%
Low level of complexity of use (minimum skills required)	42.1%
Independence from a particular platform (e.g., computers, availability already with internet access and a browser)	39.5%
Flexibility regarding the choice of technologies	36.8%
Possibility of access control through user authentication	31.6%
The possibility of creating digital content	28.9%
Expense reduction	26.3%
Sharing photos and videos	23.7%
Following current topics	21.1%
Optional access	21.1%
Reliability in continuous use over a long period	21.1%
The possibility of integrating various web 2.0 technologies in learning and teaching activities	18.4%
Less time and effort needed to search for and manage information	18.4%
Compatibility with fields of education	18.4%
Focus on innovation in learning, not technology itself	18.4%
Acquisition of IT education	15.8%
Maintaining existing contacts and connections	15.8%
Strengthening self-confidence and motivation through interaction with other users	15.8%
Increasing the way of learning due to the variety of new technologies	13.2%
Possibility of testing existing teaching models	13.2%
Supporting existing or new businesses	10.5%
Strengthening ties with the wider local community, but also with people around the world/international community	7.9%
Marketing and recruitment of new students	7.9%
None of the mentioned	7.9%
The possibility of making new acquaintances	5.3%

Table 7.
Characteristics of social media that have affected the reduction of teachers' stress during mandatory online classes during the COVID-19 pandemic, N = 38.

reduction was least influenced by the characteristics of strengthening ties with the wider local community, and also with people around the world/international community, marketing and recruitment of new students as well as the possibility of making new acquaintances.

The biggest lesson which was left to us by the stressful teaching situation during the **COVID**-19 pandemic, is that stress caused by online teaching and the use of new

Characteristics of social media that have affected the increase in teaching stress during mandatory online classes during the COVID-19 pandemic	
Neglecting direct communication (face-to-face)	60.5%
Decrease in social skills	47.4%
Privacy issues (lack of privacy …)	42.1%
Pedagogical expectations are reduced instead of the other way around	39.5%
They encourage negative behavior such as immorality and laziness	36.8%
The possibility of false identities	31.6%
They lead to low quality of the actual content	28.9%
They give everyone a chance to complain, thus creating a community without rules	26.3%
Stalking	26.3%
They negatively affect health (for example, diseases of the spine, and eyes…)	21.1%
Lack of systematic education on the use	21.1%
They promote the offer of amateur content generated by users	21.1%
They hide behind technologies and concepts that are not yet sufficiently defined/researched	21.1%
Internet connection required (especially broadband connection)	18.4%
Information is offered in open sources with very unclear meaning and quality	18.4%
Scientific communication is becoming (too) informal	15.8%
Time and knowledge spent on the use	15.8%
They have limited security	13.2%
The extremely diverse offer of social media that can be used only makes it difficult to choose	13.2%
They are monetarily quantified (everything becomes "business" and "numbers")	13.2%
Electronic violence	10.5%
The possibility of developing an addiction	10.5%
They increase the gap between generations	5.3%
They are becoming a type of second-hand web, that is, a medium for people with a low level of digital skills	5.3%
None of the mentioned	5.3%
The content means nothing itself, it's just electronic "waste"	2.6%
The speed of the program is incomparably lower than the speed of desktop programs	0%

Table 8.
Characteristics of social media that have affected the increase in teaching stress during mandatory online classes during the COVID-19 pandemic, N = 38.

digital tools **COVID**-19 pandemic would have been much milder if adaptation to the digital environment had started earlier before it became a kind of necessity and compulsion. The changes in society that occurred due to the emergence of social media, even before the **COVID**-19 pandemic, and especially after, require a change in the scientific and teaching paradigm from a classical paradigm that is gradually becoming a thing of the past to a progressive paradigm focused on the future.

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