

THE USE OF SOCIAL MEDIA IN THE PROCESS OF EMERGENCY REMOTE TEACHING DURING THE COVID-19 PANDEMIC

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Purpose: The study aims to analyze determinants that influence the attitude of students who use social media for emergency remote teaching.

Design/methodology/approach: The research was carried out on a sample of 465 students from various universities in Poland. The confirmatory factor analysis and then the regression method were used for the purpose of conducting the study.

Findings: The results pointed to the ease of social media use and their clear impact on improving emergency remote teaching. The vast majority of respondents also indicated an increased use of social media in relation to the pre-COVID period, which confirmed the thesis that the use of social media for emergency remote teaching during the pandemic was helpful.

Research limitations/implications: The limitations of the research carried out were the low diversity in the fields of study. Most of the respondents were students of economic, sociological, and technical departments. Students of medical and artistic faculties participated in the study to a small extent only, which is also an important premise and direction to be taken into account while organizing further research on a wider group of students.

Originality/value: The study brings new conclusions regarding the educational use of social media. The results provide important conclusions for universities.

Keywords: Social Media, Emergency Remote Teaching, Higher Education, COVID-19.

1. Introduction

2019 was a rather calm year in Europe, whereas in China, the first case of the coronavirus was identified as early as on 17 November according to epidemiologists. The first case of the coronavirus outside of China was spotted on 13 January 2020 in Thailand. Then, on 21 January, the first case of Covid-19 appeared in the United States, and on 24 January, the first case was identified in Europe (in France). In March 2021, a year passed since the first case of SARS-CoV-2 infection had been diagnosed in Poland. On 11 March 2020, educational units were closed and emergency remote teaching (ERT) began. Before the outbreak of the pandemic,

information technology was used as a support to the learning process, as well as was utilized as a source of new knowledge, skills, self-education, and improvement. It has been noticed that education supported by new methods of learning has been influencing qualitative changes in knowledge transfer, developing motivation to learn, and increasing interest in specific fields. E-learning has replaced traditional courses and the use of the Internet as an educational tool has been promoted by many scholars (Arulogun et al., 2020; Balakrishnan, Gan, 2016; Greenhow, Robelia, 2009; Hartley, Bendixen, 2001).

The literature on the subject defines terms related to learning with the use of information technology, i.e., online learning, distance learning, mobile learning, remote learning and others (Moore et al., 2011; Hodges et al., 2020; Martin et al., 2022). Many of these terms indicate that the learner is at the distance from the teacher or lecturer, and both of them use some type of information technology that offers the possibility to learn from anywhere, anytime, in any rhythm, with any means (Anderson, 2008; Cojocariu et al., 2014; Dhawan, 2020). However, it should be emphasized that online learning, as well as all the terms mentioned above, is a complex process with specific standards. Online learning requires the development of courses and programs, their implementation, and evaluation (Bawa, 2020). In our research, we focused on emergency remote teaching, which means a sudden transition to online teaching in a crisis (Bawa, 2020; Hodges et al., 2020; Nussli, Oh, Davis, 2022). ERT does not allow for a thorough course preparation process, and lecturers, despite providing them with training and support, are not able to take full advantage of online teaching opportunities. Such a transition to ERT was not an easy task, neither for teachers who suddenly needed to acquire new teaching skills with the use of information and communication technologies (ICT) (Bozkurt et al., 2020; Procentese et al., 2022) nor for students, who despite the ability to better cope with ICT, were not always able to adapt to the new teaching system. It is also worth noting that computer servers and online education platforms were often overloaded (Bao, 2020). The outbreak of the COVID-19 pandemic pushed the world to implement online teaching using varying technology applications including social media as an essential tool in the learning process (Eid, Al-Jabri, 2016; Makki, Bali, 2021; Salloum et al., 2021).

Nowadays, social media are being adopted by millions of users, most of whom are students of different levels of education. Using social media in an educational context can be seen as a potentially powerful idea. Students spend a lot of time online using various social media. These sites can support new ways of learning. Social media can be used as tools that engage individuals in critical thinking and enhance communication, as well as collaboration between people. Many lecturers use social media to achieve active and discovery-based learning environments (Paliszkievicz, Koohang, 2016).

Due to the pandemic, universities around the world have implemented alternative learning methods using information technologies. ERT introduced as a result of the COVID-19 pandemic calls for the search for new solutions with respect to sharing and acquisition of knowledge. One of such ways of integrating the student community, among others for learning

purposes, is to opt for social media. It is therefore sensible to examine changes caused by the COVID-19 pandemic with regard to the use of social media in ERT. Moreover, as mentioned above, in the normal mode of learning, the online learning process is meticulously prepared well in advance, which cannot be said for ERT.

The study aims to analyse determinants that influence the attitude of students using social media as a result of switching to ERT during the COVID-19 pandemic. The study highlights, among others, the communication functionality, commitment, and skills of students using social media. The frequency of using social media, the solution of scientific problems, and the availability of university-specific pieces of information made public thanks to social media have all been examined.

The rest of this paper has the following organization. First, we discuss the theoretical background about social media and its use in the learning process and then develop related research questions. Next, we outline the methodology and data samples of the research. In the following section, we present the results of the conducted study. Then, we discuss the presented results and finally, we conclude with the limitations of the study and directions for future research.

2. Social media in the learning process

Social media are defined as “a group of web-based applications that are ideological and technological underpinnings of Web 2.0 that enable the creation and exchange of user-generated content” (Kaplan, Haenlein, 2010). Social media can be considered to be a huge, active and engaged community that uses Internet-oriented technologies to engage in an interactive dialogue. Social media create a new space of communication distinguished by the free flow of information made public by the participants of the communication process. They use not only the principle of active and conscious participation but also the principle of teaching process subjectivity, in which conscious participants of the educational process decide about its course (Spivakovsky et al., 2013). There is no one-way communication – open and free discussion is also possible.

A popular theory being an immediate result of the widespread utilization of social media and mobile technologies in the learning process is the so-called social learning theory (SLT). It assumes that learning is more effective when learners have the opportunity to observe other learners, interact with them, take part in research groups, as well as actively participate in the widely understood learning process (Gong et al., 2014). The social learning theory developed by Bandura (1977) is a desired synergy between traditional learning theory and the cognitive approach. “The majority of human behavioral patterns is acquired observationally through modeling: by observing others, an idea is formed of how a given behavior should be performed.

Later on, said encoded piece of information serves as a guide to action” (Bandura, 1977). It is a process of constant and mutual interaction. Traditional one-way communication has changed into a two-way, three-way, or even multidirectional one, which in turn has increased the frequency of cognitive processes related to learning and obtaining valuable knowledge (Deaton, 2015).

Social media platforms offer a number of functions, such as creating online courses and assignments, monitoring the activities of students and teachers and, above all, the ability to share knowledge and communicate with others (Liao et al., 2015; Rahman et al., 2020). In the case of the interactive world of social media, the application of social learning theory serves as an opportunity to promote significant student achievements. Furthermore, cognitive concepts, attentiveness, memorization, and motivation are promoted by social media (Deaton, 2015; Van Dem Beemt et al., 2020).

Studies carried out on the use of social media as seen through the prism of academic performance turn out to be inconclusive. On the one hand, new technologies may support students in their scientific development and help them develop psychosocial patterns of behavior, but on the other hand, they may hinder the said processes (Lau, 2017). A negative impact of the use of social media on academic achievements has been observed by, among others, Kirschner, Karpinski (2010) and Lau (2017). The simultaneous processing of various streams of information may have a negative impact on the effectiveness of task completion. Social media have a distracting character, which may, in turn, adversely affect the concentration process, thus requiring a person to be more involved and devote more time to performing certain tasks (Bou-Hamad, 2020). A positive aspect of the learning process is based on social media cooperation-oriented principles, which in turn encourages the development of social skills, critical thinking, memorization, knowledge consolidation, as well as competitiveness (Minocha, 2009; Miyazoe, Anderson, 2010; Yang, Chang, 2012). Students are stimulated and encouraged to solve certain problems as a group, as well as to realize certain projects. Research has shown that the use of Twitter for learning purposes improved student engagement during classes (Junco et al., 2011).

2.1. Intention of use

Previous research indicates that social media are mainly used to build social networking (Duffy, 2011), as they bring people closer, facilitate cooperation, and communication (Obar, Wildman, 2015). Initially, their role focused on providing entertainment and information (Bou-Hamad 2020; Mingle, Adams, 2015) evolving into an effective marketing, educational and communication mechanism. Nowadays, social media and the set of tools they contain have become an integral part of the daily life of students (Dumford et al., 2023). Thanks to social media, students and teachers have unlimited access to remarkable sources of information, including tools that allow rapid access to specific data (Liao et al., 2015; Putra et al., 2021; Van Den Beemt et al., 2020). The multimedia-oriented character of the media facilitates

systematic and constant control over the level of the acquired knowledge, as well as stimulates and activates students. The user independently searches for necessary information and creates his or her own knowledge system (Greenhow et al., 2009). Due to the amount of data, students are forced, through analysis and criticism, to select the information they consider to be the most relevant. The materials are located on different servers, which favors a multifaceted, multidimensional approach to a given issue and the selection of an optimal solution. The user can actively participate in activities on the website, share content, share opinions, and create various groups to serve scientific purposes. It is reasonable to investigate whether students have been more likely to use social media for learning in the ERT situation than before the pandemic.

2.2. Communication functionality

Social media offer new opportunities for sharing, creating and interacting between students and teachers. Researchers have found that the use of social media makes students more independent and effective by improving the quality of communication with their teachers and classmates. The students in the research group preferred to gather information through social media (Deandrea et al., 2012; Hamilton et al., 2016). Popular social media platforms (Facebook, YouTube) allow students to interact directly with their peers and lecturers, as well as to receive quick feedback (Salloum et al., 2018). Facebook and Google+ enable multimedia content hosting. In shared media spaces, students can learn together and benefit from the knowledge of others (Wankel, 2009). According to Top (2012), teachers promote cooperation among students and create a sense of community, so they are moderately enthusiastic when it comes to using blogs while learning. They favor live broadcasting media. Teachers use social media specifically to motivate students and improve teaching. However, research indicates that teachers experience problems using social media in a situation where there has been a sudden shift to ERT (Bozkurt et al., 2020; Procentese et al., 2022). Not all teachers were well prepared for such an extensive use of social media. Therefore, we pose a question regarding the functionality of communicating with students and lecturers in the ERT situation through social media.

2.3. Way of proceeding

Social media are also a way to supplement knowledge and make educational activities more comprehensive. Platforms such as Google Meet and MS Teams allow for a free remote discussion, in the case of which each participant is at home, whereas the Periscope and ClickMeeting applications were created for people conducting webinars and videoconferences. They allow users to record a file with their own presentation and share their screen with other recipients, just like in the case of Google Meet and MS Teams (Brady et al., 2010). Facebook, Twitter, YouTube, and blogging platforms are used to send educational materials, and videos and explain information that seems to be unclear at first (Moran et al., 2011).

Concerning social mediapractices, the results pointed out that knowledge sharing has a significant positive impact on the perceived usefulness and perceived ease of use of e-learning systems (Salloum et al., 2021). Displaying didactic video clips has become effective in terms of education. Students can develop decision-making skills, higher-order thinking, problem-solving, communication, collaboration, and information sharing (Greenhow, Robelia, 2009). Studies have shown that social media (Instagram, WhatsApp, Facebook) can activate interactive, collaborative and cooperative learning which can control students while learning and provide reflection so that there is a reciprocal exchange between lecturers and students that facilitates closer learning (Putra et al., 2021; Roro et al., 2021).

We wonder if, in the ERT situation, students have taken advantage of the opportunities described above regarding social media to improve their chances of better academic performance.

2.4. Involvement

Social media may be useful in the case of “independent” students with predispositions to work individually because using social media allows such students to study the material provided beforehand at any place and time. It allows them to independently set challenges and initiatives for themselves while obtaining knowledge, mainly by browsing for key pieces of information (Hsieh et al., 2011). Students who prefer to study independently require special projects based on their interests. They are proficient when it comes to using social media in order to set their study schedule. They especially value social media ensuring their anonymity. A website that is similar to Facebook is Yammer, which allows students and lecturers to collaborate, organize projects, and interact, while at the same time granting them much greater privacy. Students also opt for such social tools as blogs and posts (Blogger, WordPress) (Ryan, Xenos, 2011).

Independent and temporarily unlimited access to information and knowledge is certainly valuable. We want to check how factors related to the convenience of access to information affect students’ academic performance.

2.5. Students’ performance in using social media

Even though social media are considered by students to be a social technology and not a formal learning or teaching tool, they can have an impact on educational outcomes (Mazman, Usluel, 2010). Nevertheless, the pandemic situation forced a greater use of these tools in learning than before.

In the literature on the subject, there are also numerous examples of the positive impact of social media on academic performance (Hamilton et al., 2016; Salloum et al., 2018). One of the key determinants of the learning process is the interaction between the student and the teacher. Students who are determined to understand the material actively derive satisfaction from their educational endeavors and take responsibility for their own learning. They also

perform well when it comes to remote learning, even if it requires them to be more involved than in the case of traditional (classroom-oriented) learning processes (Van Dem Beemt et al., 2020). An interesting study on the use of social media and its impact on student performance was conducted by (Alshuaibi et al., 2018). The authors of the study found that cognitive engagement, defined as the level of self-initiative in studying, allows students to improve their academic performance. Active participation of the student in mastering and understanding the topic can be developed with the help of social media. Furthermore, research by Lemay, Bazalais & Doleck (2021) indicated that students reported an increased workload with less understanding of course objectives and less interaction with peers. In our research, we focused on assessing the degree of complication of lectures, exercises and laboratories conducted with the use of social media tools.

The global situation caused by the COVID-19 pandemic forces the use of modern information technologies for distance learning. At the same time, the new reality has created a research gap. Therefore, it is vital to study the use of social media with regard to ERT. In addition, we also wanted to investigate whether factors such as the form and type of studies, gender and place of residence were important in the use of social media by students in the ERT process. This analysis aims to answer the following research questions:

RQ1. Which groups of factors (i.e. Intention to use, Communication functionality, Way of proceeding, Involvement) significantly influence the performance of students that use social media for learning purposes?

RQ2. Has the study mode, type of studies, place of residence, or the male/female sex been important when it comes to the use of social media by students for learning purposes?

3. Methodology

3.1. Sample and data collection

The research was carried out in March 2021 on a sample of 465 students studying in Poland at universities, taking part in first-cycle (engineering and bachelor) and second-cycle (master) courses. The sample consisted of 465 participants, 325 females (69.9%), and 140 males (30.1%). A survey questionnaire was used for the study, which was divided into five blocks: Intention to use (1), Communication functionality (2), Way of proceeding (3), Performance (4), Involvement (5). In the intention to use group, three variables were distinguished, indicating the intention to use for personal or professional purposes and the overall frequency of social media use. In the communication functionality group, four variables were distinguished, indicating the frequency, ease of communication among students, and information flow between students and lecturers. In the way of proceeding group, four variables were

distinguished regarding own skills with regard to using social media, ease of ERT through social media, scientific activity in the media, and said media assistance in solving problems related to ERT during the COVID-19 pandemic. In the performance group, four variables were also identified, regarding assistance in passing remote exams and access to information through said media (such as rector's and deans' announcements for students). In the last group of questions relating to involvement, attention was on improving the quality of learning thanks to the possibility of learning anywhere and anytime, the impact of the pandemic on the creation of new accounts on social networks, the ease of information exchange, and interactions through social media. Table 1 summarizes demographic characteristics of the sample in the current study.

Table 1.

Demographic characteristics of the sample in the current study

Characteristic	Value	n	%
Sex	Females	325	69.9
	Males	140	30.1
Study Mode	Part-time study	92	19.8
	Full-time study	373	80.2
Place of residence	City	287	61.7
	Village	178	38.3
Speed of the Internet available	Low	33	7.1
	Average	213	45.8
	High	219	47.1
Type of studies	Engineering	172	37.0
	Bachelor	184	39.6
	Masters	109	23.4

n – number of participants; % – sample percentage.

3.2. Confirmatory factor analysis

To verify the factorial structure of the questionnaire used for the discussed study, a confirmatory factor analysis was performed based on the likelihood. The preliminary assumption that was verified was that each block measured a separate and homogeneous variable. Each block of the questionnaire was analyzed by opting for a separate model. The only modifications that were applied in order to achieve the adequateness of the analyzed factor structure were based on adding inter-correlations between specific items. They were based on the values of modification indexes with a threshold value equal to 4. Figure 1 presents final structures that were developed in the course of the analysis.

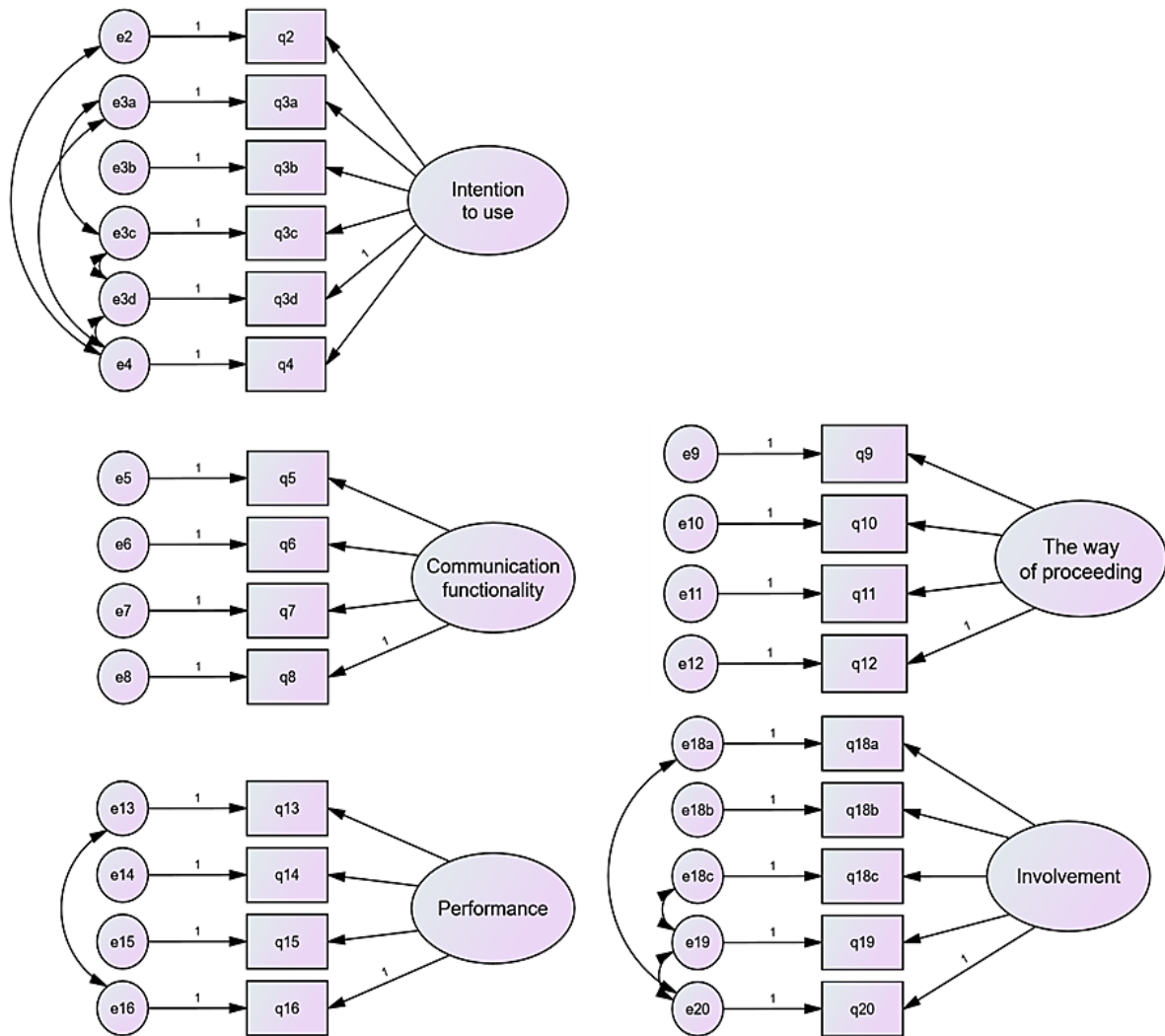


Figure 1. Factor structures of separate blocks of the questionnaire used in the current study.

Table 2 presents the values of fit indexes for each block of the questionnaire used for the current study.

Table 2.
Values of fit indexes for blocks of the questionnaire

Model	χ^2/df	RMSEA	CFI	NFI	
Block1	Intention to use	3.19	0.07	0.99	0.98
Block2	Communication functionality	1.87	0.04	0.98	0.97
Block3	Way of proceeding	2.19	0.06	0.99	0.98
Block4	Performance	4.57	0.09	0.99	0.99
Block5	Involvement	3.26	0.07	0.99	0.99

RMSEA – root mean square error of approximation, CFI – comparative fit index, NFI – normed-fit index.

The values of the fit indexes for the final models showed that the fit was adequate.

Table 3 presents acquired factor loadings and correlation values between items.

Table 3.
Factor loadings acquired using confirmatory factor analysis

Factor loadings			<i>f</i>	<i>p</i>
q3d	<---	Intention to use	0.56	0.001
q3c	<---	Intention to use	0.48	0.001
q3b	<---	Intention to use	0.83	0.001
q3a	<---	Intention to use	0.70	0.001
q2	<---	Intention to use	0.36	0.001
q4	<---	Intention to use	0.32	0.001
q8	<---	Communication functionality	0.56	0.001
q7	<---	Communication functionality	0.47	0.001
q6	<---	Communication functionality	0.31	0.001
q5	<---	Communication functionality	0.47	0.001
q12	<---	Way of proceeding	0.66	0.001
q11	<---	Way of proceeding	0.48	0.001
q10	<---	Way of proceeding	0.87	0.001
q9	<---	Way of proceeding	0.41	0.001
q16	<---	Performance	0.58	0.001
q15	<---	Performance	0.62	0.001
q14	<---	Performance	0.69	0.001
q13	<---	Performance	0.55	0.001
q20	<---	Involvement	0.38	0.001
q19	<---	Involvement	0.32	0.001
q18c	<---	Involvement	0.76	0.001
q18b	<---	Involvement	0.96	0.001
q18a	<---	Involvement	0.64	0.001
Correlations between items			<i>r</i>	<i>p</i>
e3d	<-->	e4	0.30	0.001
e2	<-->	e4	0.20	0.001
e3d	<-->	e3c	0.18	0.002
e3a	<-->	e4	-0.17	0.001
e3c	<-->	e3a	-0.21	0.001
e16	<-->	e13	-0.25	0.001
e20	<-->	e19	0.31	0.001
e19	<-->	e18c	0.19	0.001
e20	<-->	e18a	0.13	0.006

f – factor loadings; *r* – correlation coefficients; *p* – statistical significance.

4. Results

4.1. Descriptive statistics

Table 4 presents descriptive statistics of interval variables in the current study, i.e. mean values, standard deviations, minimum and maximum values, skewness and kurtosis values, values of Kolomogorov-Smirnow test for normality and Cronbach alpha reliability coefficients.

Table 4.*Descriptive statistics of interval variables in the current study*

	<i>M</i>	<i>SD</i>	<i>min</i>	<i>Max</i>	<i>S</i>	<i>K</i>	<i>Z</i>	<i>p</i>	α
Intention to use	4.09	0.90	1.83	5.83	-0.24	-0.62	0.082	0.001	0.73
Communication functionality	3.58	0.84	1.25	6.00	-0.05	0.15	0.077	0.001	0.50
The way of proceeding	4.35	0.97	1.25	6.00	-0.56	0.03	0.095	0.001	0.68
Performance	3.81	1.07	1.00	6.00	-0.16	-0.41	0.078	0.001	0.67
Involvement	3.87	1.02	1.00	6.00	-0.10	-0.13	0.050	0.007	0.78

M – mean value; *SD* – standard deviation; *min* – minimum value; *max* – maximum value; *S* – skewness; *K* – kurtosis; *Z* – value of the Kolmogorov-Smirnow test; *p* – statistical significance; α – Cronbach reliability coefficient.

The distributions of all the analyzed variables significantly differed from the normal distribution. Therefore, the bootstrap method was applied in the subsequent analysis.

4.2. Intention to use, communication functionality, way of proceeding, and involvement as predictors of performance

Regression analysis was used to assess the relationships between intention to use, communication functionality, way of proceeding, involvement, and performance. The bootstrap-based entry method was chosen. Table 5 shows the acquired values of the regression coefficients.

Table 5.*Analysis of intention to use, communication functionality, way of proceeding, and involvement as predictors of performance*

Predictors	<i>B</i>	<i>p</i>
Intention to use	0.04; 0.24	0.004
Communication functionality	0.07; 0.27	0.001
Way of proceeding	0.43; 0.63	0.001
Involvement	0.13; 0.29	0.001

B – 95% confidence intervals for standardized regression coefficients; *p* – statistical significance.

The model was statistically significant, $F(4,460) = 119.83$, $p < .001$. Intention to use, communication functionality, way of proceeding, and involvement were positively related to performance. The whole model explained 51.0% of the performance variance.

In addition, an analysis was carried out between different groups by gender, type of studies, and place of residence. It allowed to check whether there were significant differences between them in the approach to learning through social media.

4.3. Comparisons between groups

Table 6 presents the mean values of the variables analyzed acquired in the male and in the female group with the values of independent *t* samples test which were used to assess the statistical significance of the differences between the two groups. Statistical significance was based on the bootstrap procedure.

Table 6.

Mean values of variables analyzed acquired in the male and female groups

	Women (n = 325)		Men (n = 140)		t	df	p
	M	SD	M	SD			
Intention to use	4.23	0.86	3.77	0.91	5.15	463	0.001
Communication functionality	3.69	0.78	3.32	0.94	4.09	224.99	0.001
Way of proceeding	4.44	0.93	4.14	1.02	3.06	463	0.002
Performance	3.89	0.98	3.83	1.11	0.57	463	0.566
Involvement	3.91	1.02	3.57	1.16	3.16	463	0.002

M – mean, SD – standard deviation, t – value of independent samples t-test; df – degrees of freedom; p – statistical significance.

The mean values of intention to use, communication functionality, way of proceeding, and involvement were significantly higher in the group of women than in the group of men (see Figure 2).

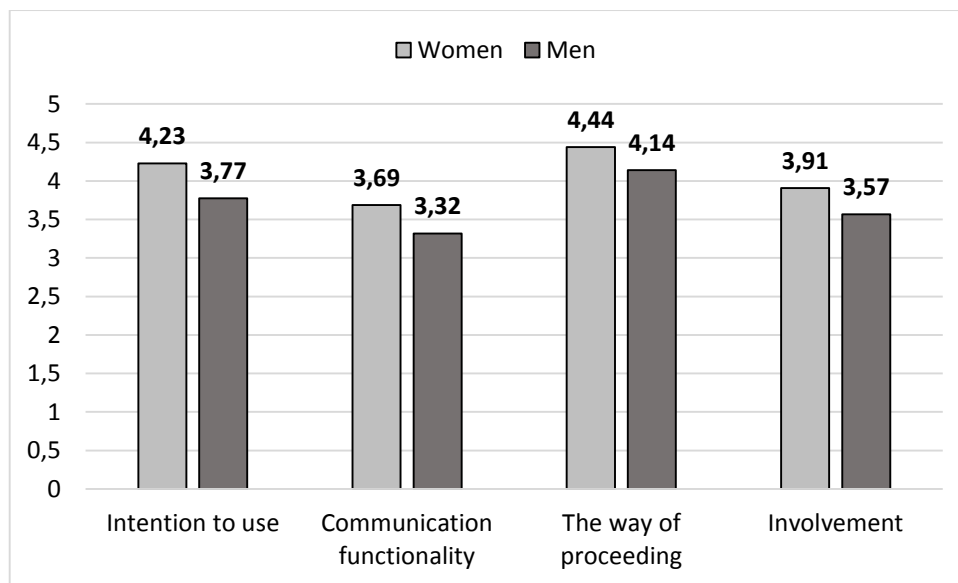


Figure 2. Statistically significant differences between the female and male groups.

Table 7 presents the mean values of variables analyzed acquired in the group of part-time students and in the group of full-time students with the values of independent *t* samples test which was used to assess the statistical significance of differences between the two groups. Statistical significance was based on the bootstrap procedure.

Table 7.

Mean values of variables analyzed acquired in the group of part-time and full-time students

	Study mode				t	df	p
	full-time (n = 373)		part-time (n = 92)				
	M	SD	M	SD			
Intention to use	4.10	.89	4.06	.91	0.38	463	0.702
Communication functionality	3.64	.82	3.30	.88	3.59	463	0.001
Way of proceeding	4.35	.98	4.33	.93	0.25	463	0.801
Performance	3.89	1.02	3.80	1.00	0.81	463	0.418
Involvement	3.78	1.06	3.89	1.12	-0.86	463	0.392

M – mean, SD – standard deviation, t – value of independent samples t-test; df – degrees of freedom; p – statistical significance.

The mean value of communication functionality was significantly higher in the full-time study participant group than in the part-time study participant group (see Figure 3).

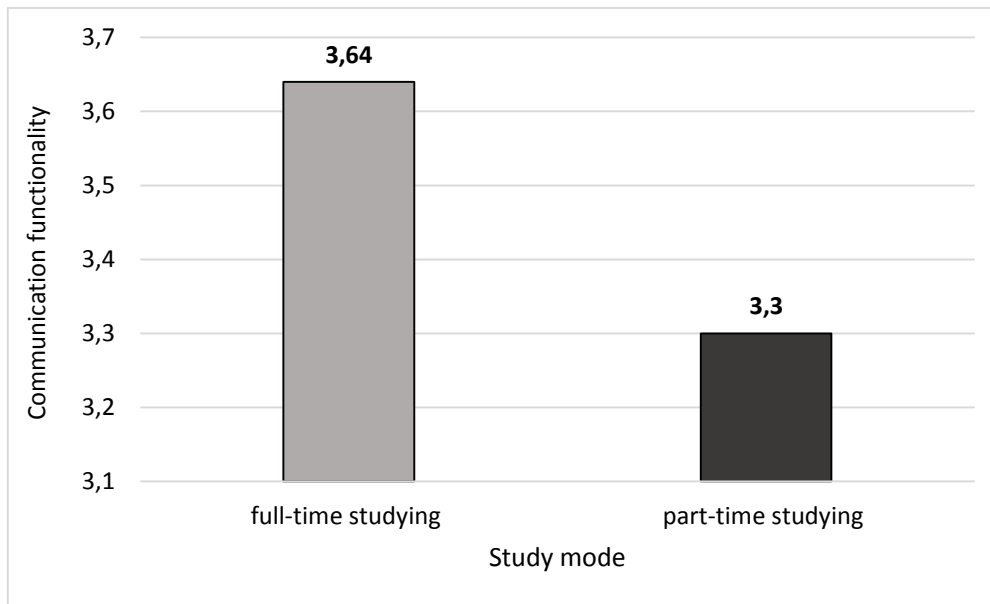


Figure 3. Mean values of communication functionality in part-time and full-time study groups.

Table 8 presents the mean values of the variables analyzed acquired in the group of participants living in cities and in the group of participants living in villages with the values of the independent *t* samples test that was used to assess the statistical significance of the differences between those two groups. Statistical significance was based on the bootstrap procedure.

Table 8.

Mean values of variables analyzed acquired in the group of participants living in cities and villages

	Place of residence				<i>t</i>	<i>df</i>	<i>p</i>
	city (<i>n</i> = 287)		village (<i>n</i> = 178)				
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Intention to use	4.08	0.89	4.10	0.91	-0.25	463	0.805
Communication functionality	3.55	0.89	3.62	0.76	-0.91	42.23	0.363
Way of proceeding	4.28	0.99	4.45	0.93	-1.84	463	0.066
Performance	3.88	1.02	3.87	1.01	0.11	463	0.915
Involvement	3.74	1.09	3.92	1.05	-1.77	463	0.077

M – mean, *SD* – standard deviation, *t* – value of independent samples t-test; *df* – degrees of freedom; *p* – statistical significance.

There were no statistically significant differences between participants living in cities and living in villages.

Table 9 presents the mean values of analyzed variables according to the type of studies with the values of one-way analysis of variance which was used to assess the statistical significance of the differences between the three groups.

Table 9.*Mean values of analyzed variables depending on the type of studies*

	Type of studies						<i>F</i>	<i>df</i>	<i>p</i>
	Bachelor (<i>n</i> = 184)		Engineering (<i>n</i> = 172)		Masters (<i>n</i> = 109)				
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Intention to use	4.14	0.87	3.97	0.95	4.19	0.83	2.61	2,462	0.075
Communication functionality	3.66	0.77	3.58	0.91	3.43	0.84	2.59	2,462	0.076
Way of proceeding	4.39	0.92	4.32	1.05	4.32	0.93	0.27	2,462	0.762
Performance	3.93	0.91	3.83	1.09	3.84	1.07	0.48	2,462	0.621
Involvement	3.81	1.02	3.74	1.10	3.90	1.11	0.72	2,462	0.488

M – mean, *SD* – standard deviation, *t* – value of independent samples t-test; *df* – degrees of freedom; *p* – statistical significance.

There were no statistically significant differences between participants with respect to different types of studies.

5. Discussion

The study was based on a functional approach to university-based emergency remote teaching opportunities through social media in the context of the COVID-19 pandemic. The motivation for the research was the desire to learn about the attitudes to ERT based on the social media of students studying at various universities in Poland, especially in comparison to the traditional way of learning. In the case of RQ1, the statistical analysis carried out allowed us to conclude that all four groups of factors (i.e. Intention to use, Communication functionality, Way of proceeding, Involvement) positively influenced the performance of students that use social media for learning purposes.

The first block of factors studied was the intention to use. It is common for companies to use social media to promote and advertise their own products and/or services, as well as for ordinary people - to utilize the medium for private purposes. In our research, we focused on checking how the frequency of social media use increased in comparison to the pre-pandemic period and for what purpose students used them. While it should not be a surprise that among students social media are used to contact friends and acquaintances, they are used almost as often for purposes related to both studies and searching for information on topics of interest to the users. However, the opposite is the case when it comes to using social media for work-related purposes. The percentage of students using social media for professional purposes was 32%, which does not necessarily translate into no intention, but rather indicates that the examined group included a limited number of working individuals. It is worth noting that 72% of the students surveyed indicated a greater frequency of use social media than before the pandemic and over 84% of them found it helpful in learning.

The second factor block examined was communication functionality. Students eagerly used social media as a channel allowing them to contact each other. 36% of the respondents indicated they used for several hours a day and 30% several times a week. However, in relation to contact with lecturers, social media were not the main contact channel. Students declared such contact with lecturers several times a month (64%). This approach to contact with lecturers might have resulted from the fact that universities use specific platforms for organizing remote classes, thus specifying the form of contact between students and teachers. Another reason may be the lower involvement of academics in modern technologies, described in the literature on the subject.

The third of the blocks studied, way of proceeding, explored the factors related to the student's skills and activities. Almost 80% of the surveyed students indicated that social media made ERT easier. In addition, the pandemic forced them to be more scientifically active in social media than they had been so far. At the same time, the respondents indicated that they had remarkable skills in terms of using social media, as they had been using podcasts or educational fanpages, which also translated into solving problems related to remote studies easier.

The fifth block, involvement, assessed the availability of scientific information (library resources) and the difficulty of learning in relation to various types of classes. Due to the epidemic situation and ERT, students set up new accounts on social media, most often on Google Meet or Zoom. Usually it was one (71%), two (15.3%), or three (6.5%) accounts. It is crucial to evaluate learning through social media compared to three traditional groups of classes: lectures, workshops, and laboratories. The fewest problems were indicated by the students with regard to the lectures, as they were considered to be easy. Difficulties began when comparing remote and traditional workshops, while laboratories turned out to be disadvantageous. More and more often it is emphasized that a return to the traditional form of education is needed, but distance learning will remain the new norm. The functioning of the education system in the post-pandemic reality will certainly force the use of information technologies, including social media, to a greater extent than it was before 2019. The results of the examination of ERT suggest that lecture is a type of educational activity that can be conducted in a different way than in the traditional form without sacrificing its quality. The access to scientific information was assessed by students at either average or good level.

The discussed factor blocks (1, 2, 3, 5) were used to evaluate the dependence on block 4 - performance. This block focused on factors related to the intensity and convenience of learning, as well as access to university-specific pieces of information. More than half of the students surveyed concluded that social media did not make it easier for them to pass an exam and that the intensity of their learning did not increase in their case. It means that social media complements learning and knowledge acquisition processes. Importantly, nearly 85% of respondents believed that the use of social media for learning was helpful. The efficiency of social media is also reflected in the high assessment of access to current, relevant academic information. Almost 70% of students positively evaluated learning at any time and place.

However, these results should be correlated with the difficulty of understanding the educational activities conducted and should not be treated in an overly optimistic manner. An in-depth research should be carried out to capture the relationship between ERT at any time and place and both the quality and difficulty of the material presented in a remote form.

For RQ2, it should be noted that there were no obvious discrepancies in the responses. The respondents, regardless of sex, type of studies, and place of residence, answered the questions almost identically. Slight differences in the results confirmed the reliability and credibility of the research carried out. It should also be taken into account that the respondents almost unanimously stated that the analyzed media had a positive impact on solving problems related to remote studies. The same pattern was observed while analyzing the contribution of the above-mentioned media to the facilitation of ERT.

6. Conclusion

The study on ERT based on the use of social media during the COVID-19 pandemic allows us to draw many interesting conclusions. By using the confirmatory factor analysis and then the regression method, one of the leading statistical data analysis methods, it was found that during the pandemic, students used social media more than in the previous period and that many of them were forced to create new social media accounts. The profiles most frequently created were the ones on platforms for audiovisual communication, videoconferencing, and online conversations, such as Zoom, Google Meet, and WhatsApp. Particular attention should be paid to the increased use of social media since the spread of the pandemic compared to the pre-COVID situation and the fact that more than half of the respondents communicated with other students at least one hour a day, as well as that the vast majority of them did it for a minimum of several hours a day, which proves the importance of social media in communication and ERT, as well as points to the potential development of education through social media in the years to come.

The analysis of the regression method used in this study showed that the covid pandemic had a huge impact on the development of ERT through social media, as well as on ERT through social media in terms of the development of educational initiatives based on the possibility of studying from anywhere in the world.

The study shows extremely important conclusions for universities. There is a very high probability that most of the solutions used during the pandemic will be used and developed in the post-COVID period. The positive perception of conducting online lectures (anytime, anywhere) has shown that universities should implement a hybrid teaching model. Laboratories and workshops that require face-to-face contact with the lecturer should still be conducted in a stationary manner. Nevertheless, lectures may be conducted online. The examinations carried

have broadened the knowledge on the use of social media for ERT and determining what factors favor the intention to use, communication functionality, way of proceeding, performance, and involvement.

The research inspired the authors to continue research on the impact of COVID-19 on ERT through social media. It seems interesting to focus on the quality of the results of ERT using social media compared to knowledge acquired in a traditional way and the attitudes of students to return to full-time learning. The limitations of the research carried out were the low diversity in the fields of study. Most of the respondents were students of economic, sociological, and technical departments. Students of medical and artistic faculties participated in the study to a small extent only, which is also an important premise and direction to be taken into account while organizing further research on a wider group of students.

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