

Learning in the Online Environment - Student Perceptions and Predictions

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Abstract

Keywords:

online learning, interrelatedness, digitization

The solution provided by information and communication technology to the educational challenges that the education system has faced as a result of the pandemic situation due to the COVID-19 virus has been generally agreed upon and accepted on a planetary scale by the entire academic community. For an important period of time (approximately 1.5 years), the didactic activity took place mainly asynchronously. The implications of this fact on academic performances, the quality of the didactic act, and the well-being of students are addressed in many studies in order to find out answers considered as predictions of future instructive-educational actions. The present study is also included in the same dimension. The results recorded or highlighted the fact that learning in the online system presents both advantages (maximizing the use of time due to the elimination of losses due to travel, domestic comfort, and the exclusive decision to interact) and disadvantages (deficient feedback, investment of intellectual effort to obtain a positive relational agreement); motivation was slightly higher, assessment anxiety and learning efficiency were lower, while comfort and satisfaction with learning did not register significant changes. The preference that students emphasized for the way the didactic activity should be carried out aims at an alternation of synchronous and asynchronous activities in the mixed system, doubled by learning in the online system.

Zusammenfassung

Schlüsselworte:

Online-Lernen, Vernetzung, Digitalisierung

Die Lösung, die die Informations- und Kommunikationstechnologie für die Bildungsherausforderungen bietet, mit denen das Bildungssystem infolge der Pandemiesituation aufgrund des COVID-19-Virus konfrontiert war, wurde von der gesamten akademischen Gemeinschaft allgemein anerkannt und auf globaler Ebene akzeptiert. Über einen wichtigen Zeitraum (ca. 1,5 Jahre) verlief die didaktische Tätigkeit überwiegend asynchron. Die Auswirkungen dieser Tatsache auf die Studienleistungen, die Qualität der didaktischen Handlung und das Wohlbefinden der Studierenden werden in vielen Studien untersucht, um Antworten zu finden, die als Vorhersagen für zukünftiges lehrreich-pädagogisches Handeln gelten. Auch die vorliegende Studie ist in die gleiche Dimension einbezogen. Die Ergebnisse dokumentierten bzw. verdeutlichten die Tatsache, dass das Lernen im Online-System sowohl Vorteile (Maximierung der Zeitnutzung aufgrund der Eliminierung von Verlusten durch Reisen, häuslichen Komfort und die ausschließliche Entscheidung zur Interaktion) als auch Nachteile (defizitäres Feedback, Investition von intellektuelle Anstrengung, eine positive Beziehungsvereinbarung zu erreichen); Die Motivation war etwas höher, die Prüfungsangst und die Lerneffizienz waren geringer, während Komfort und Zufriedenheit mit dem Lernen keine signifikanten Veränderungen verzeichneten. Die von den Studierenden hervorgehobene Präferenz für die Art und Weise, wie die didaktische Aktivität durchgeführt werden sollte, zielt auf einen Wechsel von synchronen und asynchronen Aktivitäten im gemischten System, verdoppelt durch das Lernen im Online-System.

1. Introduction

Quality learning requires involvement and responsibility, significant intellectual and physical effort investment, high projections of finalities and pragmatic orientation. At the same time, the facilitating factors of learning belong to the educational environment (Albulescu et al., 2021), education having the primary role in perfecting modern civilization (Bahasoan et al., 2020).

The technological revolution/ 4th industrial revolution has generated the premises of learning in virtual space, by exploiting the technological conquests transferred to the educational context, when, within the didactic activity, students and

teachers establish positive interactions, also supported by the mutual enthusiasm achieved through the game-action, the statutory repositioning of the teacher-student horizontally in a linearity based on equality and elements of surprise (Mudure-Iacob, 2019). The interaction relationship between the trainer and the trainee is essential to ensure learning efficiency (transmission, reception of knowledge and self-regulation) through the transfer of knowledge, on the one hand, and the transmission/reception of the answer, respectively the feedback, on the other hand (Baber, 2020). Active-participatory learning action is supported by dislocated motivation, interest and desire to know, as well as by intellectual curiosity



(Yamamoto, 2010). The more the student becomes the teacher and the teacher becomes the student, the more effective the results (Hattie, 2014).

2. Theoretical foundation

E-learning developed both before and after the pandemic caused by the COVID-19 virus, thus becoming an increasingly popular way of working. There are several independent factors which contribute to the recording of academic performances and implicitly influence the students' learning satisfaction, such as the curricular content and the manner in which it is presented, the trainer's skills, the students' expectations and the feedback received. In order to support the instructional-educational process, and to achieve managerial success assimilated to professional satisfaction and the recording of academic performances, the four factors stated above are indispensable (Gopal et al., 2021, Manea & Stan 2016). An analysis of student involvement in online learning from a behavioral, cognitive, and affective perspective highlights the need for intervention, providing support on the emotional dimension (Salas-Pilco et al., 2022). Moreover, students expressed a higher preference for learning in the traditional system than for virtual environment-supported learning, and they agree that in face-to-face instruction there are elements/aspects favoring the achievement of academic performance such as self-motivation, commitment and cognitive self-regulation, the use of technological means (Aguilera-Hermida, 2020).

Regarding the mediating role of self-efficacy in the relationship between the attitude towards virtual environment-enhanced learning, studies and satisfaction one can indicate there are gender differences, in the sense that the mediating effect of self-efficacy is more emphasized in female subjects (Koca et al., 2023). Studies that have explored the manner in which students confide in their ability to use online learning platforms, to use self-regulation strategies indicate that training programs that conferred satisfaction/usefulness to students were found to be the main predictor in securing trainees' confidence (Landrum, 2020).

Students in the online learning system face several challenges due to poor adaptation to online courses and to lack of interaction (Adnan & Anwa, 2020; Almahasees et al. 2021). The non-verbal and paraverbal language, which might be more difficult to decode in the online learning system, accentuates the communication deficit grafted on emotions, and therefore the need to support a positive interaction is

emphasized, which is significant in the context of studies indicating that the teacher-student interaction is a predictor of effective learning (Alqurashi, 2019; Moore, 2014). Thus, interaction based on group activities is difficult to be assessed according to quality standards. Differentiation in learning based on individualization/customization does not have a sufficiently nuanced objective character due to delayed feedback which supports the recording of desirable academic performance only to a small extent (Botnariuc et al., 2020). Assessment carried out with computerized means can generate an additional stressful situation given the need to focus on the correct use of technological means (Pillai et al., 2021). Therefore, effectively supporting learning in virtual environments requires the identification of solutions to problems related to both students (hearing impairments, perceptive and understanding/learning difficulties, lack of interaction and motivation) and infrastructure (functionality of communication networks, safety and data protection) (Almahasees et al., 2021; Botnariuc et al., 2020). Results of research undertaken during the pandemic marked a high degree of student ownership, their contribution to the evaluation of course design and the customization of the learning process. At the same time, online learning has favored the diminishing of communication, time and space barriers (free and unfettered expression of ideas, clear expression of divergent opinions, sending/receiving messages at the same time regardless of where you are on the globe) (Hamdan, 2022). Some studies point out that a student's acceptance of/involvement in online learning, seeing teachers as facilitators of learning, and learning online from various internet sources can lead to higher academic performance than those elements and factors specific for the traditional learning system in school spaces within educational institutions (Hamdan, 2022; Roy & Al-Absy, 2022; Zheng et al., 2021). Although some advantages/benefits of online learning are identified in aspects such as self-learning, low cost, convenience and flexibility, some studies indicate that online education is less effective than face-to-face courses and student success in K-12 online education much lower compared to traditional school environments (Price-Banks & Vergez, 2022; Yan et al., 2021). Teachers report several dysfunctions in terms of authentic communication and human relationship. The teaching staff/trainers express concern regarding the perceived dysfunctions in the communication carried out in the virtual space due to both the partial feedback provided and received, and the authentic interrelation supported (Botnariuc et al.,

2020). Another shortcoming of online learning reported by students is the lower degree of attention and attention retention due to multiple distractions in the domestic space (Selvaraj et al., 2021).

The advantages of learning achieved by exploiting the virtual environment can be maximized through the responsible use of technologies (Dhawan, 2020; Fonariuk et al., 2023) that must be made accessible and flexible. Flexible, transparent, intentional/responsible use of educational resources, including e-learning platforms, will lead to the reduction of stress generally associated with learning in a traumatized context. Thus, the use of work rooms available in video conferences, the open addressability of discussion questions, and the exchange of e-mails in communication can support the needs of social interaction and make learning more efficient (Maican & Cocorad, 2021). The "digital support" model, as a distinct element used in the learning task can generate increased well-being, lead to an active-participative attitude, desirable cognitive behavioral involvement and even independent learning (Chiu, 2022). On the same level is the model offered by some organizations such as the International Society for Educational Technology, which can be adopted by those schools that want to promote/implement online learning (Morgan, 2020). In online learning, several factors compete for performance: IT infrastructure, the type and quality of learning platforms, students' personality and skills, the quality of teachers and their skills in selecting curriculum contents and designing learning tasks, institutional support (Roy & Al-Absy, 2022).

As a result of the benefits of the technological revolution, the transversal objectives that are so important in the process of training/development of the young person's personality and obtaining independence/intellectual and socio-emotional autonomy (intellectual curiosity, joy, pleasure and satisfaction in learning, the feeling of being in control of things and using in the context of different knowledge and skills, identifying and selecting relevant information sources, using information in relation to a specific problem to identify the most appropriate solution) can be successfully achieved (Manea, 2019). At the same time, due to the multiple connections supported in the act of learning through augmented reality, the chances of perception and acquisition of information by the students are maximized, which can materialize in a clearer and more correct identification of solutions to the

problems that arise in the natural course of authentic, deep learning (Steven, 2021).

3. Methodology

This study adopted a mixed-methods approach to assess and compare the effectiveness of traditional and digital learning systems among university students. The research design incorporated both quantitative and qualitative instruments to gather comprehensive data on student perceptions and experiences.

3.1. Instruments

3.1.1. Quantitative survey

The primary instrument was a questionnaire with 16 items, designed to measure student attitudes towards traditional and digital learning. The items, excluding the introductory and demographic questions, utilized a Likert scale to facilitate quantitative analysis.

3.1.2. Qualitative group interviews

Complementing the questionnaire, focus group discussions were conducted to obtain in-depth qualitative insights. These discussions helped explore detailed student perceptions, experiences, and potential biases not captured through the survey.

3.2. Participants

The study involved 167 students from the Faculty of Psychology and Educational Sciences at Babeş-Bolyai University, Cluj-Napoca. Participants were selected based on their voluntary willingness to engage with the study and provided informed consent. The selection aimed to reflect a diverse mixture of students from various educational backgrounds and academic years.

3.3. Method

3.3.1. Quantitative Data Collection and Analysis

Data from the questionnaires were recorded and stored in tabular format, enabling systematic statistical analysis. This process helped identify significant patterns and preferences among the student responses regarding the two learning systems.

3.3.2. Qualitative Data Collection and Analysis

Focus group interviews were recorded and transcribed. Thematic analysis was employed to analyze the transcripts, allowing for the identification of recurring themes and detailed insights into student behaviors and perceptions related to online learning.

The combination of these methodologies provided a robust framework for understanding the comparative impacts of traditional and digital learning environments on student learning experiences.

4. Results

The results obtained from the administration of the questionnaire to the study participants are comprehensively detailed in Table 1, which presents aggregated responses for each questionnaire item. This table serves as a central point of reference for understanding student preferences and perceptions regarding the traditional and digital learning systems. The detailed item-wise analysis helps identify specific strengths and weaknesses within each learning system. By understanding these elements, educators and administrators can strategize more effectively to enhance learning experiences, ensuring that both systems are optimized to meet the evolving needs of students.

The first item allowed the recording of the students' opinion regarding the advantages and disadvantages generated by e-learning. The distribution of the options was very close, namely, 51% of the respondents appreciated that the disadvantages extended to a significantly wider level than the advantages generated by teaching and learning in the face-to-face system. The focus group allowed the identification/naming of the perceived disadvantages, which materialized in the sphere of cognitive and socio-emotional deficits (lack of non-verbal communication that endangers obtaining a correct and complete feed-back; lack of socialization that does not allow the building of functional and solid intercollegiate reactions; investment of intellectual and time effort for obtaining or selecting information and achieving a positive relational agreement). From the range of advantages that the online education system implies, the following were mentioned: maximizing the use of time due to the elimination of losses due to travel, domestic comfort, and the exclusive decision to interact with other people, to participate actively or passively in the didactic activities carried out, better management of time allocated for both learning and other activities, high involvement and self-responsibility in selecting learning activities and sources, and increased self-esteem. Although a greater number of advantages of learning in the online system have been identified, it is appreciated that the disadvantages are also worthy of consideration and imprint more personal development due to interrelational deficits, as well as obtaining high

academic performance due to the inability to use resources at high standards of technology by both teachers and students.

Table 1. Student perceptions of the online learning system

No. crt.	Item- Content of questions	Answer variants	N	%
1.	Perception of the online system's contribution to learning compared to the face-to-face system	Benefits	81	49%
		Disadvantage	86	51%
2.	The degree of participation/active involvement/intervention of students in the e-learning activity	Bigger	84	50%
		As	67	40%
		Smaller	16	10%
3.	Level of interpersonal relationships with teachers in online learning	Deeper	16	9%
		As	43	26%
		Less deep	108	65%
4.	The learning effort in the online teaching system	Bigger	54	32%
		As	99	59%
		Smaller	14	9%
5.	Time dedicated to individual study in the online system	Bigger	94	56%
		As	69	41%
		Smaller	4	3%
6.	Attendance at didactic activities in the online teaching system	Bigger	105	63%
		As	51	30%
		Smaller	11	7%
7.	Motivation for online learning	Bigger	67	40%
		As	87	52%
		Smaller	13	8%
8.	Level of interpersonal relationships with peers in online learning	Deeper	23	14%
		As	77	46%
		Superficial	67	40%
9.	Assessment anxiety in the online system	Bigger	20	12%
		As	72	43%
		Smaller	75	45%
10.	Objectivity in online assessment	Bigger	33	20%
		As	128	77%
		Smaller	6	3%
11.	Free time deployed/saved as a result of didactic activities carried out in the online system	Bigger	111	66%
		As	40	24%
		Smaller	16	10%
12.	The degree of discomfort with online versus face-to-face education	Bigger	11	6%
		As	123	74%
		Smaller	33	20%
13.	The volume of bibliographic resources consulted in the case of the online education system in relation to the offline	Bigger	77	46%
		As	84	51%
		Smaller	5	3%
14.	Learning performance (effort applied/results achieved) in the online system and academic performance	Bigger	9	5%
		As	103	62%
		Smaller	55	33%
15.	Satisfaction in online learning	Bigger	19	11%
		As	141	85%
		Smaller	7	4%
16.	Perception of the preferred form of organization/conduct of the educational process	Online system	73	44%
		Face to face system	15	9%
		Mixed system	79	47%

Although the appreciation of the degree of participation and active involvement of students in the didactic activities carried out in the digital environment is higher than in the traditional school system (50% of the students indicate a greater involvement). Combined with a much higher attendance at didactic activities in the online teaching system compared to attendance at face-to-face course activities according to the opinion of 63% of students, no added value was generated at the level of academic performance, which remained the same for 62% of students or was even lower for 33% of them.

Regarding the level of interpersonal relationships in the online learning system established between the educational actors (trainers and trainees on the one hand and peer learners on the other hand), they are not rated as more effective, or deeper, but on the contrary, especially at the level of interpersonal relationships with teachers, where there was a regression (65% of the respondents are of the opinion that interpersonal relationships are less deep than those in the established face-to-face education system). The level of interpersonal relationships with colleagues in online learning is valued as the same by 46% of students, while 40% of them are of the opinion that the relational level has deteriorated and is superficial. During the discussions in the group interview on the issue of the relational deficit, it emerged that the investment of effort (intellectual, physical, temporal) to have good communication meant to support positive interrelationships was far too high, and the deficient feedback led to a negative interrelationship.

The degree of motivation for learning in the online system has increased in the perception of 40% of students, while 52% of them appreciate that there have been no changes in terms of the motivation for learning achieved in the online environment compared to the traditional one, in the established school space. If we refer to the time dedicated to individual study in the online system valued as higher by 56% of students and the same, by 41% of them, the effort put into learning in the online teaching system (higher: 32%; the same: 59%), the degree of sincerity in giving the answers is highlighted, as a synchronization is observed between the degree of motivation and the time allocated to the study. At the same time, we corroborate these data with that regarding the volume of bibliographic resources consulted in the case of the traditional education system with the online system (higher-46%, the same-51%), and we can see that this fact was possible because it increased both the motivation for learning and the investment of time for

learning, which means that the online learning system is beneficial for the student's personal development and can lead to a higher degree of self-responsibility/self-involvement in learning.

Anxiety in the evaluation developed in the online system is appreciated by 45% of students as lower, and only 12% appreciate it as higher. At the same time, the degree of objectivity of teachers in online assessment is perceived as higher by 20% of students, although the assessment carried out with digital tools means generates stressful situations for those who are assessed (Pillai et al., 2021), while 77% of them appreciate the degree of objectivity in the evaluation of the teacher as a constant, regardless of the system in which it is produced, whether online or face-to-face. From the focus group discussions, it was indicated that digital skills and the use of technological resources are highly developed at the level of the surveyed students, a fact for which the evaluation in the online system did not create a problem for them nor did it generate stressful situations.

Although the well-being felt by students in the online learning system is generally not perceived as different from the face-to-face learning system (85% of students have the same degree of satisfaction regardless of the learning system approached), the degree of satisfaction in online learning is nonetheless higher for 11% of them. Satisfaction in learning can be associated with a decrease in assessment anxiety, a perception of increased objectivity in assessment, and a greater availability of free time generated by supporting learning in synchronous didactic activities compared to perceived asynchronous didactic activities by 66% of students.

Considering the ratio between the beneficial and undesirable elements of learning in e-learning contexts, students' perception of the preferred form of organizing and conducting the educational process is that of a mixed system in a proportion of 47%, an online system in a proportion of 44%, and only 9% of respondents would like to keep an exclusive face-to-face system. From the discussions held, it emerged that the good direction for effective and sustainable academic learning is that of digital transformations and the valorization of technological resources, which also explains the preference of students for online or mixed-system learning.

5. Discussions

In agreement with other results (Hamdan, 2022; Roy & Al-Absy, 2022; Zheng et al., 2021), our study confirms the benefits of online learning. The

preference for the approach of a mixed system, doubled by the online one, in student learning, based on the study carried out, results from the following aspects: the well-being given by the comfort and satisfaction in learning, the reduction of anxiety in the evaluation, and the greater availability of free time generated by the support learning in synchronous didactic activities compared to asynchronous didactic activities.

The act of learning, regardless of the environment in which it is carried out, must be customized/differentiated according to students' particularities/cognitive-intellectual experiences (Yan et al., 2021), the generation they belong to (example: the ALFA generation, whose technological skills are exceptional), and especially since for some students the value of information and internet addiction is directly proportional to satisfaction and academic performance (Maqableh & Jaradat, 2021). Given the benefits of online learning, educational institutions should consider the emerging opportunities and facilities of digital transformations and respond positively to the challenges (Agustini et al., 2020; Soto-Acosta, 2020), including by considering the digital societies of the not-so-distant future (Xiao et al., 2022) The 4th industrial revolution with its implications generated by the use of artificial intelligence on a global scale, both socially and economically, has created a series of ethical questions, but also solutions for a lot of problems faced by human society. (Nadoleanu et al., 2022). Therefore, an essential condition for carrying out online learning activities is the possession of digital skills and the realization of transformations at the level of learning spaces consistent with technological requirements. For a quality education, the teacher needs substantial training, not only in terms of digital skills, but also in the didactic, methodological dimension necessary to create new sources and curricular resources aimed at facilitating learning, motivating and supporting the student's cause/interest in learning.

6. Conclusions

The experiences accumulated during the pandemic underscored the critical need to sustain and refine educational practices. This study reveals that the persistent challenges and emerging opportunities of the pandemic have catalyzed the evolution of pedagogical strategies, demonstrating the imperative to continuously adapt and improve educational frameworks. Our findings strongly advocate for the ongoing development of best practices that were

initiated during this period, emphasizing their long-term integration into educational systems.

Our analysis indicates that the advantages and disadvantages of online learning systems are becoming increasingly balanced. While the transition to digital platforms initially presented significant challenges, including accessibility issues and the need for digital literacy, these have been substantially mitigated over time through targeted interventions and enhanced support systems. The study suggests a trend towards a more harmonious integration of online learning, with its benefits—such as flexibility and accessibility—being more fully realized and its drawbacks being systematically addressed.

The research underscores a significant inclination towards leveraging digital technologies to enhance educational outcomes. It highlights the effectiveness of e-learning environments in fostering more engaged and personalized learning experiences. By capitalizing on the inherent capabilities of digital tools—such as interactive simulations, collaborative platforms, and AI-driven tutorials—educators can maximize the educational benefits, thus enriching the learning journey for students.

One of the critical insights from this study is the necessity to bridge the disparities between traditional and online learning modalities. The findings advocate for a participatory approach to education, where learners actively collaborate with educators to co-create the learning experience. This partnership is crucial for innovating and tailoring learning processes that cater to diverse student needs and preferences. Furthermore, the study calls for learners and educators alike to invest time and effort in cultivating a learning environment that is both inclusive and effective.

Lastly, our study highlights the critical role of innovation and personal responsibility in the educational process. It encourages both students and teachers to embrace innovative practices that enhance learning outcomes. Additionally, the importance of personal investment in the educational process is emphasized, suggesting that the success of both traditional and online learning is contingent upon the proactive engagement and dedication of all stakeholders involved.

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