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EDITED BY

Amna Mirza,
University of Delhi, India

REVIEWED BY

Jupeth Toriano Pentang,
Central Luzon State University, Philippines
Bayu Setiadi,
Yogyakarta State University, Indonesia

*CORRESPONDENCE

Elham Akbari

✉ eakbari@modares.ac.ir

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A cross-sectional study of teachers' and students' preferences for educational methods in the post-COVID-19 era

Elham Akbari^{ID*}

Faculty of Industrial & Systems Engineering, Tarbiyat Modares University, Tehran, Iran

Introduction: Educational paradigms and methods have evolved in recent years, particularly after the COVID-19 pandemic. The present study aimed to investigate teachers' and students' preferences for face-to-face, blended, and e-learning educational methods in the post-COVID-19 era. This study aims to investigate the attitudes of teachers and students toward three educational methods: face-to-face education, blended learning and e-learning.

Methods: The statistical population consisted of all teachers and students in Iran. The questionnaire was sent to them through the Shad system and Telegram. 9,395 students and 964 teachers voluntarily answered the questionnaires.

Results and discussion: The results of the present study showed that both teachers and students, despite having a positive attitude towards new educational approaches, still preferred face-to-face education to blended and e-learning. Another part of the results showed that students in vocational schools preferred blended and e-learning more than other high school students. Also, students with an experience of academic failure and students who had lower incomes preferred e-learning and blended learning over face-to-face education. Students with higher incomes were also less likely to attend face-to-face education. Also, teachers with diploma and doctorate degrees were more inclined to e-learning and blended learning methods, and less teaching experience also strengthened this inclination. As to the teachers' teaching level, the results showed that there was no significant relationship between the teaching level and the preferences of blended and face-to-face learning methods. However, primary school teachers were less inclined to e-learning than the teachers in the first and second years of the secondary school. Furthermore, the results indicated that teachers in prosperous areas had more preference for e-learning, than teachers in the poor and relatively poor areas. The findings of this study can help educational policymakers and authorities design and implement educational programs tailored to the preferences of teachers and students in the post-COVID-19 era.

KEYWORDS

face-to-face education, blended learning, e-learning, teacher and student, preference, COVID-19 pandemic

Introduction

Face-to-face education was the only educational approach in the not-too-long past, and education meant physical classrooms, blackboards, and direct relations between teachers and students. Nonetheless, this type of education was called traditional education upon the use of technology in the learning and teaching process (Akbari, 2021) and consequently, e-learning

and blended learning methods developed. Therefore, students and teachers are reevaluating the educational approaches they use, to find out the more suitable ones (Abdullah et al., 2023; Ghazal et al., 2022). Until recently, traditional teaching was the only educational method and approach that existed because historically education has been identified with face-to-face interaction in a physical classroom where teachers and students interacted directly through blackboards. However, when technologies started to take place in learning and teaching then this kind of education was labeled as traditional education (Abbasi Kasani et al., 2020).

So, e-learning and blended learning were introduced and were transfigured into online platforms based on digital resources. Hence, students and teachers are reflecting upon the educational ways of learning to reconsider them in terms more suitable (Abdullah et al., 2023; Ghazal et al., 2022).

In the early years of e-learning development, many teachers and students expressed uncertainties about this approach and method (Hayat et al., 2010).

For example, teachers had concerns about student participation, the effectiveness of online assessments, and students' attitudes. Nonetheless, such outlooks mainly changed when digital literacy improved and more sophisticated online tools appeared (Peytcheva-Forsyth et al., 2018).

Today, teachers are aware of the advantages of e-learning, including, tailored and customized learning experiences, considerations for students with diverse needs, and learning opportunities outside the traditional classroom. Blended learning as a combination of online tools and traditional learning methods, is admired for its flexibility and consideration for different learning styles. As learning through digital tools increased, a more positive attitude was also developed in students (Akbari, 2016; Raza et al., 2021; Nayeri et al., 2023). However, these are the perceptions that have transformed over time due to increased digital literacy of educators and the evolution of online technologies (Peytcheva-Forsyth et al., 2018).

Benefits such as personalized and tailored experiences for each student increased accessibility to accommodate a range of learning needs among students, and continual opportunities to learn outside the customary classroom setting are now realized by educators in e-learning. These include blended learning technologies (combining traditional classroom activities with online digital media), which have garnered particular praise due to their flexibility and the variety of ways they can cater to different types of learners. For instance, changes in students' attitudes toward studying are more on the positive side due to digital education (Akbari, 2016; Tayebnik and Puteh, 2013; Poon, 2013).

Young generations grown up in the digital world, often tend to use online platforms and digital learning environments in the learning process (Prensky, 2001), and there is a growing preference among students for courses that offer kind of online interaction, due to factors such as convenience, the ability to work at your own pace, and the use of diverse multimedia resources that can enhance understanding.

Despite the advantages of digital education, a significant number of students still defend the merit of face-to-face education, and consider it important to have the opportunity for physical presence and the social aspect of face-to-face education (Wahid et al., 2023; Al-Mawee et al., 2021). This also applies to teachers, as many teachers still value face-to-face interaction in traditional

learning environments. They emphasize the importance of social interactions and the development of soft skills (Gao and Shi, 2023; Leontev, 2022).

Nonetheless, the COVID-19 pandemic unexpectedly accelerated the change in education.

In Iran, before the COVID-19 pandemic, the use of e-learning in schools and even in many universities was not yet widespread and structured, and the related infrastructure faced challenges such as poor access to high-speed internet, lack of equipment, and teachers' unfamiliarity with digital tools. However, with the onset of the pandemic and the nationwide closure of schools, the government tried to continue education through digital platforms by launching systems such as the Shad network. Although these policies had inconsistencies in implementation due to the speed of implementation, they generally led to a wider familiarity of teachers and students with e-learning and imposed a kind of "digital transformation compulsion" on the Iranian education system. This extensive experience led to the formation of new attitudes towards blended learning and e-learning, the examination of which is considered in the present study (Akbari, 2021; Abdullah et al., 2023).

At the time of the pandemic lockdown, e-learning became a compulsion for schools and universities. Such inadvertent change profoundly affected the teachers' and students' visions.

Then, all of a sudden came the pandemic: as one of its most notable ripple effects on our systems in educational modes. A time came when schools, colleges and universities had to shut their doors which made e-learning a necessity rather than an option. This sudden and unforeseen shift changed the perspective of both teachers as well as students.

Studies show that many teachers who had to adapt to online teaching tools during the pandemic decided to integrate some of these tools into their regular teaching practice. It was more convenient for students to use self-directed online learning and they valued its flexibility in managing their studies alongside other commitments (Almousa et al., 2023; Das, 2021; Muthuprasad et al., 2021). Chen et al. (2018) states that students are in favor of integrating technology into education and teachers are struggling to learn how to integrate it. But the important fact is that the COVID-19 pandemic strongly accelerated this change of approach. It is critical to understand these changes in order to be able to effectively develop and implement future learning strategies. Before the pandemic, traditional classroom-based learning was a norm. However, during the pandemic, the sudden shift to online platforms revealed various benefits and challenges associated with digital learning. Teachers felt obliged to quickly adapt and incorporate technology into their teaching methods, which in turn affected their attitudes towards digitization in education. Meanwhile, students directly experienced the advantages and disadvantages of distance learning, which affects their preferred future educational environments.

It is necessary to analyze these changing views for several reasons. First, it helps identify the best approaches and areas in need of improvement ensuring a stronger and more flexible education system. Second, it helps policymakers develop guidelines addressing the evolving needs of teachers and students. Finally, it enables educational institutions to modify their support services and foster a more adaptive and responsive learning environment. As a result, the teachers' and students' changing perspectives towards post-COVID-19 educational approaches reveal important insights that are essential for

the development of future education. The present research tries to answer the following research questions:

Which educational approaches (face-to-face education, e-learning, blended learning) do teachers and students prefer?

What is the difference between teachers' and students' perceptions of blended learning?

What is the effect of teachers' and students' demographic characteristics on their preference for different educational approaches?

Method

Two major methods were used in the present research: (1) Library studies to collect data from library sources such as articles and books to develop the theoretical foundations and the literature review of the research; (2) Questionnaire to collect data from teachers and students, which was first confirmed in terms of validity and reliability, and then analyzed statistically.

Shad system and Telegram were employed to conduct the online survey. With the spread of the coronavirus, many problems arose in the education system and caused schools to close. At this time, the Ministry of Education, in collaboration with the Ministry of Communications, designed and launched a system called the Happy Student System. The Shad system was created to promote virtual education for students and prevent academic failure. The Shad messenger can be used by students throughout Iran and offers a variety of features, such as sending text, audio, and video files with a size of 1.5 GB by students and teachers, communication between students and teachers, holding online exams, holding oral exams in audio format, establishing video communication between teachers and students online, controlling students' homework, the possibility of student attendance and absence, the possibility of questions and answers between students or teachers and students, the possibility of teaching lessons online, the possibility of parents' communication with teachers, the possibility of following up on past lessons, the possibility of locking the group by the teacher to convert the group into a channel, the possibility of live in lesson groups, audio and video calls, the possibility of sending messages to users on the personal page, having a Shad Nama section, having a parent and teacher channel, having a Shad Event section for participating in student competitions and getting information about festivals, having a conversation section with the minister, the possibility of saving files in It has saved messages, high security and user privacy, and the ability to conduct surveys. Therefore, one of the reasons for choosing the Shad program was the ability to conduct online surveys. Further, Telegram was utilized to conduct the online survey as it is one of the most popular social networks in Iran with more than 49 million users. The online survey link was shared in the Shad system and Telegram channels with participants. Participants voluntarily responded to the survey.

This study used a volunteer sampling method, meaning only those who were willing to participate in the survey are included and participants willingly contribute their thoughts and experiences about educational approaches. It's like a conversation because only those who are interested in taking part will join the online survey. Finally, 9,395 students and 964 teachers voluntarily answered the questionnaires. This method was the most appropriate option given the circumstances of the COVID-19 pandemic and the need to collect data online.

The standardized questionnaire adopted from the literature was validated in two ways. First, three experts who were familiar with our topic read through the questionnaire to confirm face validity. They evaluated whether the questions effectively captured the topic under investigation. Further, they checked the survey for common errors like double-barreled, confusing, and leading questions. According to their comments, several revisions have been made. Second, a pilot test was conducted on a subset of the statistical population. A sample of 60 participants was employed for pilot testing.

Furthermore, one of the key shortcomings of self-reported measures is their measurement error, which is present in all survey data. This lowers validity and is likely one of the reasons why self-reports fail to reflect objective behavior accurately. In this study, self-report bias was reduced in two ways. First, participants were encouraged to respond honestly by ensuring anonymity. Second, participants were provided with specific examples to clarify abstract concepts in the survey. In all statistical analyses of this study, an error level of 0.05 (5 percent) was used as the criterion for statistical decision.

Statistical society and participants

Sample specifications

In this research, 9,395 students and 964 teachers answered the questionnaire. The average age of teacher respondents was 37.7 years. As shown in Table 1, most of the teachers were female (60%) and had a bachelor's degree (46.3%), and they taught in public schools (78.8%) and in regions with middle social class (67.9%). Furthermore, above half of the teachers had graduated from public universities (35%) and Farhangian University (27.5%). As to the teachers' work experience, 28% had less than 5 years of experience, 31.6% had more than 20 years of experience, and for the rest, it was between 5 and 20 years. The student group consisted of girls (48.3%) and boys (51.7%). Moreover, the majority of students were in their first year of secondary school (67.6%) and studied in public schools (78.8%).

The family incomes of 4,208 students (44.8%) was up to 5 million Tomans. It was up to 10 million Tomans in 3,115 students (33.2%). In 1,186 students (12.6%) it was up to 15 million Tomans and 886 students (9.4%) had a family income of more than 20 million Tomans. Furthermore, 1,904 students (20.3%) had experienced academic failure, while 7,491 students (79.7%) had never had such an experience.

Data analysis

The first research question: do teachers and students prefer face-to-face education, e-learning or blended learning?

The analysis of the students' data indicated that "the means for the items related to face-to-face education, e-learning, and blended learning were 3.879, 2.434, and 3.228, respectively. "Their *t* values were all above the limit value of 1.96 (absolute value) and their significance level equaled 0.000. Furthermore, the analysis of the teachers' data revealed that the means for the items related to face-to-face education, e-learning, and blended learning were 3.27, 3.77 and 2.62, respectively. Since these values were greater than the alpha value of 0.05, the relevant statistical hypothesis (H1) was supported ($p = 0.000 > 0.05$).

TABLE 1 Respondents (teachers and students) specifications.

Respondent	Variable	Group	Frequency	Percentage
Teachers	Gender	Female	579	1/60
		Male	385	9/39
	Educational degree	Diploma	97	1/10
		Bachelor's degree	446	3/46
		Master's degree	321	3/33
		PhD	100	4/10
	University	Public universities supervised by the Ministry of Science	337	35
		Farhangian University	265	5/27
		Islamic Azad University	196	3/20
		Other universities	166	2/17
	Work experience	Less than 5 years	270	28
		Between 5 and 10 years	168	4/17
		Between 10 and 15 years	98	2/10
		Between 15 and 20 years	123	8/12
		Above 20 years	6/31	6/31
	Teaching level	Primary school	370	4/38
		Second year in high school	305	6/31
		First year in high school	289	30
	Type of school	Public schools	760	8/78
		Non-profit schools	99	3/10
		Board of Trustees schools	66	8/6
		Other schools	39	4
	Teaching region	Regions with middle social class	655	9/67
		Poor regions	223	1/23
		Affluent regions	86	9/8
Students	Gender	Girls	4,539	3/48
		Boys	4,856	7/51
	Education degree	First year in high school	6,347	6/67
		Second year in high school	2,447	26
		Vocational school	301	4/6
	Type of school	Public schools	760	8/78
		Non-profit schools	99	3/10
		Board of Trustees schools	66	8/6
		Other schools	39	4

In other words, all educational approaches are welcome by students. Moreover, the t values were all above the limit value of 1.96 (absolute value) and their significance level equaled 0.000. A look at the mean of the different educational methods illustrates that face-to-face education achieved a higher mean compared to other methods (Table 2).

In order to evaluate the preference degree for educational methods from the teachers' and students' perspectives, Friedman's ranking test was used. Table 3 shows the value of the chi-square test (χ^2) and the statistical significance (Sig.) or the p -value. It can be concluded that there is a significant difference among the means of the ratings for the educational methods (blended, face-to-face, and e-learning), and that from the point of view of the respondents (students and teachers), these educational methods do not have the same value and importance.

The second research question: what is the difference between teachers' and students' perceptions of blended learning?

To examine differences between teachers' and students' perceptions of blended learning characteristics, an independent samples t -test was conducted for each variable, except for 'workload' and 'economic cost' which were only assessed for teachers. It should be noted that the two variables of workload and economic cost were considered only for the teachers' sample, and therefore it is not possible to compare the teachers' and students' views regarding these two variables. Table 4 shows that the mean of the variable of learning facilitation was higher for teachers than students, but the mean of the variable of blended learning environment characteristics was the same for both groups. Regarding other variables, the students had a higher mean than the teachers.

These results suggest that both groups are aware of the importance of blended learning environments. However, teachers perceive greater facilitation of learning, probably owing to their instructional

experience and familiarity with educational technologies. In contrast, students report higher enjoyment and participation, which may reflect their openness to interactive and flexible learning formats.

The third research question: what is the effect of teachers' and students' demographic characteristics on their preference for different educational approaches?

Analysis of students' data

In order to answer this question, the one-way analysis of variance (ANOVA) was used. At first, the influence of the variable of students' educational level on the preference for the type of educational approach (face-to-face education, blended learning and e-learning) was investigated. Table 5 shows that there is a significant relationship between different educational levels and the preference for educational approaches ($p \leq 0.05$). Students in the first and second year of the secondary school had a greater preference for face-to-face education than students in vocational schools.

Table 6 shows students' preferences in terms of face-to-face education, e-learning and blended learning based on their different levels of family income. According to the findings, students with different levels of family incomes were different in terms of their preference for e-learning. In other words, students with lower family incomes were more likely to use e-learning. As to blended learning, students with a family income of up to 5 million were more inclined to use blended learning than students with higher family incomes. Finally, differences were observed in students with different family incomes, regarding their preference for face-to-face education. On the one hand, students with family incomes up to 5 million and students with family incomes up to 10 and 15 million both preferred face-to-face education. On the other hand, a significant difference was observed in students with different family incomes in their preference

TABLE 2 The results of the mean test of a community who answered the second research question.

Group	Type of education	Sample mean	Standard deviation	Mean of standard error	t	Significance level
Students	Blended learning	3.228	1.094	0.0114	20.036	0.000
	Face-to-face education	3.879	1.229	0.0128	68.697	0.000
	E-learning	2.434	1.321	0.0138	-41.120	0.000
Teachers	Blended learning	3.271	1.1761	0.0379	7.123	0.000
	Face-to-face education	3.777	1.2853	0.0422	18.408	0.000
	E-learning	2.262	1.1384	0.0367	-20.108	0.000

TABLE 3 Friedman test results for the answers to the first research question.

Group	Type of education	Chi-square	Sig	Mean rank
Students	Blended learning	4335.286	0.000	2.10
	Face-to-face education			2.40
	E-learning			1.51
Teachers	Blended learning	560.121	0.000	2.22
	Face-to-face education			2.37
	E-learning			1.41

for face-to-face education. This means that students with family incomes greater than 20 million had less preference for face-to-face education as compared to students with lower family incomes.

Next, the role of students' experience of academic failure in their preferred type of educational approach (face-to-face education, blended learning and e-learning) was also investigated. The results showed that there was a significant relationship between these two variables. That is, students with an experience of academic failure preferred e-learning and blended learning over face-to-face education.

TABLE 4 Comparison of the means of teachers' and students' perceptions of blended learning characteristics.

Variable	Group	Sample mean	Standard deviation	Mean of standard error
Learning facilitation	Teachers	3.59	0.81	0.03
	Students	3.45	0.70	0.01
Effectiveness of blended learning	Teachers	3.02	0.79	0.03
	Students	3.09	0.91	0.01
The amount of interaction in blended learning	Teachers	3.19	0.97	0.03
	Students	3.21	0.91	0.01
Participation in the education process	Teachers	3.05	0.96	0.03
	Students	3.23	0.86	0.01
Enjoyment	Teachers	3.29	1.06	0.03
	Students	3.32	0.97	0.01
Characteristics of the learning environment	Teachers	3.61	0.98	0.03
	Students	3.61	0.88	0.01

However, students who had not experienced academic failure preferred face-to-face education over e-learning and blended learning (Table 7).

Analysis of teachers' data

In the second part, the role of teachers' demographic variables in their answers to the questions was evaluated. Firstly, the influence of the teachers' educational degree on their preferred type of educational approach (face-to-face education, blended learning and e-learning) was investigated. The data in Table 8 shows that the teachers' educational degree had an effect on their preferred type of educational approach (face-to-face education, blended learning and e-learning). In other words, there was a difference among teachers with different educational degrees in terms of their preferred type of teaching approach. In other words, teachers with diploma and doctorate degrees had higher preferences for e-learning and blended learning approaches as compared to teachers with bachelor's and master's degrees. Moreover, teachers with bachelor's and master's degrees had higher preferences for face-to-face instruction compared to teachers with diplomas and doctorate degrees.

In order to analyze the influence of teachers' work experience on their preferred type of educational approach (face-to-face education, blended learning and e-learning), ANOVA analysis was used. As Table 9 shows, it can be observed that there was a relationship only between teachers' work experience and their preference for the e-learning approach ($p \leq 0.05$). A *post-hoc* test revealed that teachers with less experience (less than 15 years) preferred e-learning more than teachers with more experience (more than 15 years). In general, teachers with less experience preferred e-learning more than people with more experience.

The relationship between teachers' teaching level and their preferred type of educational approach (face-to-face education, blended learning and e-learning) was also investigated using one-way analysis of variance. Table 10 presents the descriptive indices including the mean, standard deviation and 95% confidence interval related to different teaching levels for the dependent variable. As can

TABLE 5 Descriptive statistics and analysis of variance for the relationship between students' educational level and the type of preferred education.

Type of preferred education	Students' educational level	Number	Mean	Standard deviation	Standard error	F	Sig.
E-learning	First year in high school	6,222	2.39	1.295	0.016	50.662	0.000
	Second year in high school	2,409	2.42	1.344	0.027		
Blended learning	Vocational school	591	2.96	1.391	0.057		
	First year in high school	6,247	3.22	1.080	0.014	3.853	0.021
	Second year in high school	2,419	3.21	1.140	0.023		
Face-to-face education	Vocational school	594	3.35	1.047	0.043		
	First year in high school	6,230	3.96	1.191	0.015	50.106	0.000
	Second year in high school	2,414	3.74	1.286	0.026		
	Vocational school	592	3.56	1.298	0.053		

TABLE 6 Descriptive statistics and analysis of variance for the relationship between students' family incomes and their preferred type of education.

Type of preferred education	Students' family incomes	Number	Mean	Standard deviation	Standard error	F	Sig.
E-learning	Up to 5 million	4,124	2.52	1.319	0.021	13.275	0.000
	Up to 10 million	3,074	2.32	1.280	0.023		
	Up to 15 million	1,164	2.42	1.349	0.040		
Blended learning	Above 20 million	860	2.46	1.405	0.048		
	Up to 5 million	4,145	3.26	1.060	0.016	3.294	0.020
	Up to 10 million	3,084	3.21	1.081	0.019		
	Up to 15 million	1,167	3.20	1.148	0.034		
Face-to-face education	Above 20 million	864	3.16	1.219	0.041		
	Up to 5 million	4,133	3.91	1.207	0.019	6.859	0.000
	Up to 10 million	3,081	3.89	1.219	0.022		
	Up to 15 million	1,163	3.84	1.228	0.036		
	Above 20 million	859	3.71	1.358	0.046		

be observed in the table, there was no relationship between teachers' teaching level and their preference for blended and face-to-face learning methods ($p > 0.05$). However, a significant relationship was observed between the preference for e-learning and the teachers' teaching level ($p \leq 0.05$). In this regard, means were compared using a *post-hoc* test. In the case of e-learning, it can be seen that the teachers teaching in the primary school were less inclined to use e-learning compared to the teachers teaching in the first and second years of secondary school.

Finally, the relationship between the region where teachers teach in and their preferred teaching method was investigated. As shown in Table 11, it was found that the relationship between the teaching region and the preference for e-learning was significant ($p \leq 0.05$), but there was no difference among the teachers who taught in different regions in terms of the preference for face-to-face education and blended learning ($p > 0.05$). Using the post hoc test, the means were compared two by two. As to e-learning, teachers teaching in affluent regions preferred e-learning more, compared to teachers teaching in the middle and poor regions.

Finding and discussion

The field of education has always been evolving and teachers' and students' views have undergone dramatic changes due to the developments in cognitive science and the amplified accessibility to digital resources. Furthermore, after the COVID-19 pandemic, the educational paradigms went through significant modifications. In keeping with such evolutions, the present study analyzed changes in

teachers' and students' attitudes toward three educational approaches, i.e., face-to-face education, blended learning, and e-learning.

As we are aware, the field of education is dynamic. The views of both teachers and students regarding educational strategies have drastically changed with the development of cognitive science by leaps and bounds. Current changes in education paradigms, especially after all the mess COVID-19 has brought! Hence, the current research aimed at investigating teachers' and students' experiences after the COVID-19 pandemic concerning three different modes of educational delivery (face-to-face education, blended learning and e-learning).

The results of the first research question revealed a more positive attitude towards face-to-face education in both teachers and students. Such inclination towards face-to-face education seems to have several underlying reasons. In Iran, the basic infrastructure for e-learning, such as stable internet, access to digital tools, and specialized training of teachers, especially in deprived areas, has not yet reached the desired level. On the other hand, many teachers and students have gained their predominant educational experience in the face-to-face education system, and this mental and psychological familiarity makes them still consider traditional education to be more effective and reliable, especially in terms of classroom control, real-time interaction, and direct feedback.

In the face of being cognizant of the benefits of e-learning, they chose it as the third priority and blended learning was their middle choice. These findings are consistent with for example Adedoyin and Soykan (2023) who demonstrated that although e-learning became a necessity during the pandemic, both teachers and students preferred traditional learning due to the better interaction inherent in it.

TABLE 7 Descriptive statistics and analysis of variance for the influence of students' experience of academic failure on their preferred type of education.

Type of preferred education	Students' experience of academic failure	Number	Mean	Standard deviation	Standard error	<i>F</i>	Sig.
E-learning	Yes	1,879	2.64	1.381	0.032	60.101	0.000
	No	7,343	2.38	1.300	0.015		
Blended learning	Yes	1,886	3.31	1.123	0.026	13.648	0.000
	No	7,374	3.21	1.086	0.013		
Face-to-face education	Yes	1,882	3.70	1.286	0.030	49.302	0.000
	No	7,354	3.92	1.211	0.014		

TABLE 8 Descriptive statistics and analysis of variance for the relationship between teachers' educational degrees and their preferred type of education.

Preferred type of education	Teachers' educational degrees	Number	Mean	Standard deviation	Standard error	<i>F</i>	Sig.
E-learning	Diploma	97	3.19	1.288	0.131	47.533	0.000
	Bachelor's degree	446	2.05	0.963	0.046		
	Master's degree	321	2.06	1.031	0.058		
	PhD	98	2.94	1.331	0.134		
Blended learning	Diploma	96	3.56	0.958	0.098	6.534	0.000
	Bachelor's degree	446	3.17	1.156	0.055		
	Master's degree	321	3.21	1.234	0.069		
	PhD	99	3.63	1.167	0.117		
Face-to-face education	Diploma	89	3.51	1.289	0.137	2.873	0.035
	Bachelor's degree	436	3.89	1.196	0.057		
	Master's degree	310	3.74	1.344	0.076		
	PhD	91	3.65	1.440	0.151		

TABLE 9 Descriptive statistics and analysis of variance for the relationship between teachers' work experience and their preferred type of education.

Preferred type of education	Teachers' work experience	Number	Mean	Standard deviation	Standard error	<i>F</i>	Sig.
E-learning	Less than 5 years	270	2.31	1.116	0.068	2.332	0.054
	5 to 10 years	168	2.42	1.333	0.103		
	10 to 15 years	98	2.38	1.264	0.128		
	15 to 20 years	123	2.13	1.034	0.093		
	Above 20 years	303	2.15	1.023	0.059		
Blended learning	Less than 5 years	269	3.27	1.090	0.066	0.160	0.958
	5 to 10 years	168	3.28	1.263	0.097		
	10 to 15 years	98	3.21	1.234	0.125		
	15 to 20 years	123	3.23	1.177	0.106		
	Above 20 years	304	3.30	1.187	0.068		
Face-to-face education	Less than 5 years	258	3.69	1.253	0.078	0.947	0.436
	5 to 10 years	158	3.78	1.379	0.110		
	10 to 15 years	97	3.70	1.393	0.141		
	15 to 20 years	118	3.94	1.186	0.109		
	Above 20 years	295	3.81	1.263	0.074		

TABLE 10 Descriptive statistics and analysis of variance for the relationship between teachers' teaching level and their preferred type of education.

Preferred type of education	Teachers' teaching level	Number	Mean	Standard deviation	Standard error	F	Sig.
E-learning	Primary school	370	2.08	0.998	0.052	14.298	0.000
	First year in high school	289	2.55	1.240	0.073		
	Second year in high school	303	2.21	1.149	0.066		
Blended learning	Primary school	370	3.23	1.147	0.060	2.434	0.088
	First year in high school	288	3.40	1.178	0.069		
	Second year in high school	304	3.20	1.203	0.069		
Face-to-face education	Primary school	361	3.83	1.244	0.065	2.511	0.082
	First year in high school	271	3.63	1.310	0.080		
	Second year in high school	294	3.85	1.306	0.076		

TABLE 11 Descriptive statistics and analysis of variance for the relationship between the region where teachers teach in and their preferred type of education.

Preferred type of education	Region where teachers teach in	Number	Mean	Standard deviation	Standard error	F	Sig.
E-learning	Poor	223	2.24	1.166	0.078	3.159	0.043
	Middle	655	2.23	1.108	0.043		
	Affluent	84	2.56	1.267	0.138		
Blended learning	Poor	223	3.19	1.203	0.081	0.965	0.381
	Middle	654	3.31	1.149	0.045		
	Affluent	85	3.22	1.303	0.141		
Face-to-face education	Poor	216	3.80	1.320	0.090	0.885	0.413
	Middle	628	3.79	1.260	0.050		
	Affluent	82	3.60	1.387	0.153		

Similarly, [Dhawan \(2020\)](#) and [Boelens et al. \(2018\)](#) argued that while e-learning and blended learning offer flexibility and accessibility, many students still prefer the social and interactive aspects of face-to-face learning. Similarly, [Adnan and Anwar \(2020\)](#) found that during the corona period, students preferred face-to-face and blended learning to e-learning because of the many challenges they confronted in the field of e-learning, including technical issues and the absence of interaction. Furthermore, [Smith et al. \(2022\)](#) indicated that both teachers and students preferred face-to-face education to e-learning, even though virtually 40% of students considered e-learning as useful because of its flexibility and accessibility. And, only 25% of teachers were concerned about the efficacy of the e-learning method.

Therefore, it seems that for a great number of people, face-to-face education continues to be the preferred educational approach though e-learning and blended learning are increasingly admired for provision of interaction and direct communication. Additionally, these findings demonstrate that multiple educational approaches should be used in order to take into consideration the various learning priorities and to enhance educational outcomes.

Although the results of this study were conducted in the Iranian context, the findings do not exclusively apply to Iran. In many countries, there is still a preference for face-to-face education; for example, research conducted in Pakistan ([Adnan and Anwar, 2020](#)) and the United States ([Smith et al., 2022](#)) also shows that despite the increased access to online education, many students and teachers prefer face-to-face education owing to human interaction, rapid feedback, and social space. Nevertheless, in Iran, this preference may be stronger, as problems such as unequal access to technology, insufficient training of teachers to use digital tools, and weak technical infrastructure in some regions have made the virtual education experience more difficult.

The second research question addressed the difference between teachers and students in terms of their perceptions of the characteristics of blended learning. The results specified significant differences. It was shown that for teachers blended learning could facilitate the learning process and the use of various educational resources and tools. This was probably because the teachers were more experienced in using educational technologies and more familiar with

different educational tools. On the other hand, the calculated mean for the variable of blended learning environment characteristics was the same for both groups of teachers and students. This finding showed that both groups were aware of the capabilities of the blended learning environment in creating a suitable and diverse educational environment. It may be claimed that this finding was due to their common experiences in using this educational method during the corona pandemic. Regarding other variables, the mean for students was higher than for teachers. In parallel with Birbal et al. (2018), the findings showed that students were more satisfied with various aspects of blended learning such as greater interaction, flexibility and easier access to educational resources. Also, as Ja'ashan (2015) and Akbarov et al. (2018) showed, students may place more value on the interactive and social features of the blended learning environment, which will enhance their learning experience.

Nonetheless, a review of the studies conducted shows that many previous studies, especially those conducted before the COVID-19 pandemic, have focused more on the general attitudes of teachers and students towards e-learning and less attention is paid to contextual differences, infrastructure conditions, and demographic variables (such as income level, geographical region, and educational experience). Also, in many of these studies, the samples were limited and mostly small, and a separate analysis of different subgroups of respondents was not provided. These limitations indicate the need for research with a large sample size and a deeper analysis of socio-economic contexts.

Various studies (Boelens et al., 2017; Cleveland-Innes and Wilton, 2018; Drysdale et al., 2013) indicated that while teachers emphasized the flexibility and accessibility that blended learning provides, students often focused on its convenience and ease of access to diverse information sources as is also specified by Stacey and Gerbic (2007). In addition, like Dinc (2019) and Çoklar and Yurdakul (2017), who underscored the inclusion of technology in teaching, teachers in the present study emphasized the importance of integrating technological tools into education to enhance teaching methods. They believed that blended learning could significantly increase engagement and personalized learning experiences in students. They also recognized the potential of technology in facilitating collaborative learning and providing timely feedback (Graham et al., 2012; Rienties et al., 2013). In recent years, several theoretical models have been developed to explain how technology is adopted in education, the most important of which are the Technology Acceptance Model (TAM) and the Innovation Diffusion Theory (IDT). Focusing on two constructs of "perceived usefulness" and "perceived ease of use," the TAM model attempts to predict users' behavior in using new technologies. IDT theory emphasizes that factors such as relative advantage, adaptability, and observability of an innovation play a role in its adoption by users. Recent studies such as Raza et al. (2021) and Nayeri et al. (2023) have used these models to analyze the behavior of teachers and students in the post-COVID-19 era and have shown that successful adoption of technology in education requires organizational support and mental readiness of users.

These results are consistent with other previous studies. For example, Adedoyin and Soykan (2023) showed that blended learning can increase interactions and improve overall satisfaction in students, although as Rasheed et al. (2020) indicated, there were challenges for teachers such as the need to more efficiently manage resources and time. Similarly, Dhawan (2020) also pointed out that blended learning

increased student satisfaction due to higher flexibility and accessibility, but required appropriate support and resources. Boelens et al. (2018) also showed that the proper design of blended learning can increase diversity and flexibility in response to different needs in students. These findings showed that using blended learning approaches can have significant benefits, but requires attention to the needs and concerns of both teachers and students. Finally, the findings showed that in order to fully exploit the potential of blended learning, the teachers' and students' needs and concerns must be taken into account. Providing educational programs that include both teachers and students, and improving teachers' technology skills as maintained by Roszak and Kołodziejczak (2017), can lead to improved educational outcomes and greater satisfaction for both groups.

The third research question was on the influence of students' and teachers' demographic characteristics (students' educational degree, students' family income, experience of failure in education, teachers' educational degrees, teachers' work experience, teachers' teaching level, teachers' teaching region) on their preference in choosing educational approaches.

Students' educational degree

The results indicated that there was a significant relationship between different educational degrees and the preference for educational approach. Students in vocational schools had more preference for blended learning and e-learning as compared to other high school students, and students in the first and second year of high school had more preference for face-to-face education compared to students in vocational schools. Similar to Wuyuan and Wenjun (2020) the research results also showed that different students with various disciplines had different online learning experiences. The findings are also in line with Asarta and Schmidt (2020) who found that online and blended experience had a rather positive influence on the GPAs that students gained. Schiavio et al. (2021) pointed out that although the students in vocational schools were trained via the e-learning approach during the corona era and used its benefits, the need to compensate for the lack of physical presence was reported by the research participants. They noted that students, both in their synchronous and asynchronous interactions with the teacher, still expressed a need to compensate for physical absence. Further, similar to Şahin (2010), Mustapa et al. (2015), and Jiang et al. (2023), the findings showed that students in vocational schools were more satisfied when e-learning was integrated into the traditional education, perhaps because it helped them do specialized exercises with a more flexible schedule and develop their skills by replaying online lessons. Digitization of educational materials and the ability to review lessons also helped them to improve their learning.

Students' family income

Students' preferences for face-to-face education, e-learning, and blended learning were influenced by their family income. Lower income students were more inclined to e-learning and were also interested in blended learning. Lower-income students had a high preference for face-to-face education, while higher-income students were less inclined to face-to-face education. The findings showed that

family income influenced students' preferences for educational methods. Lower-income students were more inclined to e-learning, which may be due to easier access to online resources and lower costs. Furthermore, blended learning was more attractive to students with lower family incomes, possibly because of the combination of advantages of both face-to-face and e-learning methods. On the contrary, students with higher family incomes were less inclined to face-to-face education, which may be due to access to better educational facilities and use of more diverse learning methods. Students in impoverished areas might prefer this method for various reasons, including the perception of less control in e-learning. These students may think that e-learning provides a more flexible education than face-to-face learning and that there are more opportunities for escaping from their educational duties. Moreover, it can be very attractive for students in disadvantaged areas to use new technologies and online resources. They may have limited access to services and resources available to students in more prosperous areas, a deficiency in face-to-face education that can be compensated via e-learning. Furthermore, e-learning offers opportunities for independent and personalized learning. It is possible for them to keep on learning at their own pace and have their individual needs in mind when deciding on learning resources. This can make for relevant deficiencies students encounter in face-to-face learning environments.

The experience of failure in education

The research results also specified a significant relationship between the experience of failure in education and the preference for the educational approach in students. Students who experienced failure in education preferred e-learning and blended learning to face-to-face education. This is because they feel more comfortable and experience less stress in the virtual environment, and they can review the learning materials whenever they want. On the other hand, students not having experienced failure in education, preferred face-to-face education to e-learning and blended learning because of the face-to-face interactions, the physical services in the school, and the more structured classrooms.

Teachers' educational degree

The results of this section showed that teachers' educational degree influenced their preferred educational approach. Teachers with diploma and doctorate degrees had more preference for e-learning and blended learning approaches than teachers holding bachelor's and master's degrees. This preference may be for several reasons. Teachers with a diploma degree may not have a precise and correct view of e-learning. In other words, lack of adequate knowledge may be the reason why they preferred e-learning. Teachers with a doctorate degree are more familiar with new educational technologies and methods which can lead them to prefer e-learning. On the other hand, teachers with bachelor's and master's degrees might prefer face-to-face instruction because of the more traditional and structured educational experiences they had during their studies (Antony et al., 2019). The finding that teachers with a PhD are more inclined towards e-learning may seem unexpected at first glance, but there are several reasons for this. This group is usually more engaged in up-to-date scientific research and familiar with

international educational standards, where the use of digital technologies is a fundamental part of the teaching process. Also, many of these teachers teach at universities or special schools where there are more facilities and access to electronic resources. Therefore, familiarity with new methods, better access to infrastructure, and a desire to update their professional skills could be the reasons for this inclination.

The research results also showed that teachers' teaching experience affected their preference for e-learning. Teachers with less teaching experience were more interested in e-learning methods than their more experienced counterparts. In general, less experienced teachers had more preference for e-learning as compared to more experienced teachers. These results can be due to younger teachers' familiarity with new technologies and their desire to use digital tools in the educational process. On the other hand, more experienced teachers may be used to more traditional teaching methods and show less willingness to change and use new technologies. Saha et al. (2022) revealed that less experienced teachers tend to favor e-learning more than their more experienced counterparts, probably because of their greater knowledge of the digital tools and the perceived benefits of interactive and flexible classrooms. Experienced teachers often preferred traditional methods, because of their extensive classroom experience.

The relationship between teachers' teaching level and the preferred type of educational approach was investigated. The results showed that there was no relationship between teachers' teaching level and the preference for blended and face-to-face learning methods. However, elementary school teachers were less inclined to e-learning than the teachers in the first and second years of high school. These findings can be due to different educational and psychological needs in students at each level. Elementary students may require more face-to-face interactions and direct teaching methods, while students of higher levels may benefit more from e-learning technologies. Moreover, elementary school teachers may use electronic tools less due to the curriculum structure and educational content.

The relationship between the region where teachers teach in and the preferred teaching method was also investigated. The results showed that teachers in affluent regions preferred e-learning more than teachers in medium and poor regions. This finding can be the result of more access to resources and advanced technologies in affluent areas, as well as better internet infrastructure and electronic equipment. However, no difference was observed among the teachers in different regions in terms of the preference for face-to-face education and blended learning. This can be due to the fact that direct interaction with students is prioritized and that face-to-face communication has a critical role in the teaching and learning process.

Different preferences of the type of educational approach indicate the need for diversity in educational methods to meet the different needs and preferences in teachers. Educational systems should be designed in such a way that they can provide the required flexibility to use different educational approaches so that both teachers and students can have the best educational experience. Such differences in educational preferences also highlight the need for professional development programs for teachers, so that they can enhance their technology skills at all experience levels and use digital tools effectively.

The findings of this study are in line with some global tendencies; for example, similar to the results of Adedoyin and Soykan (2023), teachers and students continue to prefer face-to-face education over other educational approaches. However, in areas such as the impact of income or experience of academic failure on the preference for e-learning or

blended learning, there are differences that have received less attention in the international literature. For example, in the study by Muthuprasad et al. (2021), Indian students preferred e-learning mainly due to time flexibility and ease of access, while in this study, the preference for e-learning and blended learning was higher among students with low income or those with a history of academic failure. These findings may indicate the role of Iran's specific social and economic context in shaping attitudes toward new educational approaches.

Further research

This study, similar to any other field study, has some limitations. For example, respondents were selected from only one online platform (Shad and Telegram systems) and the perspectives of other educational groups or non-online schools may not have been covered. Also, the main focus of this study was on attitudes and the actual behavior of educational users was not examined. Future research could provide a deeper understanding of the reasons for educational preferences by using mixed methods, as well as a more qualitative examination of cultural and structural contexts.

More research is needed to better understand why students prefer e-learning. Various cultural, social, and economic factors need to be investigated. In fact, increasing the quality of education in virtual environments can help ensure that this method is effective for all students, regardless of their economic status, and that they all have equal opportunities to learn.

According to the research results, one practical suggestion is that schools and educational institutions should invest more in digital literacy training for teachers and students. Improving information technology skills, especially in deprived areas, can help improve the quality of e-learning and increase its acceptance. Also, developing well-designed blended learning programs can serve as a solution to meet the diverse needs of students.

At the macro-policy level, it is recommended that by formulating specific and systematic policies for the expansion of blended learning, the Ministry of Education of the Islamic Republic of Iran, provide the basis for comprehensive benefits from face-to-face and e-learning educational capacities. These policies could include the production of blended content, financial support for the development of digital infrastructure, and specialized training for teachers in the design and implementation of blended classes.

Data availability statement

The datasets presented in this study can be found in online repositories. The names of the repository/repositories and accession number(s) can be found in the article/supplementary material.

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Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent from the participants or participants legal guardian/next of kin was not required to participate in this study in accordance with the national legislation and the institutional requirements.

Author contributions

EA: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

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