CONTEXTOS EDUCATIVOS, 34 (2024): 175-190. http://doi.org/10.18172/con.5807

ANTECEDENTS AND CONSEQUENCES OF THE UNIVERSITY PROFESSORS' BLENDED TEACHING DURING THE COVID-19 PANDEMIC

Fatemeh Moradi
Yadegar-e-Imam Khomeini (RAH) Shahre Rey Branch,
Islamic Azad University, Tehran, Iran
dr.fateme.moradi@gmail.com

ABSTRACT: The need for virtual education in the context of the COVID-19 crisis (due to the problems encountered), the weaknesses and strengths of this educational approach during this period, and attention to the experience of teachers in the traditional educational approach or, in other words, face-to-face. The motivation and objective of the present study are to examine the predictors and outcomes of blended learning in university professors. The research method was a descriptive-correlational one and the path analysis method was used to study more variables. The statistical population consisted of all professors of Islamic Azad University. This research was conducted in the first semester of the academic year 2021-2022. Accordingly, 235 university professors were randomly selected. The questionnaire (designed by the researcher) was completed online by them, after explaining the objectives of the research and attracting the participation of the participants. SPSS 26 and Amos software were then used for the analysis of the collected data. The results showed that attitudes and skills in virtual education were directly related to the skills and attitudes of blended teaching, skills in face-to-face teaching were correlated with those in the blended teaching; further, attitudes and skills in blended teaching were related to the performance in face-to-face teaching and skills in the blended teaching was correlated with the performance in the virtual education. In addition, skills attitudes in e-learning were directly related to performance in e-learning, and attitudes in face-to-face teaching were correlated with performance in face-to-face teaching. Based on the above explanations, it can be concluded that professors have a positive attitude towards blended learning. In other words, they possess sufficient

skills in virtual instruction and are capable of effectively utilizing and generating appropriate course content for students' access to relevant courses. Additionally, they are adept at assessing students' progress throughout the term using new technologies in a virtual format.

KEYWORDS: virtual education, face-to-face teaching, blended teaching, attitude, performance.

ANTECEDENTES Y CONSECUENCIAS DE LA DOCENCIA SEMIPRESENCIAL DE DOCENTES UNIVERSITARIOS DURANTE LA PANDEMIA DEL COVID-19

RESUMEN: La necesidad de la educación virtual en el contexto de la crisis del COVID-19 (debido a los problemas encontrados), las debilidades y fortalezas de este enfoque educativo durante este período, y la atención a la experiencia de los docentes en el enfoque educativo tradicional o, en otras palabras, presencial. La motivación y el objetivo del presente estudio son examinar los predictores y resultados del aprendizaje combinado en profesores universitarios. El método de investigación fue descriptivo-correlacional y se utilizó el método de análisis de ruta para estudiar más variables. La población estadística estuvo conformada por todos los profesores de la Universidad Islámica Azad. Esta investigación se realizó en el primer semestre del año académico 2021-2022. En consecuencia, se seleccionaron aleatoriamente 235 profesores universitarios. El cuestionario (diseñado por el investigador) fue completado en línea por los profesores, luego de explicarles los objetivos de la investigación y atraer su participación. Posteriormente, se utilizó el software SPSS 26 y Amos para analizar los datos recopilados. Los resultados mostraron que las actitudes y habilidades en la educación virtual se relacionan directamente con las habilidades y actitudes de la enseñanza combinada (blended learning). Asimismo, las habilidades en la enseñanza presencial se correlacionaron con las de la enseñanza combinada. Además, las actitudes y habilidades en la enseñanza combinada se relacionaron con el desempeño en la enseñanza presencial, y las habilidades en la enseñanza combinada se correlacionaron con el desempeño en la educación virtual. Por otra parte, las actitudes y habilidades en el aprendizaje electrónico (e-learning) se relacionaron directamente con el desempeño en el e learning, y las actitudes en la enseñanza presencial se correlacionaron con el desempeño en la enseñanza presencial.

En base a las explicaciones anteriores, se puede concluir que los profesores tienen una actitud positiva hacia la enseñanza combinada. En otras palabras, poseen habilidades suficientes en la instrucción virtual y son capaces de utilizar y generar contenido de cursos apropiado para que los estudiantes accedan a él en las materias relevantes. Además, son hábiles para evaluar el progreso de los estudiantes a lo largo del semestre utilizando nuevas tecnologías en un formato virtual.

PALABRAS CLAVE: educación virtual, enseñanza presencial, enseñanza semipresencial, actitud, habilidades, desempeño.

Received: 14/12/2023

Accepted: 31/07/2024

1. Introduction

Although, in recent decades, there has been a tremendous growth in the delivery of education all levels around the world, the COVID-19 Pandemic has turned into the biggest challenge facing educational systems. Medical universities decided to suspend face-to-face classes. Accordingly, international organizations such as the World Health Organization have called on countries to implement all learning measures for distance learning at all universities for learners (Chiao et al., 2018).

The fact that COVID-19 is an evolving crisis cannot be denied; it is predicted that this epidemic will forever affect the future in which education is part of all aspects of life. Closing face-to-face classes during this period due to the Coronavirus epidemic and turning to virtual education methods has been among the most important strategies that have been reported by educational institutions and universities (Dastani, 2020).

In most countries, including Iran, following the epidemic of COVID-19 and in line with the decisions made to observe distances and prevent crowds, in the country's universities, virtual education methods have officially replaced face-to-face classes; in this period, day by day, we have witnessed growth and progress in this field (Dell et al., 2020; Ghanbr, 2019).

Electronic education emerged in response to the increasing demand for formal education in various countries following the global spread of COVID-19. In recent years, particularly in Iran, due to specific climatic conditions leading to the closure of educational centers, a new learning method has been introduced. This method aims to achieve widespread learning with reduced financial costs, enabling learning from anywhere and at any time. However, experience with exclusively electronic education in virtual institutions worldwide has highlighted weaknesses in this approach (Standerford et al., 2020).

Since this type of technology is a western educational technology based on values such as individualism, independence, self-direction and active learning, of course, every society uses this type of learning in accordance with its specific social and cultural conditions (Levy, 2006).

For developing countries, the experience and understanding of e-learning in the education system are a complex real/virtual, global/local, traditional, and modern

experience; in this context, the form and type of individual-social relations have changed and power relations, the hierarchy between the teacher/student, the realization of individuality, the expansion of classroom walls, and new relationships, in general, have been formed.

Similarly, the application of this technology in Eastern and developing societies such as our country, Iran, which has different socio-cultural values, makes users' perceptions of this type of learning differently. The question that can be examined is what changes occur in the Iranian higher education system, which is a system with indigenous-national requirements, due to the introduction of virtual education (Leypold et al., 2004). The move toward this new method of higher education has led to an increasing number of universities around the world using it to offer courses. However, many experts believe that e-learning has not been able to achieve all the basic goals of education, such as the development of creative thinking, commitment and responsibility, and scientific risk-taking (Piragauta et al.,2022; Dreyfus, 2010).

Since the education that prevailed in most institutions and educational institutions before the outbreak of COVID-19 was traditional; in other words, it was face-to-face education and this traditional education was a coherent one focused on the teacher's instructions and attendance program, this section includes teacher-centered topics and knowledge passed from teacher to students. Students are placed in a classroom by their age and possibly ability. Educational materials based on textbooks, materials presented in lectures, and written assignments are provided to students (Stalker and Horn, 2012 p. 7).

This teaching method has certain drawbacks, one of the most significant being the limitation of the teacher's ability to address the diverse and varied needs of learners in a face-to-face setting. If we add to this the teacher's unpreparedness to respond to many of these diverse needs, even assuming the possibility of identifying these needs, we find that resolving this dilemma in face-to-face education is largely impossible (Ramsden 2003; Trigwell and Prosser, 1991; Boshehrian, 2011, p. 1).

Another weakness of traditional teaching methods in mathematics is the teacher-centered and passive nature of students, as well as the lack of attention to active teaching methods, especially new methods based on combined e-learning, which can guide students to learn in attractive learning environments. The learning process is too complex to be confined to the classroom (Garcion, 2004). Since science education has rapidly transformed in the digital age, a significant shift in teaching approaches has occurred over the past 10 to 20 years. The traditional model, where the teacher acts as the sole lecturer, has become outdated and contradicts many effective principles of science education that we now understand.

However, many classes in higher education rely on a transformative approach to teaching, where students are encouraged to participate in lectures and earn grades through class attendance and exams. Nonetheless, an asynchronous online course

structure helps students review and explore content at a faster pace (Wells et al., 2022). On the other hand, these asynchronous e-learning courses have the potential for students to benefit from the benefits of web-based education and the benefits of traditional classroom education such as direct interactions (Martin& Bolliger, 2018; Navarro and Shoemaker, 2000).

However, while the focus in the fledgling era of online learning was mainly on familiarizing teachers with technology and how to produce lessons technically, now, e-learning practitioners are looking for more specific methods to ensure effective performance. In other words, e-learning is not limited to the use of technology; rather, it is a redefinition of how knowledge, skills, and values are transferred to learners (Keengwe and Kidd, 2010; Clark and Myer, 2016; Gharib, 2011). Technology has continuously transformed teaching and learning, and educational systems have moved from an independent approach to face-to-face and distance education systems, to an integrated approach (Moore and Thompson, 1990; Zareie, 2011).

Many universities have focused on introducing e-learning and trying to make fundamental changes to the education system, according to the needs of the students and employers (Johns and Burns, 2010).

Blending learning is defined as a combination of face-to-face learning and online learning, aiming to provide students access to learning resources, easy communication, and collaborative collaboration between students and teachers (Smith et al., 2012). Blended learning is a thoughtful combination of face-to-face and virtual learning experiences. The basic premise of this approach is to integrate appropriate face-to-face oral communication and virtual written communication so that the strengths of each of them within a suitable exploratory learning experience can be combined with the desired educational context and goals (Al Musawi. and Ammar, 2021; Zarei Zavaraki et al., 2014).

In line with the above research, research has been done:

Dorji (2024) investigated the effectiveness of blended learning on students' academic performance in grade IX history subjects in a study titled “The effectiveness of a blended learning approach on students' academic performance: A quasi-experiment study.” They concluded that the blended learning approach was effective in improving students' academic performance in history.

Devi et al. (2024) conducted studies titled “The Effectiveness of a Blended Learning Approach on Students' Academic Performance: A Quasi-experiment Study” and “Blended-Learning-Environment for Mathematical Skill Acquisition among Higher Education Learners Using Principal Compound Analysis and Structural Equation Modelling,” respectively. These studies investigated the learnability of problem-solving skills (observation, modeling, interpretation, and solution utilization) for Higher Education Learners (HELs).

Both studies found that informal learning aspects, particularly through social media, should be integrated into the learning process as a matter of urgency. Educational stakeholders, including policymakers in educational institutions, should be encouraged to adopt innovative techniques in this area.

Sirus Mansoori et al. (2020) also showed in the study titled "Comparison between the effectiveness of e-learning and blended learning in industrial education" that the blended learning group was satisfied more than the e-learning and face-to-face groups.

Mugenyi Justice Kintu, et al. (2017) also showed in a study titled "Effectiveness of Blended Learning: The Relationship between Student Features, Design Features, and Outcomes" that some features, backgrounds, and design features were important predictors of student learning outcomes in blending learning.

Dafydd Mali and Hyoungjoo Lim (2021) also showed in a study, titled "How do students perceive face-to-face / blended learning in conclusion during the COVID-19 epidemic", that during the epidemic, online education was preferred over face-to-face learning. When there is no COVID problem, they prefer face-to-face learning to online learning because students feel.

Shishigu et al. (2024) in their research titled "Effect of blended learning on mathematical achievement and anxiety: A context-based technology integration for meaningful learning" examined how using technology as a tool to enhance student learning can overcome math anxiety caused by cognitive failure. Therefore, blended learning, which combines traditional and technology-based approaches, could be an effective way to improve students' mathematics achievement. This approach could potentially be extended to lower educational levels as well.

Digital education supports students in participatory learning; in other words, digital education supports the student in meeting the needs related to blended learning by providing a new framework to support this education.

Mitrović et al. (2024) examined the effectiveness of blended learning in calculus instruction during the COVID-19 pandemic. Their study, titled "Efficiency of Blended Learning of Calculus Content during the Covid-19 Crisis," investigated student achievement in learning calculus in a dynamic software environment. Two groups of students were involved: an experimental group and a control group. The experimental group received blended learning instruction using Microsoft Teams and the dynamic software GeoGebra, while the control group received traditional classroom instruction without GeoGebra. A comparison between these two groups of freshmen revealed that the experimental group had significantly better learning outcomes than the control group students.

On the other hand, it is not possible to predict how long COVID-19 disease will continue; so it is necessary to adopt a method that can address the shortcomings of virtual and face-to-face education and improve the quality of learning. In general, to

improve the quality of the teaching and learning process, methods should be selected that stimulate the academic motivation of learners help them acquire professional competencies, and reduce the anxiety of learning and testing. One of the solutions in this field is the use of blended learning (Kumar et al., 2021; Zarei Zavaraki and Toofaninejad, 2011).

The above research examines the issue: What are the antecedents and consequences of university professors' blended teaching during COVID-19?

2. METHOD

The method of the present study was a descriptive-correlational one; the path analysis method was used to study more variables. The statistical population consisted of all faculty members of the Islamic Azad University, with 235 professors from the engineering and basic sciences departments of all Azad Universities in Tehran participating in this study using a random sampling method. After explaining the objectives of the research and attracting the participants, the researcher-made questionnaire was completed online. After collecting data, SPSS 26 and Amos software were used for analysis.

The questionnaire consisted of 32 questions on a 5-point Likert scale (very low = 1, low = 2, medium = 3, high = 4, very high = 5). This scale had 3 subscales: Face-to-face training with 12 items, 2. Virtual teaching with 12 items, 3. Blended teaching with 16 items. This questionnaire was reviewed by (Javad Tavassoli,2008). Cronbach's alpha coefficient for the whole questionnaire was reported to be 0.91; for the subscales of face-to-face, virtual, and combined education, it was 0.87, 0.86, / 81, respectively.

The subscales included In-person education (attitudes, skills, and performance), Virtual education (attitudes, skills, and performance), and Blended learning (assessment of combined performance, in-person performance, and virtual performance). After collecting the data, SPSS 26 and Amos software were used for analysis.

Questions such as: “I prefer to be present in the classroom and have face-to-face interaction with students, all exams are conducted in writing, and student attendance is mandatory. I am a student-centered educator and believe that when students have the necessary conditions and resources, they can take the path to progress on their own. Face-to-face education is necessary but not always possible, and I believe that virtual education can be used as a complement to traditional instruction. “Prompted the researcher to use this questionnaire”.

To address the hypothesis of what are the antecedents and consequences of blended learning for university professors during the COVID-19 pandemic.

After collecting the data, SPSS 26 and Amos software were used for analysis.

3. FINDINGS

Table 1 shows the descriptive measures of the mean and standard deviation of the research variables.

Table 1. *Descriptive indicators of the mean and standard deviation of research variables (N = 235)*

General factor	Mean	The standard deviation
Attitudes in face-to-face teaching	3/29	0/824
Skills in face-to-face teaching	4/22	0/575
Attitudes in e-learning	3/55	0/791
Skills in e-learning	4/13	0/745
Attitudes in blended teaching	4/14	0/599
Skills in blended teaching	3/93	0/732
Face-to-face functions	2/87	0/827
Virtual functions	3/95	0/718

It should be noted that all factors were normal.

Investigation of the correlation matrix of research variables:

The results, as can be seen in Table 2, showed that the relationship between all variables (except the relationship between skills in face-to-face training and face-to-face practices) was significant. ($p \leq 0.05$).

Table 2. *Correlation matrix between the studied variables*

Variable	١	2	3	4	5	6	7	8
Attitudes in face-to-face teaching	1							
Skills in face-to-face teaching	.108	1						
Attitudes in e-learning	-.584**	.113	1					
Skills in e-learning	-.172*	.374**	.263**	1				
Attitudes in blended teaching	-.209**	.305**	.428**	.247**	1			
Skills in blended teaching	-.236**	.388**	.432**	.346**	.541**	1		
Skills in blended teaching	.555**	-.027	-.364**	-.285**	-.283**	-.289**	1	
Virtual functions	-.408**	.353**	.574**	.536**	.448**	.595**	-.433**	1

*P<0.05 **P<0.01

In this section, the path analysis method was used to explain the structural pattern of the antecedents and consequences of blended teaching. (Figure 1). In Table 3, the chi-square index (X2) is equal to 127.0747, the chi-square index to the degree of freedom (X2 / pdf) is equal to 2.764, the comparative fit index (CFI) is equal to 0.93, the goodness index is (GFI) equal to 0.92, and the root-mean-square error (RMSEA) is equal to 0.074. Therefore, according to Hu and Bentler (1999), a value greater than 0.90 for the CFI and GFI indices and a value less than 0.08 for the RMSEA index indicate a good fit of the assumed pattern with the data.

Figure 1. *Structural pattern of the antecedents and consequences of blended teaching after model modification*

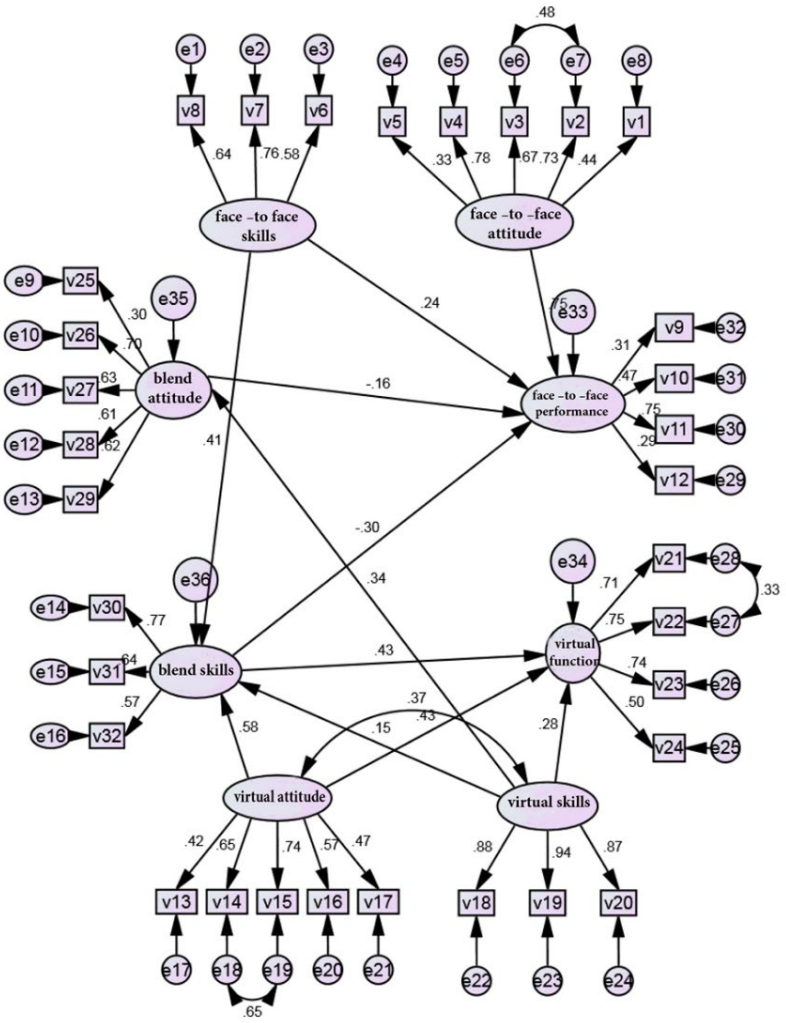

Table 3. *Goodness indicators of fitting the assumed pattern after correction*

Before Modifications After Modifications	RMSEA	CFI	GFI	df2χ/
	*/074	0/93	0/92	2/764

Before examining the results and providing information from the structural equation output model using Amos software, the standard coefficient estimation model was used. The indices and indicators of the research variables and the path indicators for each variable were introduced as shown in Table 4.

Table (4). *Relationship of the variables by the model*

Criterion	Result	Standard coefficient	The value of t	Significante level
Attitudes in virtual education have an effect on skill in blended learning.	proving a theory	.576	4.355	***
Face-to-face training skills have an impact on blended learning skills.	proving a theory	.409	4.339	***
Skill in virtual education has an effect on skill in hybrid education.	proving a theory	.152	1.975	.031
Skill in virtual education has an effect on attitude in blended learning.	proving a theory	.339	4.093	***
Skill in blended learning has an effect on performance in face-to-face learning.	proving a theory	-.302	-2.561	.010
Skill in blended learning has an effect on performance in virtual learning.	proving a theory	.433	4.240	***
Skill in virtual education has an effect on performance in virtual education.	proving a theory	.281	4.456	***
Attitudes in virtual education have an effect on performance in virtual education.	proving a theory	.432	3.808	***
Attitudes in face-to-face education have an effect on performance in face-to-face education.	proving a theory	.238	2.166	.030
Attitude in belended education has an effect on performance in face-to-face education	proving a theory	.747	2.981	.003

Based on the results obtained, after modifying the model and reducing the degrees of freedom by creating relationships between predictive components (Figure 1 and Table 4), it can be said that:

1. There is a directional relationship between attitudes in virtual education with skills in blended teaching and between skills in face-to-face teaching and those in blended teaching.
2. Skills in virtual education have a direct relation to those in blended teaching education; also, there is a direct relationship between skills in virtual education and attitudes toward blended teaching.

3. The skill in blending teaching has a direct relation to performance in face-to-face teaching and the skill in blended teaching is directly related to performance in virtual teaching.
4. Also, based on the results (Figure 1 and Table 4), the skills in virtual education have a direct effect on performance in virtual education, and attitudes toward virtual education are directly related to performance in virtual education.
5. Also, based on the results (Figure 1 and Table 4), attitudes in face-to-face teaching have a direct relation to performance in face-to-face teaching; as well, attitudes in blended teaching are correlated with performance in face-to-face teaching. Overall, the predictor variables predict 46.3% of the variance in performance.

The results showed that there were relations between attitudes and skills in virtual education and those of blended teaching, between skills in face-to-face teaching and those in combined education, between attitudes and skills in blended teaching and the performance in face-to-face teaching, between the skills in blended teaching and the performance in virtual education; also, there were relations between skills and attitudes in virtual education and performance in virtual education, and between attitudes in face-to-face teaching and the performance in face-to-face teaching.

4. Discussion and conclusion

Based on the findings of this research, it was found that the COVID-19 disease has challenged the educational system of all countries affected by the virus. The prevalence of this disease is predicted to have a profound effect on future education (Chick RC et al., 2020). Due to the critical situation, teachers have been forced to use virtual education; concerns about the spread of the epidemic have hurt the quantity and quality of teaching sessions. The anxiety and stress caused by the COVID-19 crisis, lack of preparation, limited familiarity with this teaching method and lack of regular and specific instructions for using virtual education have all caused confusion among teachers.

One of the most important concerns of university professors and students when this method during the pandemic was the inability to provide practical courses and internships, holding exams and the possibility of cheating in cyberspace, traditional resistance to change, and reduced social interactions (Ebadi et al., 2020). In the traditional classroom, quality arises because of the teacher's responsibility and the interaction between him and the student on various topics. However, the biggest challenge virtual student's face is the lack of direct face-to-face communication. The connection, which is one of the most important factors for success in traditional education, is not there, and that is why students often find it very effective to hold a

face-to-face class alongside their learning system. However, this has not been implemented due to some restrictions, such as the Quid 19 epidemic. However, educational experts are aware that holding a face-to-face class, although small and to the extent of troubleshooting, has a significant impact on students' performance. So the appropriate solution is the option of combining virtual and traditional education (in other words, blended teaching). (Kumar et al., 2021; Zarei Zavaraki and Toofani Nejad, 2011).

In blended learning courses, as compared to other courses such as face-to-face learning, there is a greater variety of learning methods that can lead to a significant improvement in the learners' performance.

On the other hand, they can use electronic texts and other electronic products to have a more real and lasting experience. As a result, the combination of traditional teaching methods and new technologies can be more effective in enhancing learning, as compared to other approaches (Sirus Mansoori et al., 2020; Wilson and Smilanch, 2004).

The purpose of this study was to investigate the antecedents and consequences of university professors' blended teaching during the COVID-19 pandemic. The results showed that there were relations between attitudes and skills in virtual education and those of blended teaching, between skills in face-to-face teaching and those in combined education, between attitudes and skills in blended teaching and the performance in face-to-face teaching, between the skills in blended teaching and the performance in virtual education; also, there were relations between skills and attitudes in virtual education and performance in virtual education, and between attitudes in face-to-face teaching and the performance in face-to-face teaching.

Ultimately, it can be concluded that the strongest variables that can explain the skill in blended learning are the variables of attitude towards virtual education over face-to-face education skills.

Based on the above explanations, it can be concluded that teachers have a positive attitude towards blended teaching; in other words, they have sufficient skills in virtual education. In addition, professors have good ability and expertise to use and produce content, provide appropriate teaching resources for students to access the relevant courses, and evaluate students during the semester by using new technologies and virtually.

The next most important factor in blended learning is the skill in blended learning over performance in virtual education.

On the other hand, it can be said that given the current situation (COVID-19 disease), which has challenged the world and educational centers, forcing experienced educational institutions to move towards virtual education, it can be said that teachers have enough virtual education. Therefore, they have a positive

attitude towards education. In addition, they can prepare and teach course content in different ways (electronic text, image, animation), online, and can set up the test virtually and not in person.

Finally, the strongest variable that can explain performance in virtual education is the variable of blended learning skills over virtual education skills. In other words, blended learning, due to its emphasis on and usually in the implementation of the blended method, with attention to the special capabilities that the electronic space provides for teachers, makes it easier to design education in active and participatory ways than traditional classrooms. The shift from teacher-centered to learner-centered, from content-centered to experience-centered, and from technology-centered to technique-centered education leads to increased learner access to instructors, educational resources, and flexibility in designing and producing educational content at any time and place. It also increases the return on investment in education, enriches experiences, and increases learner satisfaction. Ultimately, this leads to an improvement in the teaching-learning process and an increase in the effectiveness and quality of education, which can help to improve learner performance.

In addition, given that in the present study, most of the participants were professors who had sufficient experience in face-to-face teaching, it can be concluded that teachers have sufficient skills in blended teaching; in other words, they have sufficient skills to be able to present the course content, provide appropriate course resources and evaluate both in person and virtually. This research is in line with studies such as Dorji (2024), Devi et al. (2024), Sirus Mansoori, et al. (2020), Mugenyi Justice Kintu, et al. (2017), (Shishigu et al., 2024), Thomas K.F. Chiu (2021) and Mitrović et al. (2024).

It seems that if learners are allowed to select the teaching method, they will have a higher sense of self-efficacy and therefore, experience better learning outcomes. The presence of technology and teaching design specialists along with computer specialists can bring a plethora of teaching programs with a synergistic approach; thus, it is recommended to hold appropriate training courses to acquaint managers and employees with an enhanced blended learning approach, as well as enhance their information literacy. Based on the research findings, it is suggested that a blended approach be used instead of a one-dimensional approach in industrial education, such as face-to-face or e-learning approaches. Given that the effectiveness of blended courses in learning is greater than that of other courses, it is suggested that these courses be used more, especially at different educational levels, to save students' social skills (speech, etc.), while saving facilities and workforce. This research, however, faced limitations, the most important of which was related to the conditions caused by the COVID-19 pandemic. Another suggestion is that researchers in their future research consider blended learning from the perspectives of psychological, aesthetic, social presence, and cultural foundations.

REFERENCES

Bushehrian, O., and Rezaei, M. (2011). Introducing a new architecture based on ontology to automatically create an e-learning path in a service-oriented environment. *Sixth National Conference and Third International Conference on E-Learning*. [In Persian] https://civilica.com/doc/159776/.

Chiao, H. M., Chen, Y. L., and Huang, W. H. (2018). Examining the usability of an online virtual tour-guiding platform for cultural tourism education. *Journal of Hospitality, Leisure, Sport & Tourism Education*, *23*, 29-38. https://doi.org/10.1016/j.jhlste.2018.05.002

Chick, R. C., Clifton, G. T., Peace, K. M., Propper, B. W., Hale, D. F., Alseidi, A. A., and Vreeland, T. J. (2020). Using technology to maintain the education of residents during the COVID-19 pandemic. *Journal of surgical education*, *77*(4), 729-732. https://doi.org/10.1016/j.jsurg.2020.03.018

Chiu, T. K. (2021). Digital support for student engagement in blended learning based on self-determination theory. *Computers in Human Behavior*, *124*, 106909. https://doi.org/10.1016/j.chb.2021.106909

Dastani, M. (2020). COVID-19: A New Beginning in Virtual Education at the Medical Universities of Iran. *Horizon of Medical Education Development*, *11*(1),1-4. [In Persian] https://doi.org/10.22038/hmed.2020.50428.1059

Devi, S. B., Jain, P., and Tyagi, G. (2024). Blended-Learning-Environment for Mathematical Skill Acquisition among Higher Education Learners Using Principal Compound Analysis and Structural Equation Modelling. *Educational Administration: Theory and Practice*, *30*(5), 5970-5977. https://doi.org/10.53555/kuey.v30i5.3888

Dewart, G., Corcoran, L., Thirsk, L., and Petrovic, K. (2020). Nursing education in a pandemic: Academic challenges in response to COVID-19. *Nurse education today*, *92*, 104471. https://doi.org/10.1016/j.nedt.2020.104471

Dorji, S., and Dorji, U. (2024). The effectiveness of blended learning approach on students' academic performance: A quasi-experiment study. *Bhutan Journal of Research and Development*, *13*(1). https://doi.org/10.17102/bjrd.rub.13.1.04

Dreyfus, H. (2010). About the Internet: A Philosophical Look at the Internet. Farsinezhad A. Trans Tehran: Saghi Publications (pp. 20-85). [In Persian].

Ebadi, A., and Heidaranlu, E. (2020). Virtual learning: A new experience in the shadow of coronavirus disease. *Shiraz E Med J.*, *21*(12), 1-2. [In Persian]

Garrison, D. R., and Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The internet and higher education*, *7*(2), 95-105. https://doi.org/10.1016/j.iheduc.2004.02.001

Garrison, R. D., and Vaughan, N. D. (2007). Blended Learning in Higher Education: Framework, Principles, and Guidelines. *Online Teaching and Learning*, Jossey-Bass, *227*.

Ghanbri, S., Rezghishirsavar, H., Ziyaeei, M., and Mosleh, M. (2019). Presenting an e-learning evaluation model in the electronic unit of Islamic Azad University. *Medical Sciences Studies and Education Development Office*, *11*(4.911-57:)9. [In Persian].

GHarib, A. (2011). Promoting Critical Thinking in the Master of Virtual Medical Education: A Qualitative Study of the Experiences of Professors and Students. *Developmental Steps in Medical Education*. 8(1), 22-32. [In Persian] https://circle.ubc.ca/bitstream/handle/2429/1333/WikiRevolutionCATaC2006.pdf?sequenc

Hu, L. T., and Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural equation modeling: a multidisciplinary journal*, *6*(1), 1-55. https://doi.org/10.1080/10705519909540118

Jonas, D., and Burns, B. (2010). The transition to blended e-learning. Changing the focus of educational delivery in children's pain management. *Nurse Education in Practice*, *10*(1), 1-7. https://doi.org/10.1016/j.nepr.2009.01.015

Levy, P. (2006). *The Impact of Technology in Cyber Culture*. University of Minnesota Press.

Mansoori, S., Ziaaldin Salari, K., and Ghasemali, M. (2020). A Comparison Between the Effectiveness of E-learning and Blended Learning in Industrial Training. *Interdisciplinary Journal of Virtual Learning in Medical Sciences*,*11*(1), 46-53. https://doi.org/10.30476/ijvlms.2020.84352.1006

Mishra, L., Gupta, T., and Shree, A. (2020). Online teaching-learning in higher education during lockdown period of COVID-19 pandemic. *International journal of educational research open*, *1*, 100012. https://doi.org/10.1016/j.ijedro.2020.100012

Mitrović, S., Božić, R., and Takači, Đ. (2024). Efficiency of blended learning of calculus content during the Covid19 crisis. *Interactive Learning Environments*, *32*(1), 52-66. https://doi.org/10.1080/10494820.2022.2076129

Mugenyi, J., Chang, Z. K., and Kagambe, E. (2017). Blended learning effectiveness: the relationship between student characteristics, design features and outcomes. *International Journal of Educational Technology in Higher Education*, *14*(7), 64-75. https://doi.org/10.1186/s41239-017-0043-4

Shishigu, A., Michael, K., and Atnafu, M. (2024). Effect of blended learning on mathematical achievement and anxiety: A context-based technology integration

for meaningful learning. *E-Learning and Digital Media*, 20427530241241767. https://doi.org/10.59324/ejceel.2024.2(1).04

Smyth, S., Houghton, C., Cooney, A., and Casey, D. (2012). Students' experiences of blended learning across a range of postgraduate programmes. *Nurse education today*, *32*(4), 464-468. https://doi.org/10.1016/j.nedt.2011.05.014

Staker, H., and Horn, M. B. (2012). *Classifying K-12 blended learning*. Innosight institute. http://www.innosightinstitute.org

Szeto, E. (2014). A comparison of online/face-to-face students' and instructor's experiences: Examining blended synchronous learning effects. *Procedia-Social and Behavioral Sciences*, *116*, 4250-4254.

Tavangarian, D., Leypold, M. E., Nölting, K., Röser, M., and Voigt, D. (2004). Is E-learning the Solution for Individual Learning? *Electronic Journal of E-learning*, *2*(2), 273-280.

Viktorija, S., and Dušan, L. (2007). Blended learning and study effectiveness. *Issues in Information Systems, 3*(1), 127-133. https://doi.org/10.48009/1_iis_2007_127-133

Zarei Zavaraki, I., Ramezani, M., and Saeedpour, M. (2014). *Integrated learning in higher education in Tehran*: Avaye No Publications. [In Persian]

Zarei Zavaraki, I., and Safaei, M. (2008). *E-learning in the 21st century Tehran*. Science and Technology Publications. [In Persian]

Zarei Zavaraki, I., and Toofani, E. (2011). *Quarterly Journal of Higher Education. Fourth year, number fourteen, summer,* 87-71.