



La relación entre las actitudes de los estudiantes hacia el uso de la educación virtual y su nivel de satisfacción durante la pandemia de COVID-19¹

The relationship between student attitudes towards using virtual education and their satisfaction during the COVID-19 pandemic

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Resumen:

El avance hacia nuevos enfoques de la educación superior, ha requerido a muchas universidades alrededor del mundo que emplean educación virtual en sus cursos.

Abstract

The move to new approaches to higher education has required many universities around the world to use e-learning in their courses. The present study aimed to inves-

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El objetivo de este estudio es investigar la relación entre las actitudes de los estudiantes frente al uso de educación virtual con el nivel de su satisfacción durante el crisis del covid-19. Este estudio fue diseñado como una investigación descriptiva aplicada. Una muestra aleatoria de 165 estudiantes fue recogida de la población de los estudiantes de pregrado de cursos de Ingeniería Técnica y de psicología (89 estudiantes técnicos y 76 estudiantes de psicología) de la Universidad Islámica Azad de Shahre Rey-Irán, durante el primer semestre de 2020-2021. para recopilar datos sobre el actitud y el nivel de satisfacción de los estudiantes, un cuestionario fue utilizado. el análisis fue realizado a través de programa spss (versión 26), utilizando la correlación de Pearson y Prueba T para muestras independientes. Los hallazgos indicaron que hay una relación significativa entre las actitudes hacia a la educación virtual y la satisfacción de todos los participantes. Además, no hubo diferencia entre las actitudes y el nivel de satisfacción hacia la educación virtual entre los dos grupos. Hay que tener en cuenta, que un análisis más preciso sobre la pregunta demuestra que la educación virtual ha creado más problemas en la comprensión de los conceptos principales para los estudiantes técnicos. Aunque ambos grupos opinaron que los exámenes on-line eran más apropiados dado las circunstancias de la pandemia, algunos dificultades como la velocidad de internet, los desafíos en cargar la hoja de respuestas y ... afectó sus actitudes en una manera negativa. Los resultados del estudio también demostraron que los estudiantes de psicología encuentran más desafiante usar el internet y plataformas en línea, comparado con estudiantes de ingeniería. Según los hallazgos de este documento, se puede suponer que al diseñar infraestructuras de e-learning si el material debe ser entregado de manera productiva y eficaz, hay que tener en cuenta el contenido educativo de los diferentes áreas de estudio.

Palabras clave:

actitud frente a la educación virtual, satisfacción a la educación virtual, e-learning

investigate the relationship between the attitudes of the students toward using virtual education and their satisfaction level during the Covid-19 crisis. The research methodology used was descriptive. A sample of 165 undergraduate students (89 technical engineering and 76 psychology students) were randomly selected at Islamic Azad University Shahre Rey in the first semester of 2020-2021. Attitude and satisfaction level toward virtual education questionnaires were used to collect data. The analyses were carried out through SPSS software (26 version), by using the Pearson correlation and t-tests on two independent samples. Findings indicated that there was a significant relationship between attitudes toward virtual education and satisfaction for all participants. Therefore, it can be concluded that the more positive attitudes towards e-learning and virtual education are, the higher the satisfaction level toward virtual education is. In addition, there was no difference between the attitudes and satisfaction level toward virtual education in the two target groups. A more accurate analysis of the questions showed that virtual education generated more problems for technical students when it came to understanding the main concepts. While both groups believed that online examinations were more appropriate given the pandemic circumstances, some difficulties such as internet speed and challenges while uploading the response sheets affected their attitude in a negative way. The findings also indicated that psychology students found using the internet and online platforms more challenging than engineering students.

Keywords:

attitude towards virtual education, satisfaction with virtual education, virtual education, e-learning

Résumé:

Le passage aux nouvelles techniques dans l'enseignement supérieur a contraint de nombreux établissements dans le monde à inclure l'apprentissage virtuel dans leur programme. Cette étude descriptive a analysé la relation entre les opinions des étudiants sur l'éducation virtuelle et leur degré de satisfaction pendant la maladie Covid-19. Parmi la population des étudiants de premier cycle inscrits aux cours d'ingénierie technique et de psychologie à l'Université islamique Azad de Shahr Rey au cours du premier semestre de 2020-2021, un échantillon de 165 individus (89 étudiants en technique et 76 en psychologie) a été sélectionné de manière aléatoire. Des questionnaires ont été utilisés pour obtenir des données sur les attitudes et les niveaux de satisfaction vis-à-vis de l'enseignement virtuel. L'analyse a utilisé la version 26 du logiciel SPSS, la corrélation de Pearson et un test t de l'étudiant indépendant à deux échantillons. Il a été démontré que les opinions de tous les participants concernant l'éducation virtuelle étaient significativement liées à leur niveau de satisfaction. Les attitudes et la satisfaction des deux groupes à l'égard de l'éducation virtuelle étaient également les mêmes. Une analyse plus précise des questions a révélé que l'enseignement virtuel a rendu plus difficile la compréhension des idées fondamentales par les étudiants techniques. Bien que les deux groupes aient convenu que les examens en ligne étaient préférables en cas de pandémie, d'autres problèmes, tels que la lenteur de l'Internet et la difficulté à télécharger les réponses et les feuilles, ont eu un impact négatif sur leurs attitudes. En outre, selon l'étude, les étudiants en psychologie ont plus de difficultés à utiliser l'internet et d'autres ressources en ligne que les étudiants en ingénierie. Sur la base des résultats de cet article, on peut déduire que lors de la construction d'infrastructures d'apprentissage en ligne, le contenu éducatif de divers domaines d'étude devrait être pris en compte si le contenu est fourni avec succès et de manière productive.

Mots-clés :

Attitude à l'égard de l'enseignement virtuel ; Satisfaction à l'égard de l'enseignement virtuel ; Enseignement virtuel ; E-learning.

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Introduction

The COVID-19 pandemic has left a notable impact on various aspects of life, including education (Tadesse & Muluye, 2020; Papapicco, 2020; James et al., 2022). Efforts to control the spread of the COVID-19 virus have affected all sectors of society worldwide, including the higher education system that switched to digital higher education (Handel et al., 2020). According to The United Nations Educational, Scientific and Cultural Organization (UNESCO), the crisis has changed the way students learn. Many educational institutes were shut down during the pandemic, pushing education systems to rely on remote learning. Supporting students during the transition phase through various measures has been necessary to alleviate the negative educational consequences of these chang-

es; these measures have led to creative methods replacing former teaching routines (Iyer, Aziz & Ojcius, 2020; Zhao, 2020). In over 60 countries, all, or at least some, schools and universities were shut down due to safety concerns. Over 42 million students around the Middle East, including Iran, turned to digital education and e-learning (UNESCO, 2020; Irfan et al., 2020; Rajab et al., 2020). One of the most important changes in the field of education in the current situation is the transfer of the paradigm from teacher-centered to student-centered (Lee et al., 2009). The advent of e-learning has been able to significantly contribute to the development of student-centered and other changes in educational activities (Lee et al. 2009). E-learning has become a ubiquitous learning method that takes advantage of various electronic media, such as computers, the internet, and universities' electronic portals (Romiszowski, 2004). Virtual classrooms have facilitated remote communication between instructors, learners, and universities, as well as the interaction between students (Sathiyamoorthi, 2020). These classrooms can provide users with live or recorded access to multimedia resources—audio, video, graphic, and electronic—in the fastest and most convenient way (Gunasinghe et al., 2019; Taib et al., 2021). Virtual classrooms deliver interactive environments, where students can use textual, visual, and audial inputs to partake in discussions and carry out various activities without the necessity of their physical presence (Bawaneh, 2020; Zboun & Farrah, 2021)

A review of empirical evidence in the e-learning field indicates that this method can be considered an effective way of teaching and learning. Ahn & Edwin (2018) have demonstrated that GeoGebra can improve mathematics learning significantly. El Mamoun et al. (2018) have proposed an Intelligent Tutorial System (ITS) that can enhance learners' mathematics learning capabilities. Chitra & Raj (2018) have pointed to the fact that virtual learning provides new learning and teaching opportunities for both students and instructors, leading to more profound collaborations between the two. According to Conceição (2006), "providing immediate feedback, distinguishing between and personal interactions, or connecting with learners on a regular basis" can help mitigate some of the adverse effects of remote learning. Virtual learning is a Western educational technology, which is based on values such as individualism, independent learning, and autonomy. There can be no doubt that each society should find suitable ways to make virtual learning compatible with its social and cultural circumstances (Famulasih, 2020; Levy, 2006)

According to Saho et al (2021), the outbreak of corona pandemic has had a significant impact on educational institutions. Research findings indicate that individuals have been less committed to e-learning than traditional learning methods (Nicholas & Levy, 2009). Economical, educational, and technological problems are considered to be barriers to educational activities during the pandemic of COVID-19 (Habibi, 2021; Weerathunga et al., 2021). Several reports point to the new technology's poor performance when it comes to character building. According to these reports, in some cases, platforms of education emphasize going beyond traditional educational values and overcoming educational hierarchies to such a degree that they sacrifice necessary educational content (Hall, 2001). When it comes to higher education in Iran, however, the incapacity to meet the scientific and educational demands of students satisfactorily is the main issue. The current system is lacking to such a degree that proposing e-learning as a new, valuable, and effective method of teaching and learning in the higher education system seems implausible. Furthermore, there are obstacles and difficulties that have set back e-learning development around the world, including those related to comprehensive policies for educational planning, infrastructure, language, potentiality, finance, and pedagogical, organizational, and technological challenges (Razzaghei, 2006; Rasmitadila et al., 2020, Barton Essel et al., 2021)

Many experts have pointed out shortcomings of virtual learning. Dreyfus (2010), the contemporary professor of philosophy and internet critic, is of the opinion that virtual learning cannot guarantee creativity, quality of information, users' grasp of reality, and meaningful life for learners. He believes students are aware of a feeling of mutual connectivity and interactivity when they are in a physical classroom with an instructor and other students, and they do not want to give up this feeling. The feeling is such a favorable experience for these students that they are willing to partake in classes even in dreadful conditions to be among their peers. In addition, Aristovnik et al. (2020) indicated that students' academic workload has been impacted, with a large percentage (43%) of the students reporting a significant increase. Bao (2020) also has found an existing association between studying in isolation at home and an inappropriate learning environment and lack of self-discipline. online-learning as a remote type of training courses, could lead to some limitations in the field of education and cultural, moral and sometimes social aspects, since the

students are deprived of being in the scientific environment and consequently, the transfer of morals and academic etiquette between the student and the professor, is not completely formed. This type of communication not only affects the student, but also the professor. A professor who is accustomed to the traditional way of education may even have a harder time adapting to the virtual classroom environment than a student (Alonso Díaz, Blázquez Entonado, 2009; Lim, Wang & Graham, 2019). The research background shows that professors believe that students in the virtual classroom are weak in terms of innovation, creativity, and critical thinking. Therefore, students literacy and knowledge quality decrease (Yusuf & Jihan, 2020).

A review of experiential evidence, however, points to the many advantages of virtual learning. Several studies have demonstrated that the fluid nature of discussions and trends in these sessions leads to better educational opportunities and makes educational planning based on students' needs possible. Generally speaking, traditional methods of education face space and facility limitations that could curb their potential in meeting students' needs in high numbers. Naturally, such issues are non-existent in virtual learning contexts, where thousands of students can partake in the same session. In such environments, students enjoy identical educational resources, which would, in turn, benefit the whole society at large, leading to a higher level of educational and social equality among the citizens (Asgari et al., 2021). A notable benefit of virtual learning is the fact that it makes reviewing various resources painless, while the review process in traditional educational contexts can be quite complicated. (Brodsky, 2020; Chitra & Raj, 2018; Salloum et al., 2019; Rusu & Tudose, 2018)

Researchers in the Information Systems field have established the fact that users' satisfaction plays an important role in these systems' success (DeLone & McLean, 1992). Therefore, it can be surmised that the success of a virtual learning program depends, to a great extent, on the way it is implemented. In other words, it should be designed to meet learners' demands and take educational aims into account (Lee et al., 2009). While several studies have investigated factors influencing user satisfaction in virtual learning, many questions remain unanswered, including questions about the relationship between electronic teaching services' quality and users' satisfaction. It is still not clear why many users are unwilling to continue using such services after their initial experience. Furthermore,

such educational methods are not quite effective in building up learners' characters (Sun et al., 2008; Sarkar Arani et al., 2004; Schroeder, 2003; Atihal & Atihal, 2016).

Bawaneh (2020) has studied the level of satisfaction among students at a Faculty of Fundamental Sciences, and found it to be medium. Many researchers have also demonstrated that virtual classrooms have proved effective in improving students' self-confidence and instructors' communicative skills in their dealings with their peers (Ozgun, 2015; Miltiadou & Savenye, 2003; Glenda, Joslyn, & Mariel, 2019). Al-Akharas (2018) has studied the impact of e-learning on students' mathematical competency, concluding that e-learning can play a positive role in students' progress. Al-Saedy et al. (2017) have also surmised that e-learning can be influential in improving students' mathematical competence and attitude at Sultan Qaboos University. Annelies et al. (2020) have studied the impact of using a combination of virtual and physical classrooms on students' interactions and their performance. They have demonstrated that such combinations can influence students' success positively. Paudel (2021) has also found that online mode of teaching and learning in the context of Nepal by itself cannot be enough so the participants preferred blended learning. Malkawi & Bawaneh (2021) discovered a significant difference in students' level of satisfaction and attitude based on their educational stage. According to evidence, students react differently to online education, and their reaction is based on their proficiency in using online tools, their ability to technically access online courses, and the instructors' manner in conducting learning activities (Butnaru et al., 2021). Aguilera-Hermida et al. (2021) found that students' attitude toward virtual education impacts their cognitive engagement in Mexico, Peru, and the USA. Furthermore, self-efficacy is a significant moderator for cognitive engagement in all four countries. Jimenez (2020) has analyzed e-learning's impact on teaching mathematics and its influence on students' performance, finding that using electronic resources has a positive impact on academic performance, where an instructor can use electronic tools to provide students with a fertile learning environment. Ashkamov (2016) has studied mathematical learning among engineers in motivational-adaptive, subjective, integrative, and managerial environments, concluding that using e-resources in training future engineers at the university level can be effective. Umoh & Akpan (2014) have evaluated students' understanding of e-learning tools in mathematics training, finding that there are significant differences

among students based on the e-learning tools employed. Mailizar et al. (2020) have analyzed teachers' opinions on obstacles facing the implementation of e-learning during the COVID-19 pandemic at four barrier levels of teacher, school, curriculum, and student. According to their findings, teachers' background had no impact on the potency of these barriers (Pellegrini, Uskov & Casalino, 2020).

Before the pandemic, most of university students and instructors in Iran did not have any experience about e-learning (Irfan et al., 2020). During the pandemic, however, learning through online platforms turned into an all-encompassing procedure in many fields, including technical and engineering sciences, humanities, and fundamental sciences. Virtual whiteboards and pre-scheduled videoconferences became indispensable tools for teaching and evaluating students in online classrooms. Despite their inexperience, faculty members, instructors, and students had no choice but to learn how to work with virtual white online platforms. Both students and instructors had to carry heavy loads of responsibility in these new circumstances, which, in turn, led to new challenges. It should be noted that virtual learning is not free of restrictions. The factors affecting the quality of virtual education included the following factors: The input (infrastructure of virtual education, appropriate content, the ability of professors and students to use virtual education), the process (teaching, evaluation, supervision, support, and interaction between teacher and students), and output (planning for improvement) (Chamasemani & ehtesham, 2021). Chief among these restrictions is the fact that virtual learning cannot provide a valuable platform for affective and face-to-face interactions between students and instructors, interactions that are common in physical classroom (Kian, 2014; Zolfaghari et al., 2007; Doyumğaç et al., 2021; Pokhrel & Chhetri, 2021; Alghizzawi et al., 2019).

Research on information systems clearly shows that user satisfaction is one of the most important factors in evaluating the success of these systems (Delon and McClellan 1992). It seems like not all subjects can be taught through e-learning. When it comes to subjects that require intense concentration and exercise, existing e-learning platforms are still not capable of delivering the prerequisites of an efficient and effective education (Chakraborty et al., 2021). Therefore, it can be said that focusing on users in evaluating the effectiveness of e-learning can help researchers to answer the following question.

The present paper is an analysis of the students' attitudes and their level of satisfaction in two relatively dissimilar fields of study. In contrast to other researches, this study was conducted only 7 months after the outbreak of Covid 19, namely when the first semester of the students had just finished, thus the collected data reflects the primary experiences of students in coping with online education. Accordingly, the following hypotheses were investigated:

- 1- There is a significant relationship between the attitude of engineering and psychology students towards virtual learning and their level of satisfaction with virtual learning.
- 2- The attitude of engineering students towards virtual learning is different from the attitude of psychology students towards virtual learning.
- 3- The level of satisfaction of virtual learning among engineering students is different from the level of satisfaction of virtual learning among psychology students

Methodology

A causal-comparative method was adopted to conduct the present descriptive-correlative research. The statistical society consisted of all engineering and psychology students at Islamic Azad University of Shahre Rey. 89 engineering students and 76 psychology students, 165 students in total, were randomly selected. Study goals were described for the participants to pledge their cooperation. Two questionnaires including satisfaction with virtual learning and attitude towards virtual learning were presented to the participants through an online platform. These questionnaires were designed based on a review of existing research literature. Students engaged in learning in the first semester of the 2021-2022 academic year who were familiar with virtual learning procedures were included, and those who failed to answer more than 5 percent of the questions were excluded.

The present study, like other studies, has applied ethics including anonymity and confidentiality of personal information of the participants, and voluntary participation. More over, ethical considerations have also been used to reduce inappropriate motives for the participants and prevent bias in data collection and analysis.

“Satisfaction with virtual learning” questionnaire. This questionnaire was designed by the researchers to evaluate the level of satisfaction with virtual learning methods. It consisted of 20 items in a five-level Likert scale (strongly disagree = 1, disagree = 2, neutral = 3, agree = 4, strongly agree = 5). The minimum score was 20 and the maximum score was 100. The content validity of the questionnaire was evaluated and approved by academic experts. For this purpose, the questionnaire was assessed by 20 university professors to ensure that the items are appropriate enough to measure the variable. The questionnaire’s reliability was evaluated by calculating Cronbach’s alpha for all subjects (0.81), psychology students (0.80), and engineering students (0.81).

“Attitude towards virtual learning” questionnaire. This questionnaire consisted of 12 questions in a five-level Likert scale (strongly disagree = 1, disagree = 2, neutral = 3, agree = 4, strongly agree = 5). It was designed to evaluate students’ attitudes toward virtual learning. The minimum score was 12 and the maximum score was 60. The content validity of the questionnaire was evaluated and approved by academic experts (n=20). The questionnaire’s reliability was 0.86 for all subjects, 0.87 for psychology students, and 0.85 for engineering students.

Findings

To analyze the data, first, they were screened. Then, the correlation between the two variables of satisfaction with virtual learning and attitude towards virtual learning was calculated for all subjects as a whole, and for engineering and psychology students separately. The results of these calculations are demonstrated in Tables 1 and 2.

Hypothesis 1: There is a significant relationship between the attitude of engineering and psychology students towards virtual learning and their level of satisfaction with virtual learning.

Table 1

The correlation coefficient between satisfaction with virtual learning and attitude towards virtual learning in all participants

Variable	# of subjects	Mean	S.D	R	p-value
Satisfaction	165	63.27	10.73	0.81	p < 0.001
Attitude	165	36.88	9.60		

As shown in Table 1, a significant relationship between the two variables was observed among all participants [$r=0.81$, $p < 0.001$] i.e., the more optimistic participants' attitude towards virtual learning, the more satisfied they would be with this method of teaching. In addition, the findings in table 2 indicates that in each group of the participants there was a statistically significant relationship between the attitude of the students towards virtual learning and their level of satisfaction with virtual learning, [$r=0.82$, $p < 0.001$] for psychology students and [$r=0.79$, $p < 0.001$] for engineering students which implies that this relationship has been a little stronger in psychology group.

Table 2

The correlation coefficient between satisfaction with virtual learning and attitude towards virtual learning in different groups

Variable	Group	# of subjects	R	p-value
Satisfaction Attitude	Psychology	76	0.82	$p < 0.001$
Satisfaction Attitude	Engineering	89	0.79	$p < 0.001$

Hypothesis 2: The attitude of engineering students towards virtual learning is different from the attitude of psychology students towards virtual learning.

Hypothesis 3: The level of satisfaction of virtual learning among engineering students is different from the level of satisfaction of virtual learning among psychology students

Table 3

T-test results for comparing engineering and psychology students

Variable	Group	Mean	S.D	S.D difference	Standard error	Degrees of freedom	T	p-value
Satisfaction	Psychology	62.5	10.59	1.4	1.68	163	0.81	0.41
	Engineering	63.9	10.87					
Attitude	Psychology	36.5	9.46	0.7	1.50	163	0.44	0.65
	Engineering	37.2	9.76					

According to table 3 there was not any statistically significant difference between the attitude [$t=0.44$, $p=0.65$] and satisfaction [$t=0.81$,

p=0.41] of the two groups of students which means that both groups were equal.

Finally, each question was analyzed to determine the items related to highest and lowest levels of satisfaction and the most positive and most negative attitude levels. Table 4 indicates the percentage frequency of the participants in each group who chose agree and strongly agree in response to the items of satisfaction questionnaire mentioned in the table 4 and similarly, table 5 demonstrate the percentage frequency of the students in each group who chose agree and strongly agree in response to the items of attitude questionnaire mentioned in the table 5.

Table 4

Factors influencing satisfaction with virtual learning

Influencing factors	Category	Item	Percentage frequency for psychology students	Percentage frequency for engineering students
Promoting factors	Common items	save time and energy	65	82
		prevent COVID-19	90.8	79.8
		reduce anxiety about family	93.4	88.8
		spend more time with family	71	75.3
		attend sessions during work hours	59.2	68.5
	Uncommon items	achieve better scores	61	
		opportunity for learning to work with online platforms	58	-
Demoting factors	Common items	have more assignments	76.3	57.3
		ignore learners' difference	67.1	58.4
		face difficulty in concentration	56.6	51.7
	Uncommon items	face difficulty in grasping basics	-	55.1

According to the findings (table 4), items such as “save time and energy”, “prevent COVID-19”, “reduce anxiety about family”, “spend more time with family”, and “attend sessions during work hours” were the common factors that increase the satisfaction level of both groups of the participants, whereas the two items including “achieve better scores” and “opportunity for learning to work with online platforms” were specifically important for psychology group. Among the demoting factors “have more assignments”, “ignore learners' difference” and “face difficulty in concentration” were in common in both groups and “face difficulty

in grasping basics” was a factor which reduced the level of satisfaction in engineering students.

Table 5

Factors influencing attitude towards virtual learning

Influencing factors	Category	Item	Percentage frequency for psychology students	Percentage frequency for engineering students
Promoting factors	Common items	need to learn online education skills	92.1	85.4
	Uncommon items	less anxiety about scores online tests	60.6 -	- 53.9
Demoting factors	Common items	high internet costs	67	51
		anxiety about online tests	59.2	60.7
	Uncommon items	lack of skill to work with internet and online platforms	63.5	-
		less interaction between instructors and students on online platforms	57.9	-

Analysis of the items of the attitude questionnaire demonstrated that both groups of participants had a positive attitude toward virtual learning since it obliged them to learn online education skills. The other promoting factors for psychology group was “less anxiety about scores” and for engineering group was “online tests”. In contrast, “high internet costs” and “anxiety about online tests” were the common factors which caused negative attitude toward virtual education. there were two more factors including “lack of skill to work with internet and online platforms” and “less interaction between instructors and students on online platforms” affecting psychology group attitude in negative way.

Discussion and Conclusion

As a global challenge, the COVID-19 pandemic has given rise to many changes in people’s everyday lives, especially in the way they learn (Tadesse & Muluye, 2020; Papapicco, 2020). Most countries and educational systems have had no choice but to turn to virtual learning. Virtual learning may prove an effective learning method—so much so that even

prior to the pandemic, many universities made extensive use of it—and given the current particular circumstances, it is the only way educational systems have if they are to continue operating (Irfan et al., 2020). Virtual learning is all but mandatory nowadays. As such, questions about its efficacy for fields such as engineering and fundamental sciences, where intensive concentration is a prerequisite of learning, should be investigated. Similar questions may be posed about humanities fields as well (Zhao, 2020, Rasmitadila et al., 2020, Taib et al., 2021)

Virtual learning has entailed advantages, as well as difficulties for both instructors and students (Romiszowski, 2004; Chitra & Raj, 2018; Ozgur, 2015; Miltiadou & Savenye, 2003; Glenda, Joslyn, & Mariel, 2019). Many students believe that the method can protect their families from the virus, save time, help them learn skills required to work with electronic devices, provide them with access to educational content more conveniently, and remove spatial limitations. Such factors can promote satisfaction among these students. Conversely, virtual learning restricts student-instructor interactions in some fields, making comprehension and concentration difficult. Furthermore, character building remains largely overlooked in e-learning contexts (Sarkar Arani, 2004). Lack of character building is one of the disadvantages of virtual learning. Virtual learning classrooms are lecture-based and, as such, they lack characteristics necessary for a comprehensive building of character (Schroeder, 2003). Furthermore, virtual learning can be anxiety-inducing in some cases. Factors such as dropped connections during teaching or testing sessions can cause high levels of anxiety, which can disrupt learning. Additionally, many students lack sufficient skills to work with electronic education devices, which can lead to serious challenges. Internet costs can also be a hindering factor for many students (Sun et al., 2008; Famularsih, 2020; Asgari et al., 2021; Zboun & Farrah, 2021).

The present paper aimed to study engineering and psychology students' level of satisfaction of and their attitude towards virtual learning at Islamic Azad University of Shahre Rey during the COVID-19 pandemic. The results indicated that there was a significant relationship between two variables of satisfaction and attitude in these students. Furthermore, in each group, engineering students and psychology students, a significant relationship between satisfaction and attitude was observed. Comparing these two groups of students indicated no significant relationship between satisfaction and attitude. Regarding factors promoting satisfaction

with virtual learning, both groups believed that the method could have the following advantages: save time and energy, be considered a sound strategy during the COVID-19 pandemic, mitigate anxieties about passing on the virus to family members. Conversely, both groups believed that the method could entail the following disadvantages: put more pressure on students regarding assignments, overlook individual differences between students, cause difficulties regarding concentration. It should be noted that engineering students encountered serious comprehension problems during their virtual learning sessions, such as unwillingness to do homework and reduced adherence to classroom regulations and discipline, weakness of evaluation objectively and practically, restriction of human interactions, and lack of creativity (Rasmitadila et al., 2020; Rajab et al., 2020). Therefore, it can be surmised that virtual learning is not advisable for all fields and should not be adopted as a universal method of teaching in academic contexts (Chakraborty et al., 2021; Paudel, 2021; Alghizzawi et al., 2019)

Comparing the two groups indicated that both of them demonstrated a positive attitude towards acquiring skills necessary for virtual learning, pointing to the fact that these students lacked these skills and needed more training in this regard. Furthermore, high internet costs and anxiety about exams led to negative attitudes towards virtual learning in both groups. While both groups found online examinations reasonable given the pandemic circumstances, the focus of education on memorization, limitations of taking risk in learning, and using mental ability to create new ideas was unsatisfactory. Dreyfus (2010) believes learning through cyberspace stops in the early stages of cognition, so that the learner, due to lack of communication with the teacher and the weakness of the learning environment in fostering creativity, never reaches far higher levels of learning such as proficiency, expertise, mastery, and practical wisdom. The way these examinations were held was not acceptable for them, as factors such as connection problems, exam registration problems, and downloading questions and uploading answers in a timely manner caused problems for them. Study results indicated that psychology students find using the internet and online platforms a more serious challenge compared to engineering students. The mean satisfaction and attitude scores among engineering students are slightly higher than psychology students, which can, to some extent, be due to the fact that engineering students find working with electronic and com-

municative devices more manageable (Salloum et al., 2019). This finding is in accordance with other studies that find students react differently to online education (Butnaru et al., 2021; Malkawi & Bawaneh, 2021; Aguilera-Hermida et al., 2021; Pellegrini et al., 2020)

Based on the findings of the present study, providing social platforms—where in-person interactions between students, instructors, and administrative staff is made possible through multimedia tools, student councils, educational and research organizations, and scientific conventions—is recommended. To achieve meaningful learning in virtual contexts, instructors should emphasize problem-solving, support novel approaches, and try to mitigate remote learning drawbacks through interactive learning techniques (Ozgur, 2015; Miltiadou & Savenye, 2003; Glenda, Joslyn, & Mariel, 2019). The instructor should combine virtual learners' various real-life skills with their virtual-life skills. Instead of engaging with abstract ideas in one-way lectures delivered by their instructors, students should turn to research-based activities and problem-solving, where they can actively discuss problems and negotiate solutions. Instructors should design their course plans so that, in addition to practicality, topics are based on daily experiences that can create genuine curiosity and meaningful learning among e-learners (Chitra & Raj, 2018; Doyumğaç et al., 2021; Aithal & Atihal, 2016)

Since interaction plays a decisive role in academic development, instructors are advised to use interactive, bilateral, and cooperative methods, such as encouraging dialogue and brainstorming sessions, to foster interaction by including all students in the teaching and learning process. Students should try to partake in class discussions, and interact with their instructors and peers to improve their academic performance. Furthermore, interactive software programs and other online live and recorded media can facilitate communication between students. Future studies should investigate satisfaction with virtual learning among different gender groups separately to determine how gender can influence the virtual learning process (Weerathunga et al., 2021; Rusu & Tudose, 2018)

The present study was subject to several limitations. The study sample was restricted to engineering and psychology students. Succeeding studies should investigate these factors among other student groups. Data gathering was carried out through two questionnaires in the present study, which can lead to uncontrollable biases. The present study adopted a comparative viewpoint. Future researchers are recommended

to choose alternative methods of investigation, such as path analysis, to identify other factors influencing satisfaction with virtual learning. The present research was conducted during the COVID-19 pandemic, which constitutes a crisis. Students' satisfaction with virtual learning should be investigated in normal circumstances as well.

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