Students' Perception of Virtual Classrooms as an Alternative of Real Classes.

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Abstract—Virtual classrooms are online environments that enable students and teachers to interact as if they were face to face in real classes. It seeks to develop the efficiency and quality of teaching and learning. However, using virtual classrooms as an alternative of real classes is relatively new in Saudi universities. The study explores students' perception of virtual classrooms as an alternative of real classes. The technology acceptance model is used as a theoretical framework to explain students' acceptance or rejection of virtual classrooms as an alternative to real classes. The questionnaire is distributed online to all female students of the College of Education, and the responses are 289. Data were analyzed using descriptive statistics, correlation analysis, and linear regression analysis. The results showed that perceived usefulness is a significant factor that positively influences students' Attitude toward virtual classrooms that intend to use it in the future

Keywords— virtual classrooms, Technology Acceptance Model, Students.

I. INTRODUCTION

Following the emergence of the Internet in the early 1990s, many aspects of life, such as commerce, electronic shopping, and others, have benefited significantly. Posey, Burgess, Eason, and Jones [1] argued that education also has one of the fields that took many advantages of this technology evolution. Today, new technologies have changed the educational landscape by creating a set of digital learning platforms and digital classrooms [2]. Virtual classrooms are one of the new technologies that have helped develop teaching and learning in a way that allows learning to happen anytime and anywhere [3] ; [4].

Virtual classrooms are becoming increasingly popular and used significantly in educational environments[1] ; [4]. They are similar to the traditional face-to-face classrooms in achieving the learning process, but the difference in the teaching and learning methods. In virtual classrooms, students are provided with interesting new dimensions [5]. For example, virtual classrooms offer online interaction, whether audio, visual, or textual interaction, between students and teachers [6], unlike the traditional environments that require face-to-face interaction to receive the information [7] ; [4]. In the virtual classroom environment, students enable to improve their efficiency and skills. They do not only get knowledge from teachers, but they also learn from other students and experts. This innovation also helps teachers create a fully immersive teaching environment and improve teaching quality [3]. Indeed, they enjoy the learning process, view each other through a webcam, are emotionally engaged with the lesson, and work together in break-out rooms [8]; [6]; [4].

Adopting virtual classrooms in education and particularly in higher education seems to be the orientation of future education. Thus, in the current study, the researcher seeks students' perception of virtual classrooms as an alternative to real classes. The study adopts Technology Acceptance Model (TAM) as the theoretical framework to explain students' acceptance or rejection of virtual classrooms as an alternative to real classes in achieving the learning process's aim. It also investigates how new technology might affect the students' behavior, intention, and attitudes toward the learning process

Literature review:
Virtual reality in education:

Virtual reality refers to "a computer-simulate-reality or fictitious environment with which the users interact through a human-computer interface so that the users experience the immersion" [9]; [4]. In other words, computer imitations provide the virtual scene with simulated reality in a way that allows users to learn and observe through this fabricated environment [10]. Virtual reality's goal is to create the illusion of being in another place or in immersed in a different environment. Pratt, Zyda, and Kelleher added that virtual reality enables the users to interact with imitated settings created by computers [11].

For users to interact with 3D environments created by computers, virtual reality technologies are needed to transform this interaction from the real world to the virtual world, such as virtual reality headsets, display screens and tracked handheld controllers [10]. Shin illustrated that virtual reality technologies could provide users with several skills such as spatial socialization [12], data visualization, and experimenting with real-time things. Moreover, virtual reality technologies have increasingly appeared in different scopes such as military simulation, industrial manufacturing management, architectural design, sports training, entertainment, and gaming [13]. In an educational environment, Bernardo argued that virtual reality technologies had been applied in different fields to help students understand phenomena or notions that are difficult to experience in traditional settings [14]. For instance, in the medical field, virtual reality technologies give students a chance to replicate the simulated reality where they can replicate surgery procedures in a virtual surgery setting to help them receive visual and haptic feedback.

Virtual reality plays a vital role in an educational environment and particularly in higher education. Previous studies such as [15] ; [10] indicated that virtual reality could be seen as an effective tool in supporting critical thinking, collaboration, and communication skills. Also, Zhang, Liu, Luo, Shen, and Guo developed the Marine Engine Simulation system (MESS) [16], for marine engineering English in Chinese maritime universities to solve the problem of insufficient qualified teachers to introduce effective learning tools. They found that this system enables students to interact and communicate effectively with others in a virtual 3D environment through wearable devices. Therefore, they believed that the virtual world could encourage students to engage more in the course more than in the real world. However, some obstacles have negatively affected students' experience of virtual reality. Firstly, Hartley, Ludlow, and Du argued that technical difficulties are obstacles that discourage students' abilities to gain the educational and social benefits of the virtual environment [17]. Secondly, Riley and Stacy stated that there are some issues exposed by the students and particularly children during the virtual world, which negatively affect their personality, such as sexual content, violence, and harassment that display in this environment [18].

Virtual classrooms environment:

Virtual classrooms environment integrate virtual reality technologies with the teaching and learning process [3]. clarified that in virtual classrooms environment, there is a combination between terminals, application system and platforms with teaching content to create a realistic and immersive learning environment where helps students to learn effectively. Hiltz introduced virtual classrooms in 1986 since he viewed the computerized conference system as a "virtual classroom". Nowadays, virtual classrooms environment offer both students and teachers slides presentation, real-time voice and video, whiteboard, and text-based interaction.

According to Xenos, M, Initially, a virtual classroom environment was very necessary in distance learning settings where teachers create a three-dimensional environment that supports students dynamically [19]. He argued that the virtual classroom environment in the present time is used for distance learning and is also utilized for blended learning and as a supplement of on-campus courses. He added that a virtual classroom environment aims to provide students with experience learning analogous to real classroom settings. However, in some cases, it is difficult to provide students with experience in this environment due to the technical limitations or internet connection that causes audio or video issues.

Furthermore, He also stated that the virtual classroom environment has several features that emulate traditional classrooms, but it also moves beyond traditional classroom limitations. These features are shown in the following:

1- The property of video and sound in the virtual classrooms increases the sense of community among students and faculty member staff by presenting themselves on video while showing the session, especially in difficult cases to communicate directly.

2- A chat is an alternative feature for sound problems that occur during the session in a virtual classroom environment. Xenos and Skodras argued that in the chat feature, students could ask their faculty member staff again to clarify points that are hard to hear, and faculty member staff can collect short responses from students [20].

3- The students' feedback property gives faculty member staff a chance to monitor students' participation. It can be through replying to students to a simple question such as "is everything OK so far?", or "can everyone hear me?".

4- The whiteboard property in a virtual classroom environment is different from the traditional classroom environment. For example, use the whiteboard in the real classrooms, faculty member staff need to turn them back to students for a long time, while use whiteboard in the virtual classrooms, faculty member staff do not need to do. It also allows students to write on the whiteboard and highlight points they want to discuss later with their professor.

5- The discussion administration feature helps faculty member staff overcome challenges faced when using virtual classrooms environment, such as providing faculty member staff an opportunity to control students, monitor the 'raised hands', and allow 'turns' to speak during the session.

6- Break-out rooms feature allows faculty member staff to split session students into small groups to do activities such as discussion, brainstorming or problem-solving.

7- Shared documents and files in virtual classrooms create an atmosphere of collaboration between professor and their students during the session. It gives them a chance to work together on a document, such as reviewing codes or sharing files related to the session.

8- The slide presentations feature is seen as a valuable feature. It supports the session by allowing faculty member staff to upload presentations to facilitate students' learning process.

Although virtual classrooms environment can provide students with an educational experience by fully immersive and economic scenes, they have some disadvantages. For instance, Hicks indicated that virtual classrooms instead of real classrooms might negatively affect personal human connection and interpersonal interactions. He explained that meaningful interactions are between humans, not humans and software or robot. Therefore, virtual classrooms might isolate students from the community for an extended period since they see this setting as the real one. Nevertheless, it does not mean that virtual classrooms environment should not be used as a learning tool [21].

Technology Acceptance Model (TAM):

Technology Acceptance Model (TAM) has become the most popular research model employed to explain the acceptance or rejection of new systems by individual users. It is based on the Theory of Reasoned Action (TRA), which has been developed by [22]. TRA believes that a person's behavioral intention depends on the person's Attitude about the behavior and subjective norms. In 1985, the Theory of Planned Behaviour (TPB) was proposed by Ajzen, which is an adaptation of TRA. It declares that actual behavior is strongly related to behavioral intention.

Nevertheless, some research discovered that behavioral intention does not always define the actual behavior, especially when it is related to technology use. This has led to the emergence of the Technology Acceptance Model (TAM), proposed by [23]. This model includes four main constructs (perceived usefulness, perceived ease of use, Attitude towards use, and behavioral intention to use). He added that there is a strong relationship between these constructs since behavioral intention to use is affected by perceived usefulness and perceived ease of use, which ultimately affect Attitude towards the use of technology (see Figure 1)
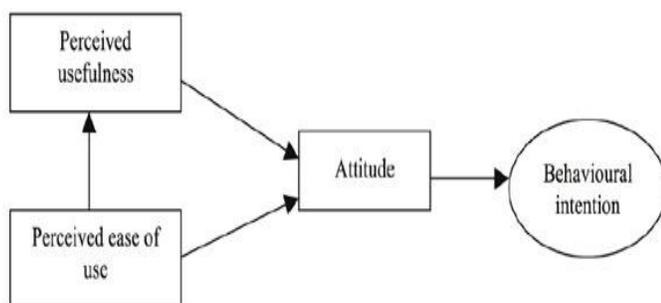

Figure 1: TAM model from Davis (1989)

Moreover, some studies adopted TAM to understand students' acceptance or rejection of using e-learning as a learning tool. For example, students who perceived the e-learning environment as a useful tool believe it is straightforward to use found by [24]. They added that students who are confident in their ability to master an e-learning environment without help are more likely to use this environment independently. However, very few studies sought to explain students' acceptance or rejection of virtual reality as a learning tool

using TAM. Thus, the current study aims to adopt TAM as a theoretical framework to help the researcher understand and explain students' acceptance or rejection of virtual classrooms environment as an alternative to real classes. The study intends to test these four hypotheses:

H1 Perceived ease of use would positively influence students' perceived usefulness of virtual classrooms as an alternative to real classes.

H2 Perceived usefulness will positively influence students' Attitude towards virtual classrooms as an alternative of real classes.

H3 Perceived ease of use would positively influence students' Attitude towards virtual classrooms as an alternative to real classes.

H4 Attitude towards usage will positively influence the behavioral intention of using virtual classrooms as an alternative to real classes.

Methodology:

As the current study is quantitative, a questionnaire was collected by a questionnaire adapted from [23]. The questionnaire used in this study contains three sections. The first section collects demographic information about the participants, designed with multiple choices. The second section concerns general information about the use of virtual classrooms environment. The third section contains the scale measuring using virtual classrooms as an alternative of real classes, consisting of items that are divided into several sub-sections. The retained sub-sections are perceived usefulness (PU), 5 items; perceived ease of use (PEU), 4items; attitude toward use virtual classrooms environment, 3 items; and behavioral intention, 4 items. According to a Likert scale, respondents agree or disagree with the items according to a Likert scale arranged from strongly disagree to agree strongly.

Descriptive analysis was used to investigate students' perception of virtual classrooms as an alternative to real classes. Statistical analysis, correlation analysis, and linear regression analysis were used to determine how PEU, ATVC, PE and BI influence the use of virtual classrooms as an alternative to real classes.

Findings:

1- Reliability and validity Analysis:

The reliability of the scales was assessed by Cronbach's alpha. Pallant stated that Cronbach's alpha's value is in the range from 0 to 1 and that higher than 0.7 indicates high reliability [25]. The Table results show that the value of alpha for all the 16 items was .978, which is considered a very high score. This means that the scales were reliable and would give consistent results. Furthermore, to ensure the validity of the questionnaire, the items of the scales had checked and reviewed by experts in my institution.

Table 1.
Reliability of the questionnaire scales

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.978	.978	16

2- Demographic Information:

The questionnaire was randomly distributed online to all female students of the college of education. Responses were 289 out of 2468 students, and more than 50% of ages of the sample were between 21-22 ages old. It found that more than a third of the sample were from the Kindergarten Female section, which might be due to the labor market requirement at the current time. The findings also show that homework (70%), quizzes (72%) and audio conferencing (65%) were the most tools of the virtual classrooms are used between students and faculty member staff.

3- Descriptive analysis:

Descriptive statistics of the four scales (perceived usefulness, perceived ease of use, Attitude toward the use of virtual classes, and behavioral intention) are shown in the following Tables.

Perceived usefulness (PU):

Yuen and Ma defined PU as "the prospective user's subjective probability that using a specific application system would increase his or her job performance"[26]. Many studies discovered PU plays a vital role in influencing the Attitude toward the use of ICT. The following table illustrates items related to the usefulness of using virtual classrooms [27].

Table 2.
Descriptive of perceived usefulness

Items	N	Minimum	Maximum	Mean	Std. Deviation
Using virtual classrooms improves my learning performance	289	1	5	2.94	1.410
Using virtual classrooms enhances my effectiveness in learning	289	1	5	2.93	1.369
Using virtual classrooms improves the quality of my learning	289	1	5	2.86	1.429
Using virtual classrooms increases my academic productivity	289	1	5	2.87	1.386
Using virtual classrooms is an useful environment for me to develop my learning	289	1	5	3.00	1.408

The table above shows that, in general, students tended to agree that virtual classrooms were perceived as useful for them. The statement stated, "Using virtual classrooms is a useful environment for me to develop my learning," were scored relatively high.

Perceived ease of use (PEU):

According to Yuen & Ma, PEU refers to "the degree to which the prospective users expected the target system to be free of effort" [26: 232]. Davis argued a strong relationship between perceived ease of use and perceived usefulness [23]. For example, if students see technology as easy to use, they will perceive it as a useful learning environment. So, four items of perceived ease of use were shown in the following table.

Table 3.
Descriptive of perceived usefulness

Items	N	Minimum	Maximum	Mean	Std. Deviation
The instructions in virtual classrooms are clear and understandable	289	1	5	3.12	1.315
The functions in virtual classrooms are easy to use	289	1	5	3.24	1.335
I find virtual classrooms technology is flexible to use	289	1	5	3.04	1.387
Virtual classrooms technology is possible to be used without any expert help	289	1	5	3.30	1.334

The table demonstrates a positive perception of the ease of use of virtual classrooms. The statement that stated, "Virtual classrooms technology is possible to be used without any expert help" has a quite high score (3.3).

Attitude toward the use of virtual classrooms (ATVC):

Fishbein and Ajzen defined Attitude toward use behavior as "an individual's positive or negative feelings (evaluative effect) about performing the target behavior" [22: 216]. Attitude is considered as a fundamental element that affects the intention to use ICT" [28]. This leads me to ask three items to assess students' Attitudes toward the use of virtual classrooms.

Overall, the table above shows that students have a slight positive Attitude toward the use of virtual classrooms.

Behavioral intention to use:

Table4
Descriptive of Attitude toward use of virtual classrooms

Items	N	Minimum	Maximum	Mean	Std. Deviation
Using virtual classrooms as an alternative of real classes makes the learning more interesting	289	1	5	2.79	1.482
Using virtual classrooms as an alternative of real classes is good idea	289	1	5	2.97	1.433
I like using virtual classrooms as an alternative of real classes	289	1	5	2.82	1.516

The intention is described as the degree of a person's willingness or not to engage in a specific behavior [29]. The following table has four items that assess how ready the person can engage in a specific behavior

Table5
Descriptive of behavioral intention to use

Items	N	Minimum	Maximum	Mean	Std. Deviation
I plan to use virtual classrooms during my studying at university	289	1	5	2.82	1.435
I will recommend others to use virtual classrooms technology as learning tool	289	1	5	2.94	1.458
I intend to use virtual classrooms to support my study needs	289	1	5	3.02	1.438
I intend to use virtual classrooms to improve my study performance as often as needed	289	1	5	3.15	1.427

From table above, students described showing some intent to use virtual classrooms. The statement stated, "I intend to use virtual classrooms to improve my study performance as often as needed," scored the highest on this scale.

From table above, students described showing some intent to use virtual classrooms. The statement stated, "I intend to use virtual classrooms to improve my study performance as often as needed," scored the highest on this scale.

4- Correlation analysis:

Table6
Correlation analysis among the four scales

Factor	Perceived_ usefulness	Perceived ease of use	Attitude toward use	Behavioral intention
Perceived usefulness	-			
Perceived ease of use	.833**	-		
Attitude toward use	.827**	.729**	-	
Behavioral intention	.860**	.804**	.886**	-

The value of Pearson's correlation coefficient, calculated for the variables Behavioral intention and Attitude toward the use of virtual classrooms, was 0.886, p<0.01, which indicated a strong positive, statistically significant, connection between Behavioral intention and Attitude toward the use of virtual classrooms. The value of Pearson's correlation coefficient, calculated for the variables Behavioral intention and Perceived usefulness, was 0.860, p<0.01, which indicated a strong positive, statistically significant, the connection between Behavioral intention and Perceived usefulness. The value of Pearson's correlation coefficient, calculated for the variables Perceived ease of use and Perceived usefulness, was 0.833,

p<0.01, which indicated a strong positive, statistically significant, the connection between Perceived ease of use and Perceived usefulness. The value of Pearson's correlation coefficient, calculated for the variables Attitude toward the use of virtual classrooms and Perceived usefulness, was 0.827, p<0.01, which indicated a strong positive, statistically significant, connection between Attitude toward the use of virtual classrooms and Perceived usefulness. The value of Pearson's correlation coefficient, calculated for the variables Behavioral intention and Perceived ease of use, was 0.804, p<0.01, which indicated a strong positive, statistically significant, the connection between Behavioral intention and Perceived ease of use. The value of Pearson's correlation coefficient, calculated for the variables Attitude toward the use of virtual classrooms and Perceived ease of use, was 0.729, p<0.01, which indicated a strong positive, statistically significant, connection between Attitude toward the use of virtual classrooms and Perceived ease of use.

5- Hypotheses Testing:

To test the hypothesis, a linear regression analysis was conducted. The table summarizes the findings of regression analysis.

Table: Summary of Hypotheses Testing

Hypothesis	Specification	Results
H1	perceived ease of use will positively influence perceived usefulness	$\beta=0.833$, $r2=0.693$ p<0.001
H2	perceived usefulness will positively influence Attitude toward use of virtual classrooms	$\beta=0.827$, $r2=0.683$ p<0.001
H3	perceived ease of use will positively influence Attitude toward use of virtual classrooms	$\beta=0.729$, $r2=0.531$ p<0.001
H4	attitude toward use of virtual classrooms will positively influence behavioral intention	$\beta=0.886$, $r2=0.786$ p<0.001

1- Perceived ease of use has a positive, statistically significant, influence on perceived usefulness, p<0.001, with ($\beta=0.833$, $r2=0.693$), which implies that only 69.3% of the variation in perceived usefulness can be explained by the model containing perceived ease of use.

2- Perceived usefulness has a positive, statistically significant, influence on Attitude toward the use of virtual classrooms, p<0.001, with ($\beta=0.827$, $r2=0.683$), which implies that only 68.3% of the variation in Attitude toward the use of virtual classrooms can be explained by the model containing perceived usefulness.

3- Perceived ease of use has a positive, statistically significant, influence on Attitude toward the use of virtual classrooms, p<0.001, with ($\beta=0.729$, $r2=0.531$), which implies that only 53.1% of the variation in Attitude toward the use of virtual classrooms can be explained by the model containing perceived ease of use.

4- Attitude toward the use of virtual classrooms has a positive, statistically significant, influence on behavioral

intention, p<0.001, with ($\beta=0.886$, $r2=0.786$), which implies that only 78.6% of the variation in behavioral intention can be explained by the model containing Attitude toward the use of virtual classrooms.

Discussion:

The study confirmed that TAM is an ideal theoretical framework, which helps to understand students' use of virtual classrooms as an alternative to real classrooms. The study results revealed that the perceived ease of use (virtual classroom technology can be used without experts' help), the instructions in the virtual classroom are clear and understandable. Also, The functions in the virtual classroom are easy to use. Virtual classroom technology is flexible in use. It has a statistically significant effect on the perceived benefit. This may be because students at the beginning of dealing with virtual classroom systems see how easy it is to use them. If they find it easy, they have a positive attitude towards increasing Wichadee indicated that teaching assistants in universities toward the usefulness of learning management systems increase as they become aware of their ease of use

[30]. The current result is consistent with the result that found a strong relationship between perceived ease of use [24], about Perceived interest. They discovered that students who have confidence in their ability to master the e-learning system, without assistance, are more likely to become users, thus enhancing their effectiveness in learning; however, the effect of perceived interest on students' Attitude towards use has a higher percentage (about 70%) Of perceived ease of use (about 53%). This may be due to the virtual learning platform's difficult design for some students to use more effectively to develop their learning process [24]. I would argue that, however, to encourage all students to use virtual classrooms as an alternative to real classrooms effectively and to help them have a positive attitude towards the usability of these classrooms, there is a need for training courses from the university that help train students how to use them and facilitate their use. This result is consistent with the [31] ; [32] ; [33] ; [34].

The results showed that perceived interest positively affects the students' Attitude towards using the virtual classroom. As it was found that there is a positive relationship between students' scores in the perceived interest factor and their scores in the trend factor towards using virtual classrooms, indicating that the higher the students' grades About the perceived interest factor, their tendency to use virtual classes increased. That relationship was statistically significant at the level (0.01). Thus, the second hypothesis of the study hypotheses was accepted. This result can be interpreted in light of what is available to students through virtual classes as an environment that can contribute to developing their abilities and development. Their competence contributes to the delivery of information and knowledge more simply and easily and develops the spirit of teamwork and cooperation between learners, and provides a lot of knowledge and information through research resources and centers widely available on the Internet [35]; [36]; [33]; [37].

The results revealed that perceived ease of use has a positive, statistically significant effect on the trend towards the use of virtual classrooms, as these results indicate that students' positive vision towards the benefits of the system and its ease of use helps create positive trends among students towards using virtual classrooms. Students are determined more according to the ease of use expected from the virtual classroom, as it is considered a fundamental motivating factor for the benefit of virtual classrooms. Thus students' attitudes are determined based on the characteristics related to the system, confirming the importance of clearly introducing students to those characteristics, and this is consistent with the study Which confirmed that ease of use affects the level of student satisfaction, as they usually need an educational system free of effort [38].

The results also revealed a statistically significant effect of the trend towards using virtual classrooms (using virtual classrooms as an alternative to real classrooms makes learning more interesting, using virtual classrooms as an alternative to real classes is a good idea, I like using virtual classrooms as an alternative to real classrooms) has a positive effect. And a statistical indication of the behavioral intention to use links the current result with the effect of perceived ease on behavioral intention. Students look at the usefulness of virtual classes (after they found them easy to use). If they are found to be useful, a strong position is developed that leads them to develop the behavioral intention. Alharbi & Drew reported that the benefit of using a learning management system increases the degree of positive tendencies towards its use, which affects the behavioral intent to use virtual classrooms [39].

These results are consistent with the results confirmed that a positive Attitude toward using virtual classrooms among students would lead to the intention to use them as language learning tools [40] ; [41]. However, I may argue that the virtual classroom experience may not be enjoyable to some students for the first time due to their lack of practice. Therefore, I believe that another agent of change, such as faculty member staff's support, is needed to keep a positive attitude toward virtual classrooms among students and encourage them to continue using these classrooms for educational purposes in the future. This result is consistent with the study [33] ; [42] ; [31].

Conclusion:

The current study may contribute theoretically to educational technology, particularly the university students' use of virtual classrooms as an alternative to real classes. Overall, students have positive perceptions of using virtual classrooms as an alternative to real classes. According to the findings, perceived usefulness is seen as a significant factor than perceived ease of use, which positively influences students' Attitude toward the use of virtual classrooms that leads to intention to use it in the future. This does not mean that factor of perceived ease of use is not very important. Still, preferably students need support and encouragement from both university and faculty member staff on how to use virtual classrooms to succeed to achieve the educational aim.

To have insight and more understanding about the issue, qualitative methods, such as interviews, are needed to comprehend their views about using virtual classrooms as an alternative to real classrooms.

REFERENCES

[1] Posey, G., Burgess, T., Eason, M., & Jones, Y. (2010). The Advantages and Disadvantages of the Virtual Classroom and the Role of the Teacher. Paper presented at the Southwest Decision Sciences Institute Conference.

[2] Clark, D. N., & Gibb, J. L. (2006). Virtual team learning: An introductory study team exercise. Journal of Management Education, 30(6), 765-787

[3] Dong, X. (2016). An overall solution of Virtual Reality classroom. Paper presented at the 2016 IEEE International Conference on Service Operations and Logistics, and Informatics (SOLI).

[4] Ibrahem, U. M., & Alamro, A. R. (2021). Effects of Infographics on Developing Computer Knowledge, Skills and Achievement Motivation among Hail University Students. International Journal of Instruction, 14(1).

[5] Flatley, M. E. (2007). Teaching the virtual presentation. Business Communication Quarterly, 70(3), 301-305.

[6] Parker, M. A., & Martin, F. (2010). Using virtual classrooms: Student perceptions of features and characteristics in an online and a blended course. Merlot Journal of Online Learning and Teaching, 6(1), 135-147

[7] Al-Nuaim, H. A. (2012). The use of virtual classrooms in e-learning: A case study in King Abdulaziz University, Saudi Arabia. E-Learning and Digital Media, 9(2), 211-222.

[8] Ayad, K., & Rigas, D. (2010). Comparing virtual classroom, game-based learning, and storytelling teachings in e-learning. International Journal of Education and Information Technologies, 4(1), 15-23.

[9] Hung, C.-M., Hwang, G.-J., Huang, I., & Li, J.-M. (2010). Effects of interactively virtual reality on achievements and attitudes of pupils: a case study on a natural science course. WSEAS Transactions on Information Science and Applications, 7(12), 1413-1422.

[10] Baxter, G., & Hainey, T. (2019). Student perceptions of virtual reality use in higher education. Journal of Applied Research in Higher Education.

[11] Pratt, D. R., Zyda, M., & Kelleher, K. (1995). Virtual reality: in the mind of the beholder. Computer(7), 17-19.

[12] Shin, D.-H. (2017). The role of affordance in the experience of virtual reality learning: Technological and affective affordances in virtual reality. Telematics and Informatics, 34(8), 1826-1836

[13] Merchant, Z., Goetz, E. T., Cifuentes, L., Keeney-Kennicutt, W., & Davis, T. J. (2014). Effectiveness of virtual reality-based instruction on students' learning outcomes in K-12 and higher education: A meta-analysis. Computers & Education, 70, 29-40.

[14] Bernardo, A. (2017). Virtual reality and simulation in neurosurgical training. World neurosurgery, 106, 1015-1029.

[15] Jensen, C. G. (2017). Collaboration and dialogue in Virtual reality. Journal of Problem Based Learning in Higher Education, 5(1).

[16] Zhang, N., Liu, Y., Luo, W., Shen, Z., & Guo, C. (2015). Virtual reality-based marine engineering English learning environment simulation research. Paper presented at the 2015 12th International Computer Conference on Wavelet Active Media Technology and Information Processing (ICCWAMTIP).

[17] Hartley, M. D., Ludlow, B. L., & Duff, M. C. (2015). Second Life®: A 3D virtual immersive environment for teacher preparation courses in a distance education program. Rural Special Education Quarterly, 34(3), 21-25.

[18] Riley, S. K. L., & Stacy, K. (2008). Teaching in virtual worlds: Opportunities and challenges. Setting Knowledge Free: The Journal of Issues in Informing Science and Information Technology, 5(5), 127-135.

[19] Xenos, M. (2018). The Future of Virtual Classroom: Using existing features to move beyond traditional classroom limitations. Paper presented at the Interactive Mobile Communication, Technologies and Learning.

[20] Xenos, M., & Skodras, A. (2003). Evolving from a traditional distance learning model to e-learning.

[21] 21) Hicks, P. (2016). The pros and cons of using virtual reality in the classroom. eLearning Industry.

[22] Fishbein, M., & Ajzen, I. (1975). Belief, Attitude, Intention, and behavior: An introduction to theory and research.

[23] Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 319-340

[24] Abbad, M. M., Morris, D., & De Nahlik, C. (2009). Looking under the bonnet: Factors affecting student adoption of e-learning systems in Jordan. International Review of Research in Open and Distributed Learning, 10(2).

[25] Pallant, J., & Manual, S. S. (2010). A step by step guide to data analysis using SPSS. Berkshire UK: McGraw-Hill Education.

[26] Ibrahem, U. M., Alamr, A. R. (2020). The Effect of Using Cinemagraph Pictures in Social Platforms and Mobile Applications in the Development of Peace Concepts among University of Hail Students, JOURNAL OF INFORMATION SCIENCE AND ENGINEERING, 37(6), (November 2021).

[27] Taylor, S., & Todd, P. A. (2001). Understanding information technology usage: A test of competing models. Information systems research, 6(2), 144-176

[28] Chang, P. V. C. (2004). The validity of an extended technology acceptance model (TAM) for predicting intranet/portal usage.

[29] Ajzen, I. (1991). The theory of planned behavior. Organizational behavior and human decision processes, 50(2), 179-211.

[30] Wichadee, S. (2015). Factors Related to Faculty Members' Attitude and Adoption of a Learning Management System. Turkish Online Journal of Educational Technology-TOJET, 14 (4), 53-61.

[31] Wong, G. (2016). The Behavioral Intentions of Hong Kong Primary Teachers in Adopting Educational Technology. Educational Technology Research and Development, 64 (2), 313-338.

[32] Wong, G. (2015). Understanding Technology Acceptance in Preservice Teachers of Primary Mathematics in Hong Kong. Australasian Journal of Educational Technology, 31 (6), 713- 735

[33] Fathema, N., Shannon, D. and Ross, M. (2015). Expanding the Technology Acceptance Model (TAM) to Examine Faculty Use of Learning Management Systems (LMSs) In Higher Education Institutions. Journal of Online Learning and Teaching, 11 (2), 210-232

[34] Park, S. Y. (2009). An analysis of the technology acceptance model in understanding university students' behavioral intention to use e-learning. Journal of Educational Technology & Society, 12(3), 150-162.

[35] Alqahtani, M., & Mohammad, H. (2015). Mobile Applications' Impact on Student Performance and Satisfaction. Turkish Online Journal of Educational Technology, 14(4), 102.

[36] Parker, M & Martin, F. (2014). Using Virtual Classrooms: Student Perceptions of Features and Characteristics in an Online and a Blended Course. MERLOT Journal of Online Learning and Teaching, 6(1).

[37] Al-Juhani, L. S. (2016). Investigate the behavioral intentions of postgraduate students in using the Edmodo educational platform in the future using the technology acceptance form, Journal of the College of Basic Education for Educational and Human Sciences/ University of Babylon, Issue 28

[38] Yusoff, Noor & Rani, Nazatul Shima & Suradi, Zurinah. (2014). An Analysis of Technology Acceptance Model, Learning Management System Attributes, E-satisfaction, and E-Retention.

[39] Alharbi, Saleh & Drew, Steve. (2014). Using the Technology Acceptance Model in Understanding Academics' Behavioural Intention to Use Learning Management Systems. International Journal of Advanced Computer Science and Applications. 5. 13. 10.14569/IJACSA.2014.050120.

[40] Nair, I. (2012). Using Technology Acceptance Model to assess teachers' Attitude towards using technology as a teaching tool: A SEM Approach. International Journal of Computer Applications, 42(2), 1-6.

[41] Abd Majid, S. N., Ismail, R., Kassim, H., Kassim, A., & Bakar, A. H. A. (2018). Students' perception in using virtual reality device in English classrooms.

[42] Lee, D. and Lehto, M. (2013). User Acceptance of YouTube for Procedural Learning: An Extension of the Technology Acceptance Model. Computers and Education, 61 (1), 193- 208

[43] Batova M. M., Baranova I V. (2019). Information Technology Knowledge Management in the System of Interaction of Educational and Scientific-Production Structures, WSEAS Transactions on Business and Economics, Vol. 16, 545-551.

[44] Kusi, L. Y., Domfeh, H. A., & Kim, P. (2018). Impact of celebrity advertising on purchase intention of University Students: The moderating role of celebrity advertising risk. WSEAS Transactions on Business and Economics, 15, 128-142.