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Research paper



Holographic Video Conferencing for Fostering Communication and Participation: Pre-Conceptualization of Focus Group of Female Learners in Arab Open University (KSA)

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Abstract

Educational institutes are quick to take benefits of technological facilities through incorporating ICT into education, particularly for female students in Saudi education system due to the imposed religious barriers, which sequentially has produced innovative models of education such as, distance learning and blended learning. Deriving from this, holographic video conference (HVC) is considered to be a new tool for better achievement with respect to communication and participation of female students at Arab Open University in Saudi Arabia. This phenomenon makes it progressively important to understand factors impacting it. The study will use design science research (DSR) as a research paradigm that will create and evaluate information technology (IT) artifacts proposed in this research to explain recognized female students' problems. DSR model includes five phases which are: awareness of problem, suggestion, development, evaluation and conclusion. The proposed research method will be used to determine the perceptions of female learners towards HVC. Using this technique, the effectiveness of HVC in regards to participation and communication of female learners with the male instructors will be determined.

Keywords: *Blended Learning, Holographic Video Conference, Design Science Research, Arab Open University*

1. Introduction

The revolution in information technology has accelerated expansion in almost through all areas of the recent modern world. It caused to be a vital requirement for all educational institutions like schools and universities to consider it for gaining potential benefits in improving learning and teaching atmospheres as well as to better handle the soaring demand for training and education [1]. Similarly, the parallel advancement due to IT in instructional technology and its impact on both learning and teaching has led to the major changes in the academic environments in the Kingdom of Saudi Arabia [2]. This is noteworthy that various Saudi educational institutions have already started shifting to the application of blended learning and many of them are using different learning systems and methodologies to support their students [3]. Previous researchers similarly emphasized that e-learning in Saudi Arabia has got attention and interest particularly in academic institutions as well as in students and academics although the pace is relatively slow [4,5].

The distance learning in KSA for higher education through institutions was ratified and published officially in 2010 [6]. There exists the resistance to implement instructional technology at all levels including administrative, technical and government side by side with other challenges like lack of knowledge and web-based instruction [7,8]. The recent trend in learning has got the focal importance for educational institutions teachers to equip themselves with all necessary skills to meet the new challenges. The urgency of e-learning in Saudi Arabia is due to the quick increase in population growth coupled with the low supply of teachers in both respects of quantity and quality, as well as due to the extreme shortage of female teachers for female learners given the imposed religious barrier. There is a substantial challenge for academicians and also a great need to develop an appropriate e-learning system that not only facilitate distance learning but also is acceptable culturally for female education, a blended learning system.

Scholars specified that 56% of female students register in public universities for higher education but majority of them graduate without having any direct interaction with male instructors. Due to legal and religious views, male and female learners are divided at all stages of education. Due to the lack of female teachers in higher education, male teachers give lectures through video camera, rather than face to face lectures to their female students. While instructors give lectures through a closed-circuit video system, female students watch the lectures on TV screens in the campus, and they use a microphone system to ask queries and get feedback. According to some female students, this learning process seems boring and it discourages them to ask questions to learn more. Similarly, few of the instructors responded this lecturing technique as often uninteresting teaching method [9,10]. However, there are various problems in synchronous blended education, name a few; communication deficiency, eye-contact problem, visual and sound problems, not feeling together and weak lecturer control as mentioned below in Figure 1. Another study conducted by Karal, [11] revealed that there are significant issues such as speed, sound and connectivity. However, it is believed that these conditions inhibit the steadiness of the program and leads to distraction.

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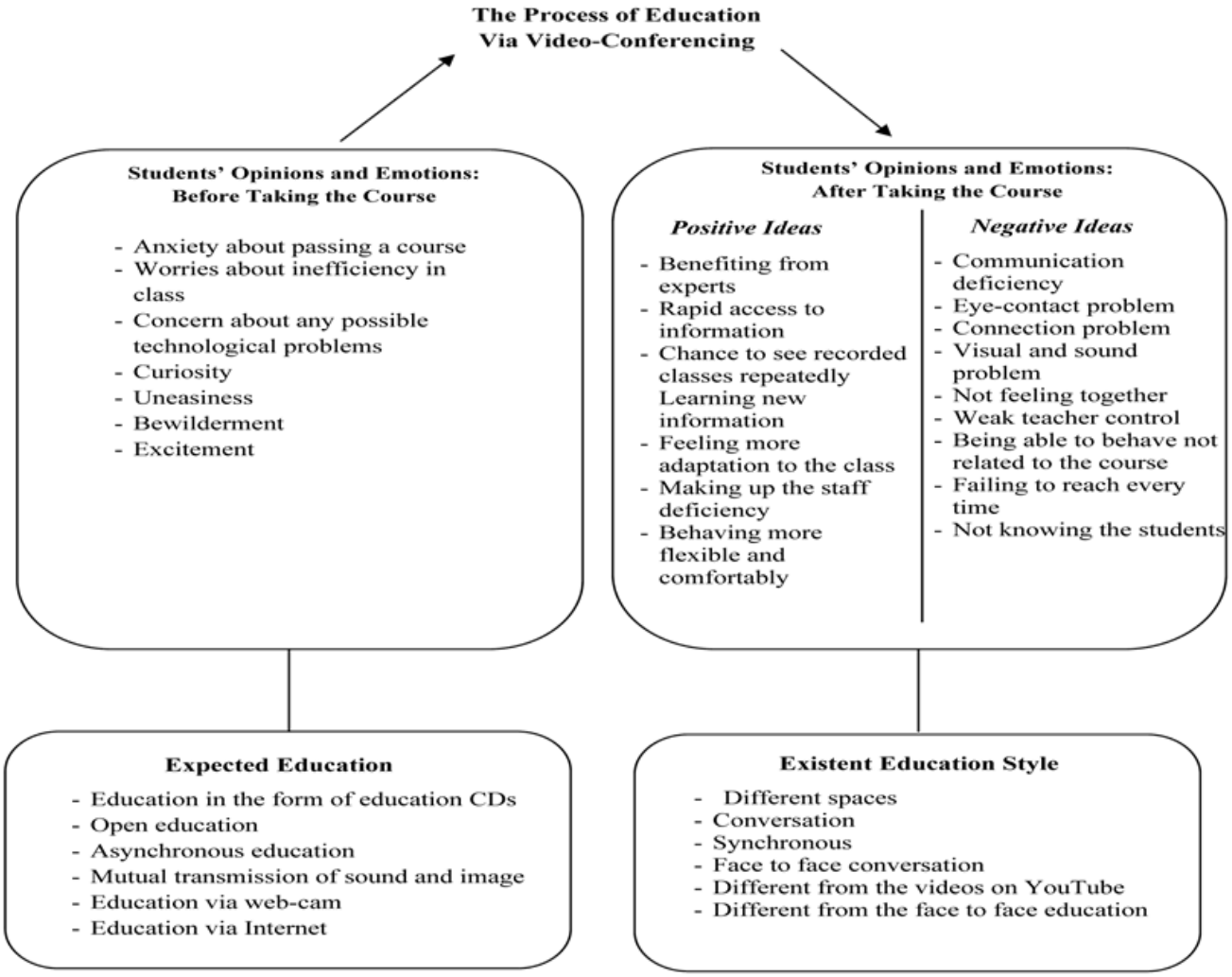


Figure1: Students' Opinions about Video Conferencing

Source: *Karal et al. (2011)*

Up to this point, no reviews have acknowledged the Arab female learners' perceptions to the difficulties they meet in the classrooms that custom video conferencing technology in AOU, nor there are any studies that caters to such issues. Many feminist theorists argued that there is unfairness and suppression of females in a male dominated society [12]. A female student from Saudi, for instance, feels that she gets 'discriminated' against male learners for being a female. She stated: *'My male professors have never met me, they have never talked to me face to face'* [13,14]. Another female student, who held similar views criticized the learning practices in a male dominated world, and agreed to share her views on the promises of anonymity fearing her marks be deducted, she stated: '*When I call my male lecturers, sometimes they hang up in my face since I am a woman*' [15,16]. However, there is a need to study how to best utilize video conferencing to determine female students' problems. Due to the benefits of ICT to create a learning environment, many educational institutions are blending ICT services into their teaching. Holographic video conferencing (HVC) is one of the most creative of these solutions [17]. The implementation of HVC learning is widely accepted due to its tremendous opportunities to connect students and teachers especially with the advancement of internet infrastructure and capability, growing demands of flexible education and preferences of younger generations of learners.

Saudi Arabia is a big country with a significant growth in its higher education system [18,19]. The ICT is a point of prime attention for the Kingdom which is also reflected both in its development plans for five-year and in its long-term national comprehensive development plans and also its national policy for science and technology is derived from it [20]. Based on this, particular attention is paid to the contextual factors that could potentially support or inhibit virtual learning environment in Arab Open University. With a futuristic vision to "empower people through creative e-learning in lifelong education", kingdom of Saudi Arabia started the National Plan for Information Technology (NPIT). This helps in recommending the adoption of blended learning with its applications in academic institutions and it also includes the establishment of the National Centre for E-Learning & Distance Learning (NCeDL) in Riyadh [21]. The government of KSA has taken steps to improve learning both on traditional courses and on distance learning courses through its interactive support in developing of blended learning [22] Thus, the government is engaged in adoption of blended learning in academic institution by both promoting and supporting via its proactive strategy by establishing the National Centre of e-Learning and Distance Learning (NCEDL) that has been serving prominently like other centres in the Middle East and the Arab World for a similar cause.

2. Literature Review

2.1. Women's Education in Kingdom of Saudi Arabia

Since Islam recommends separation of males and females in all conditions [23], female education in Saudi Arabia is also considered to follow this rule. However, the Saudi Government made incredible endeavours and showed considerable measures to higher education of females. This framework was instituted by Royal Decree on 30 April 1968 [24] under which a board of trustees that

included profoundly instructed individuals have studied all possibilities of higher education for females in KSA, and framed rules for their execution. As a consequence of this venture, the first ever female primary school was opened in 1970 by the General Presidency of Girl's Education [25,26] with the objective to prepare small girls for further education. Gradually, the General Presidency of Girl's Education realized the need to open new schools to meet the demand for education and thus 12 universities were opened in various districts of Saudi Arabia during 1970 and 1980 to offer four year college degree courses in different majors [27]. Subsequently, a few junior female colleges were started by the General Presidency of Girl's Education in various urban areas across the Kingdom in 1979 and 1984 [28,29]. Further, they suggested that the goal was to instruct the young females according to Islam to set them up for parenthood and to appreciate general society eye.

The Kingdom's colleges were started for individuals; however, co-education was not yet acknowledged. As a result of the requests made, the colleges began a few schools for young females though in an isolated setting. The government kept on building higher education institutions for females and by 2009, the number of admissions increased in these institutions to 70% of the total aggregate undergraduate admissions in all institutions [30]. Additionally, to facilitate female education, the government provided latest hardware, infrastructures and apparatuses, which resulted in highlighting the learning procedure and supporting the increasing number of female students. Likewise, the King Abdullah's Foreign Scholarship Program (KAFSP) also financed female graduates to pursue their higher education in another country. In 2006, Princess Noura bint Abdul Rahman University was opened for females only (PNU, 2013 cited in ALGARNI, 2014). Nonetheless, the government has provided ample opportunities to women in 23 state funded colleges in various provinces of the country and in several private higher educational institutions". For that reason, this study focuses on the female education in Saudi Arabia. Particularly, it aims to build Holographic Video Conferencing (HVC) model that can help remove the barriers in learning through interactive communication and class participation being faced by female students and also male instructors at AOU campuses in Saudi Arabia due to imposed religious factor. As previous studies found the scarcity of literature on the female education in KSA, precisely on the problems facing by them, it is believed that this study will be a significant contribution in the phenomenon studied in the context of Saudi Arabia.

2.2. Blended Learning

[31] points out how blended learning has dealt differently by critics and researchers. For example, [32,33,34] suggested that blended learning integrates both e-learning and face-to-face instruction. Similarly, [35] stated that arrangements in blended learning use 33 technology-based learning with face-to-face learning and have got popularity in different settings. [36] also called blended learning courses as "half breed courses" which are routine courses but their exercises are uploaded on the web in order to cut down the time of learners that they spend in the customary classrooms.

2.2.1. Blended Education Delivery Methods

Numerous higher education institutions are equipped to offer mixed courses with different learning methodologies [37] giving various points of interest over other less difficult teaching types. Although the e-learning arrangement could not replace the conventional instructional settings, mixed learning methodologies were boosted by using number of different learning stages where LMS is an example [38,39] It seemed that these different methodologies could cover the gap through clients' nearness, in a characteristic and in a simulated domain, carrying about close and personal correspondence and collaboration with different clients. Likewise, [40] stated that blended strategies should include the teachers and in addition to that distinctly wind up from their enlistment mindful of the advantages. In addition to these discoveries, Tselios, [41] have showed that the mix of up close and personal communication with online guideline arrangement could have an incentive through support of learner-focused and also collective learning forms. Additionally, a mixed method not just connects to both the customary and the separation exercises; it is considered as a more positive approach where clients could reap the benefits of collective effort and better coordination [42,43]. Below Figure 2 demonstrates the three education delivery methods.

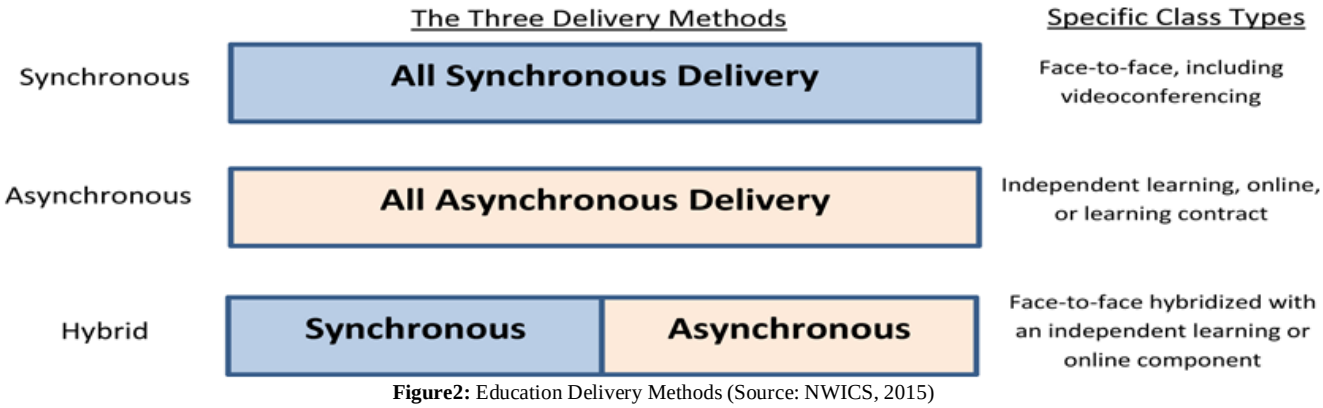


Figure2: Education Delivery Methods (Source: NWICS, 2015)

There are three delivery methods which includes synchronous delivery (requires interaction in real-time), asynchronous delivery (does not require interaction in real-time), and a blend of
both synchronous and asynchronous delivery, illustrated as in Figure 2.1. All guidelines of the course irrespective of location or delivery method, must achieve both the set approved outcomes and the set standards of the course. Educational institutes, however, are quick to take benefits of these delivery methods and technological facilities through incorporating ICT into education, particularly for female students in Saudi education system due to the imposed religious barriers, which sequentially has produced innovative models of education such as, distance learning and blended-learning. Considering religious barriers, in Kingdom of Saudi Arabia these models have changed the face of learning especially for females, similarly, it has played a vital role in increasing the student strength and also in
providing an opportunity to learn irrespective of time and/or place boundaries.

2.2.2. Holographic Video Conferencing

Holographic video conferencing (HVC) works with a video camera that captures an image of a person or an object and its whole movements. The image and its movements are then loaded into a

PC encoding card and transformed into a digital form with the help of a software. With the help of the Internet, the image is then transmitted to another computer which receives and decodes the data and reverses the process in order to recreate the same image. In other words, the receiving-end will receive the full image of the person present at the transmitting-end along with movements, like talking and walking. A high definition camera is used to capture the image through a HD projector placing the image on a screen made of special foil. Transmission reports that although all the images transmitted through the transmission system appears as 3D images, these can also be seen as 2D images into a 3D stage set. It creates an illusion in 3D (see Figure 3) in the minds of the viewers. It means that minimal equipment and cost as well required to film (one camera lens) and to playback (one projector) for holographic projection.



Figure3: Transmission effectively transmitted 3D multi-dimensional images of Marthin De Lager and Toss Stucki of Cisco from San Jose to Bangalore amid the opening of Cisco's Globalization Center East

Several educational institutions integrating ICT into their teaching and learning system in order to transform the nature of learning enables the learners to access knowledge irrespective of location. Technological growths have been introduced into the education sector which plays a significant role in shaping and enhancing the process of learning. [44] cited in [45] pointed out the significance of holographic technology as an educational tool. HVC connects individuals or groups at two different locations via real-time data and voice. It allows sound with video to be shared both simultaneously and interactively between different sites which can be two or more than two. Using the Internet or dedicated telephone circuits, these connections are live, allowing people to interact across space in a real-time environment [46]. Not only for instructional purposes for the learners, likewise, HVC can also be used for staff training and professional development. As an additional resource for education, HVC can effectively serve as a medium to implement professional development [47]. HVC is one amongst numerous means to back blended-learning with contacts to the curriculum and its use as an educational tool is growing [48].

2.2.3. Relevance of Holographic Video Conferencing in Education System

Shao, [49] stated that holography based video conferencing is a method that can store the complete tri-dimensional quality of an object, and which can facilitate the viewers to view as a truly three dimensional image. [50] elaborated it as an effective tool for learners of all age groups, since it has a three dimensional environment that provides a stimulating educational training experience and can turn any complex information into a very simple, engaging and meaningful learning. A 'virtual teacher' can make use of the HVC technology and interact with his students who may be physically miles away. [51] points out that holography based video conferencing has changed the traditional way of learning by listening to teachers or lessons. It has opened up and devised new learning styles through observing, watching, feeling and doing action. This has transformed learning into a more direct, useful and effective method in which the student is engaged in a self-learning mechanism. A great advantage of HVC is that it can connect students from extreme remote areas with the lectures given by specialists irrespective of their locations. It can facilitate a real-time communication with coordination that results in a good quality education that otherwise is inaccessible to remote locations students. Holographic technology can be used to deliver same lectures in more than one class rooms simultaneously regardless of their sites. This technology is particularly helpful to those highly sought after professionals and educationists who can now share their expertise with a wider audience without any constraints of time and distance. Globalization has further revolutionized education and opened up new opportunities in several parts of the world. Premier institutes have set up blended campuses and are offering education to students worldwide. They no longer now face the difficulty of gaining the good desired faculty at their off-shore campuses, nevertheless, HVC helps them to offer real-time lectures to students at their off-shore campuses. This kind of interaction has thus resulted in better understanding among students and also excelled the quality of education.

3. Methodology

The implementation of new technologies in IT and communication has brought about major changes in the education structure and functionality. This combination of education with technology has derived in developing and disseminating the electronic learning (e-learning) and the distance learning, and thus providing a new interactive teaching method to the delivery and content of education [52]. Hence, when interactive teaching methods are there with innovative new ways, students will be stimulated to learn more and with better understanding. Based on this, the current research study proposes the design science research (DSR) as a research paradigm. DSR is a research paradigm that creates and

evaluates IT artifacts proposed to explain recognized organizational problems. These kind of artifacts are embodied in a structured method which might change from severe mathematics to casual natural language metaphors, software and formal logic. It is a pragmatic research paradigm which creates innovative artifacts to solve real-world problems [53]. DSR is the foundation to create products and services, as well as the systems that react to individual requirements. Consequently, this study practices the DSR adapts from the prominent DSR model by Takeda, [54] which was later adapted by Offermann, [55]. This DSR model make combination of various research methods which have been used for both quantitative and qualitative research in Information System researches. This model exhibits a very structured process mainly in three phases, which are; problem identification, solution design and evaluation. The effective execution of this process produce DSR results. The research activities phases are presented in below Figure 4.

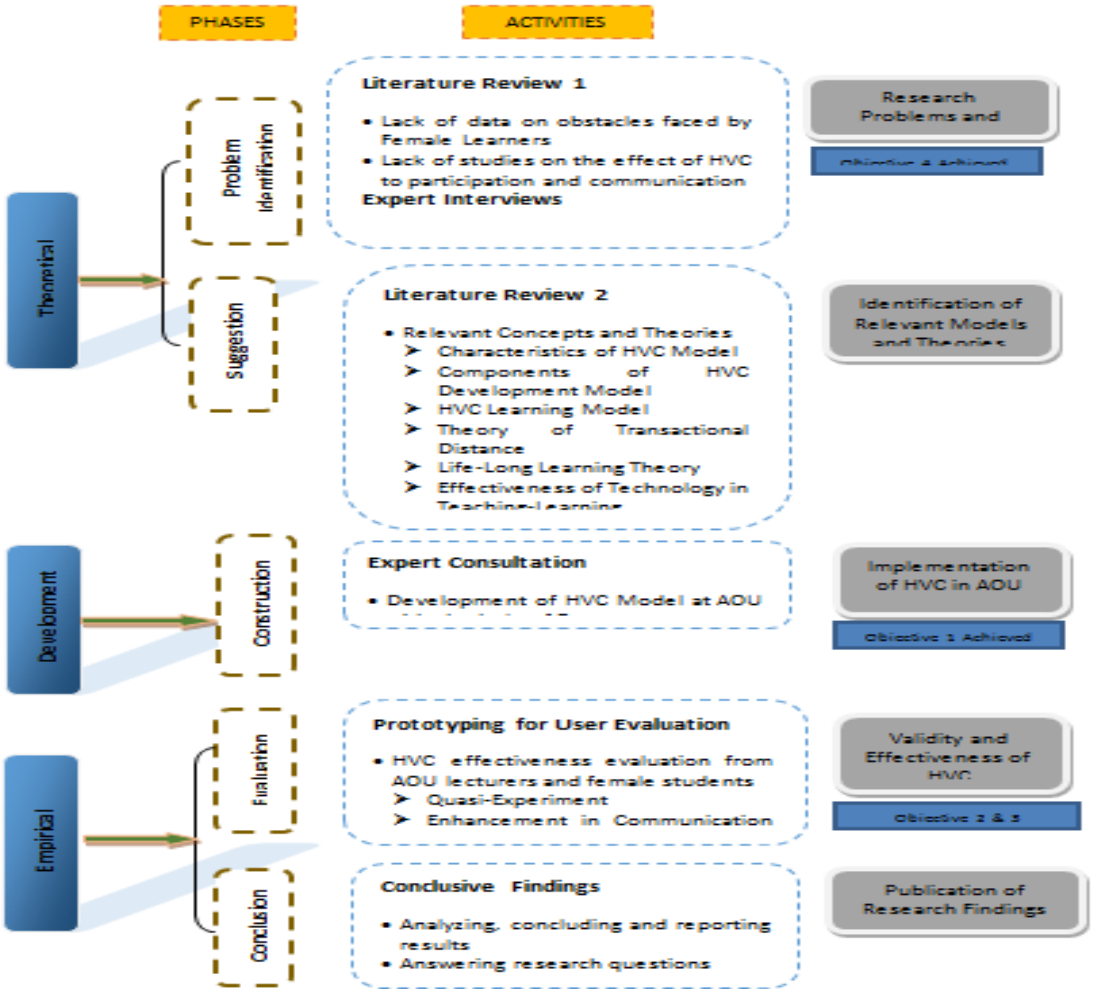


Figure 4: Design Science Research (DSR) Process

4. Conclusion

This study is an attempt to construct a Holographic Video Conferencing (HVC) model for the purpose of enhancing communication and participation of female students with the male lecturers given the imposed religious barrier at Arab Open University (AOU) in Saudi Arabia. It further aims to create a virtual learning environment for female students at AOU campuses in Saudi Arabia through integration and adaptation of holographic telepresence which might allow the formation of an attractive and efficient interface between female students and male lecturers. Similarly, the present study also makes an effort to focus on the background of blended learning that can be utilized to improve students' participation in the lecture hall. Theoretically, the current study attempts to suggest the intended solutions that contribute normally to the body of information which covers holographic telepresence area and instructional design to influence teaching and learning styles. The study requires to be tested empirically in terms of its usefulness and efficacy in Arab Open University.

References

[1] Akyol, Z., Vaughan, N., & Garrison, D. R. The impact of course duration on the development of a community of inquiry. *Interactive Learning Environments*, 19(3), 231-246, (2011).

[2] Al-Asmari, A. M., & Rabb Khan, M. S. (2014). E-learning in Saudi Arabia: Past, present and future. *Near and Middle Eastern Journal of Research in Education*, 2, 1-11.

[3] Al-Dosari, H. Faculty members and students perceptions of eLearning in the English department: A project evaluation. *Journal of Social Sciences*, 7(3), 391-407, (2011).

[4] ALGARNI, A. *Video Conferencing Technology for Distance Learning in Saudi Arabia: Current Problems, Feasible Solutions and Developing an Innovative Interactive Communication System based on Internet and wifi Technology for Communication Enhancement* (Doctoral dissertation, Durham University), (2014).

[5] Alhabeeb, A., & Rowley, J. Critical success factors for eLearning in Saudi Arabian universities. *International Journal of Educational Management*, *31*(2), 131-147, (2017).

[6] Al-Qahtani, A. A., & Higgins, S. E. Effects of traditional, blended and e-learning on students' achievement in higher educa-

tion. *Journal of Computer Assisted Learning*, 29(3), 220-234, (2013).
[7] Aloraini, S. Proposed Model for Distance Education in Kingdom of Saudi Arabia Based on the British, Malaysian and Arab Open University Models, Paper presented at "*First International Conference on eLearning and Distance Learning (eLi 2009)"*: Riyadh – KSA, (2009).
[8] Alsuwaida, N. Women's Education in Saudi Arabia. *Journal of International Education Research*, *12*(4), 111-11, (2016).
[9] Aman, A. M., Meddour, H., Majid, A. H., & Auf, M. A. Exploring the Use of Holographic Telepresence in Designing Virtual Learning Environments: A Saudi Experience. *International Journal of Economic Perspectives*, 10(4), 610-621, (2016).
[10] Arna'out, A. R. The Effectiveness of E-Learning Coordinators' Performance: Faculty Members' Perspective. *International Journal of Asian Social Science*, 6(1), 35-48, (2016).
[11] Barkhaya, N. M. M., & Halim, N. D. A. A review of application of 3D hologram in education: A meta-analysis. In *Engineering Education (ICEED), 2016 IEEE 8th International Conference* (pp. 257-260), (2016).
[12] Bhasin, B. Integration of Information and Communication Technologies in Enhancing Teaching and Learning. *Contemporary Educational Technology*, 3(2), 130-140, (2012).
[13] Burgess, M. L., Slate, J. R., Rojas-LeBouef, A., & LaPrairie, K. Teaching and learning in Second Life: Using the Community of Inquiry (CoI) model to support online instruction with graduate students in instructional technology. *The Internet and Higher Education*, *13*(1), 84-88, (2010).
[14] Clark, R. C., & Mayer, R. E. *E-learning and the science of instruction*, 2nd ed. Pfeiffer, San Francisco, CA, USA, (2007).
[15] Dimitrios, B., Labros, S., Nikolaos, K., Maria, K., & Athanasios, K. Traditional Teaching Methods Vs. Teaching Through The Application Of Information And Communication Technologies In The Accounting Field: Quo Vadis?. *European Scientific Journal, ESJ*, 9(28), (2013).
[16] Dziuban, C. D., Hartman, J. L., & Moskal, P. D. Blended learning. *EDUCAUSE Center for Applied Research Bulletin*, *7*(1), 12-24, (2004).
[17] El-Guindi, F. Is There an Islamic Alternative? The Case of Egypt's Contemporary Islamic Movement. *International Insight*, 1(4), 22, (1981).
[18] Fadale, A. V. *The use of a virtual network as a professional development tool for teachers* (pp. 1-180). Pepperdine University, (1999).
[19] Garnham, C., & Kaleta, R. Introduction to hybrid courses. *Teaching with Technology Today*, *8*(6), 5-13, (2002).
[20] Ghuloum, H. 3D Hologram Technology in Learning Environment. *Informing Science & IT Education Conference* (pp. 693–704). Italy. Retrieved from: (2010).
[21] http://proceedings.informingscience.org/InSITE2010/InSITE10p693-704Ghuloum751.pdf
[22] Greenberg, A. D. *Mapping the latest research into video-based distance education*. Wainhouse Research, LLC, (2009).
[23] Harrington, A. M. Problematizing the Hybrid Classroom for ESL/EFL Students. *TESL-EJ* 14(3), 1-13, (2010).
[24] Hevner, A. R. A three cycle view of design science research. *Scandinavian Journal of Information Systems*, *19*(2), 87-92, (2007).
[25] Ibrahim, R., Leng, N. S., Yusoff, R. C. M., Samy, G. N., Masrom, S., & Rizman, Z. I. E-learning acceptance based on technology acceptance model (TAM). *Journal of Fundamental and Applied Sciences*, 9(4S), 871-889, (2017).
[26] Johnson, T. E., Top, E., & Yukselturk, E. Team shared mental model as a contributing factor to team performance and students' course satisfaction in blended courses. *Computers in Human Behavior*, *27*(6), 2330-2338, (2011).
[27] Karal, H., Ayça, Ç. E. B. I., & Yigit, E. T. Perceptions of students who take synchronous courses through video conferencing about distance education. *TOJET: The Turkish Online Journal of Educational Technology*, 10(4), (2011).
[28] Kerres, M., & Witt, C. D. A didactical framework for the design of blended learning arrangements. *Journal of Educational Media*, *28*(2-3), 101-113, (2003).
[29] Mayadas, A. F., & Picciano, A. G. Blended learning and localness: The means and the end. *Journal of Asynchronous Learning Networks*, *11*(1), 3-7, (2007).
[30] Mortera-Gutiérrez, F. Faculty best practices using blended learning in e-learning and face-to-face instruction. *International Journal on E-Learning*, *5*(3), 313-337, (2006).
[31] Newman, D. L. *Videoconferencing Technology in K-12 Instruction: Best Practices and Trends:* IGI Global. Information Science Reference. Hershey, NY, (2007).
[32] Offermann, P., Levina, O., Schönherr, M., & Bub, U. Outline of a design science research process. In *Proceedings of the 4th International Conference on Design Science Research in Information Systems and Technology* (p. 7). ACM(2009).
[33] Rather, F. M. Education and Women Empowerment in Saudi Arabia. *Quarterly Journal of Chinese Studies*, *4*(3), 96-110, (2016).
[34] Rawaf, H. S. A., & Simmons, C. Distance higher education for women in Saudi Arabia: Present and proposed. *Distance Education*, *13*(1), 65-80, (1992).
[35] Shao, L., Lin, W. S., & Ko, C. C. Video object segmentation based on change detection and region growing. In *Proc. IASTED Int. Conf. on Signal and Image Processing* (pp. 387-391), (1998).
[36] Smith, L. & Abouammoh, A. *Higher education in Saudi Arabia: achievements, challenges and opportunities*. New York: Springer, (2013).
[37] Takeda, H., Veerkamp, P., & Yoshikawa, H. Modeling design process. *AI Magazine*, *11*(4), 37-48, (1990)..
[38] Tselios, N. K., Daskalakis, S., & Papadopoulou, M. Assessing the acceptance of a blended learning university course. *Educational Technology & Society*, *14*(2), 224-235, (2011).
[39] Thorne, K. *Blended learning: How to integrate online & traditional learning*. Kogan Page Publishers: London, (2003).
[40] Voogt, J., Almekinders, M., van den Akker, J., & Moonen, B. A 'blended'in-service arrangement for classroom technology integration: impacts on teachers and students. *Computers in Human Behavior*, *21*(3), 523-539,(2005).
[41] Walker, R. A. Holograms as Teaching Agents. In *Journal of Physics: Conference Series* (Vol. 415, No. 1, p. 012076). IOP Publishing, (2013).