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Design and Validation an Online Education Model in Critical Conditions for Higher Education System

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ABSTRACT

Objective: The aim of this study is to examine the development and verification of the virtual education model under challenging circumstances within the realm of higher education.

Methods: This particular study adopts an applied approach in terms of its objective and utilizes a descriptive-survey research design in relation to its characteristics and methodology for data collection, specifically relying on structural equation modeling. The target population for this study encompasses all master's and doctoral students enrolled in Islamic Azad Universities across 5 provinces within the nation. Through the application of Cochran's formula based on a population size of 300,000 individuals, a sample of 384 participants was selected using the one-step cluster sampling method. The primary data collection instrument employed in this research is a questionnaire developed by the researcher, which was crafted based on insights and feedback from experts in the field.

Results: The results of the study reveal that the virtual education model during challenging circumstances within the higher education sector comprises four educational dimensions, namely aesthetic, content, extra-organizational participation, with the mean shared values and average R Squares values demonstrating a GOF value of 0.49, denoting a robust model fit.

Conclusions: In light of the onset of the COVID-19 pandemic leading to the closure of educational institutions and the surge in virtual learning, there is a pressing need to reassess the educational process from a novel and pragmatic standpoint to enable seamless continuation of education without necessitating physical presence.

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Introduction

In recent years, the realm of virtual education has surfaced as a significant application of information and communication technologies globally, leading to widespread initiatives in this domain. Given the swift transformations occurring in the environment, the integration of virtual systems to offer educational services and innovative technology in the realm of teaching and learning has been posited as a fundamental necessity. Developers of such educational platforms, utilizing electronic resources and instruments, oversee and coordinate all educational components and processes, enabling learners to engage in the educational environment from any location and at any time (Böhme et al., 2017). Presently, in our nation, akin to other developing nations, the utilization of information networks for educational purposes in universities and schools is on the rise, signifying a transition from emergence to implementation. The escalating demand for higher education access fosters the adoption of distance learning methodologies in online education. Moreover, as the efficacy of teaching is contingent on the adeptness of professors in utilizing technology, educators must actively acquire technological skills and seek opportunities for experimentation, subsequently evaluating outcomes based on empirical data (Rezazadeh et al., 2018). Educational provisions and resources are pivotal factors in the educational process; however, devoid of proficient educators, the effectiveness of such provisions diminishes. In conjunction with resources, educators assume a pivotal role in the learning process by demonstrating appropriate scholarly and behavioral attributes. Emphasizing teaching quality can enhance the higher education framework, while understanding the attributes of adept educators can elevate the educational standard. Consequently, the shift towards innovative approaches in higher education has prompted numerous universities to integrate virtual educational technology in course delivery (Barkhoda & Ahmadhidari, 2021). The primary objective of online or electronic educational systems, akin to traditional models reliant on physical presence, is to convey a maximum amount of knowledge from authoritative sources, particularly instructors, to students. Enhancing this process necessitates a systematic evaluation of the degree of goal attainment, or rather, the efficacy of knowledge transmission, through appropriate and valid assessment methodologies. Despite the existence of several models for gauging educational effectiveness in traditional systems, new virtual education systems exhibit fundamental disparities rendering the application of traditional models unsuitable (Pathak, 2016).

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The Corona crisis in Iran and globally has instigated significant transformations across various facets of regular human activities, particularly in the realm of education through virtual platforms. This shift has turned virtual space into a hub for addressing communication necessities, delivering products, and facilitating education.

Recent research findings from the QS Institute reveal that nearly half of the world's educational courses have migrated online amid these circumstances. The emergence of the Covid-19 pandemic has prompted a redefined perspective on life, particularly in educational methodologies worldwide. Conventional teaching approaches have become largely ineffective as educational institutions were compelled to shut down to safeguard students from potential virus exposure. Throughout the ongoing pandemic crisis, the fundamental impetus for upholding social distancing has been a key driver for students enrolling in online classes. Evaluating the efficacy of e-learning and gauging learners' satisfaction levels are crucial amidst this transition to online education in the face of the Covid-19 pandemic. The entire educational framework, spanning from primary to tertiary education levels, has been disrupted during the quarantine period stemming from the 2019 coronavirus outbreak, not only within Iran but on a global scale. Educational establishments worldwide have shuttered due to the Covid-19 pandemic threat, prompting a widespread shift towards digital learning platforms to sustain academic operations.

It is imperative to underscore how educational institutions can effectively transition from traditional to online education through virtual classrooms and other digital tools within this ever-evolving educational landscape. Reviewing research endeavors conducted domestically and internationally underscores a focus on crafting and validating the online education paradigm in exigent circumstances within the higher education system. Noteworthy studies accentuate the viability of the online education model for the higher education sector in challenging scenarios (Gandolfi, 2021; Karami et al., 2012; Mosayebi et al., 2021; Razeghi et al., 2020).

When contemplating the significance and imperative of research, it is essential to acknowledge that virtual education epitomizes the pinnacle of technological advancements in the educational domain. With technological advancements flourishing and solidifying within the realm of learning, experts in this field are compelled to cater to learners' educational needs by introducing electronic learning courses.

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Virtual education has achieved numerous educational ideals, such as the ability to learn anywhere and anytime, engage in cooperative learning, and practice self-evaluation and self-direction (Klašnja-Milićević et al., 2018). This educational approach represents a novel method of establishing an interactive and learner-centered environment, equipped with the necessary tools, that can be accessed at any location and time through the utilization of diverse digital technologies, and harmonized with other educational settings to establish a system of education that is open, adaptable, and decentralized (Karami et al., 2012). In recent times, virtual education has emerged as a significant utilization of modern information and communication technologies globally, leading to widespread implementation in this domain. Given the rapid transformations occurring in the external environment, the integration of virtual systems to introduce innovative services and technologies in the realm of education has been recognized as an essential requirement (Razeghi et al., 2020). With this background in mind, the researcher seeks to address a fundamental inquiry: what constitutes the design and validation of the model of online education in critical conditions for the higher education system?

Material and Methods

From the perspective of the objective, the ongoing study falls into the category of applied research. Given that the subject being examined pertains to the current timeframe and the researcher aims to gather data and information regarding the present state of affairs to attain a more profound and comprehensive comprehension of the current scenario, this research employs a descriptive-survey research methodology. The statistical population under scrutiny encompasses all graduate and doctoral students hailing from five provinces within the country's geographical expanse (including the northern region, the universities in Mazandaran province, the central region, the universities in Tehran, the eastern region, the universities in Khorasan Razavi province, the western region, the universities in East Azarbaijan province, and the southern region, the universities in Hormozgan province), constituting an approximate total of 300,000 individuals. The quantitative section will utilize a one-step cluster sampling method for the sampling process. Based on the population size of 300,000 individuals and in accordance with Cochran's formula, a sample of 384 individuals was chosen. The questionnaire was developed by the researcher, drawing upon analyses and insights from experts, and subsequently disseminated among the targeted sample. Among the various

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sampling methods available, the cluster sampling method is deemed more appropriate than the simple random sampling method in certain scenarios. The data collection methodology comprises a fusion of fieldwork and library research techniques. The data pertaining to the theoretical framework and literature review of this study were sourced through an examination of documentary materials and library resources encompassing articles, as well as Persian and English literature. Post the scrutiny of theoretical foundations, literature review, and expert evaluations, a questionnaire was formulated and utilized to gather the requisite data. The data underwent analysis through inferential statistics. Initially, the distribution normality of the data was assessed utilizing the Kolmogorov-Smirnov test, followed by the utilization of paired and one-sample t-tests to assess the disparity between the current scenario and the SPSS software. Subsequently, upon identifying the factor structure of the model, a PLS structural equation software was employed to conduct a confirmatory factor analysis for analyzing the model's factor structure. In the discourse on ethical considerations, students were reassured that the article is solely a research endeavor, and as a token of appreciation, a summary of the findings will be furnished to them.

Results

Demographic findings show that 53.6% (206 people) were men and 46.4% (178 people) were women in the studied group. In the studied group, 20.1% of the subjects were less than 25 years old, 27.6% of the subjects were between 25 and 30 years old, 30.7% of the subjects were between 30 and 35 years old, and 21.6% of the subjects were over 35 years old. In the studied group, 71.6% were masters and 28.4% were doctoral students. Before the research question is tested, the normality of the variables must be ensured. One-sample Kolmogorov-Smirnov test was used to check the normality of the studied variables. If the significance level is greater than 0.05%, it is a normal variable. Otherwise, the data is non-normal. Therefore, according to the table 1, all variables are non-normal.

Table 1. Descriptive index and statistics of the Kolmogorov-Smirnov test of variables related to research hypotheses

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Variables	N	Test value	P
Online education in critical conditions for the higher education system	384	0.233	0.001
Educational dimension	384	0.208	0.001
Interactions with other virtual training groups	384	0.192	0.001
More time for online training	384	0.226	0.001
Adaptability	384	0.242	0.001
Aesthetic dimension	384	0.266	0.001
Hardware factors	384	0.228	0.001
Reducing barriers to online teaching	384	0.252	0.001
Content dimension	384	0.254	0.001
Online education system management	384	0.244	0.001
Required course materials	384	0.315	0.001
The dimension of extra-organizational participation	384	0.337	0.001
Creating a suitable platform for virtual education	384	0.324	0.001
Customization of service delivery systems	384	0.273	0.001
Proper support of service delivery systems	384	0.207	0.001

In order to test the sub-hypotheses of the research, structural equation modeling with partial least squares approach using PLS software was used. Standard coefficients are used to check the fit of the structural model of the research. The fit of the structural model using standard coefficients is such that these coefficients must be more than 0.3 to be able to confirm them at the 95% confidence level. The higher the value of R^2 related to the endogenous constructs of a model, the better the fit of the model. Chin (1998) considers three values of 0.19, 0.33 and 0.67 as criteria values for weak, medium and strong fit of the structural part of the model by means of the R2 criterion.

Table 2. Determination coefficient (R^2)

Dependent variable	**R^2**	**Intensity**
Educational dimension	0.723	Strong
Aesthetic dimension	0.566	Strong
Content dimension	0.784	Strong
The dimension of extra-organizational participation	0.483	Strong
Mean	0.639	Strong

Predictive quality (Q^2) specifies the predictive power of the model. Models that have an acceptable structural component should be able to predict indicators related to the endogenous constructs of the model. Chin et al. (2020) have defined three values of 0.02, 0.15, and 0.35 to indicate weak, medium, and strong predictive power of the structure or related exogenous structures. It is important to mention that this value is calculated only for the endogenous structures of the model whose indices are reflective.

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Table 3. Prediction quality (Q^2)

Dependent variable	Q^2	Intensity
Educational dimension	0.375	Strong
Aesthetic dimension	0.362	Strong
Content dimension	0.388	Strong
The dimension of extra-organizational participation	0.353	Strong
Mean	0.370	Strong

The GOF criterion is used to check the fit of the overall model that controls both the measurement and structural model parts. This criterion is calculated according to the following formula.

GOF model = √(Communality × (R^2)) = √(0.370 × 0.639) = 0.49

where Communalities is the average value of communal values of each structure and (R^2) is the average value of R Squares values of the endogenous structures of the model. Wetzels et al. (2009) introduced three values of 0.01, 0.25 and 0.36 as weak, medium and strong values for GOF. Tables (2) and (3) show the mean (R^2) and mean (Q2) values, based on which the GOF value using the fitting model is equal to 0.49, which indicates a strong fit.

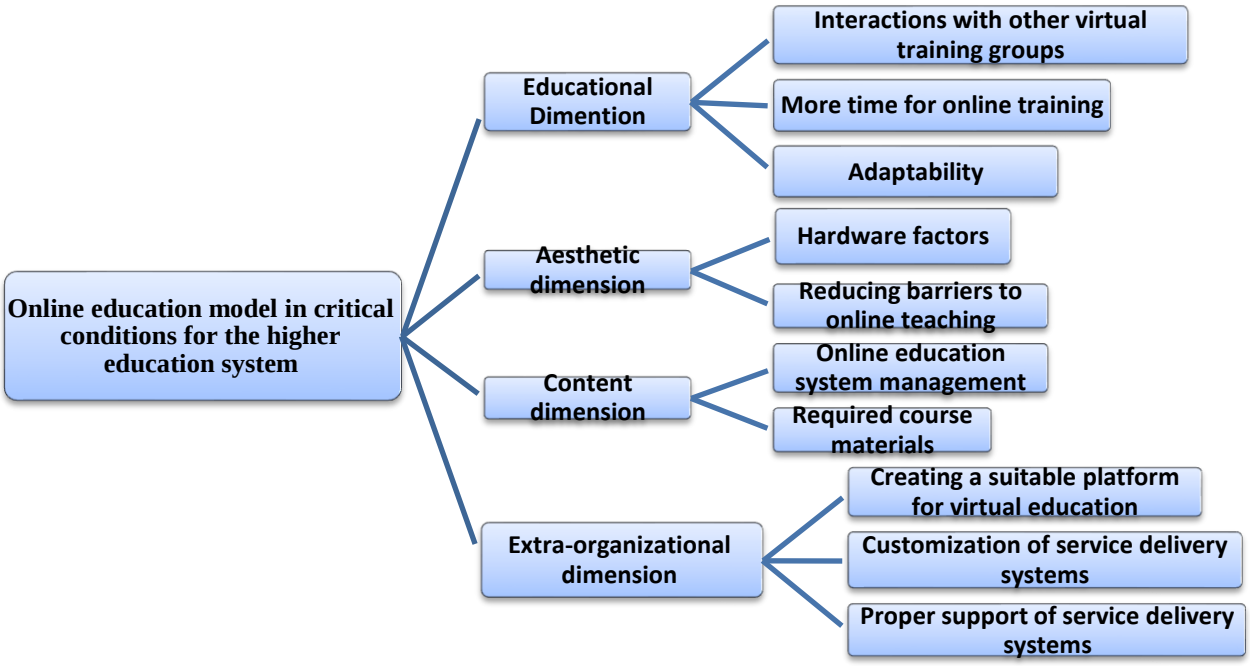


Fig 1. The conceptual model of research

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Discussion

The present research was conducted in order to design and validate the online education model in critical conditions for the higher education system. The results showed that at the end of 2019, the Covid-19 pandemic has disrupted the normal functioning of various activities around the world, including learning and education. The shift towards online education during the Covid-19 pandemic has led many studies to focus on perceived learning outcomes and student satisfaction in this new learning environment. The main goal of online or electronic education systems, like traditional systems based on physical presence, is to transfer maximum concepts from published sources, especially from the instructor, to the receiving student. Although various models have been presented to measure the effectiveness of education in traditional systems, new and virtual education systems have fundamental differences with previous types that make the use of those models inappropriate. During the Covid-19 pandemic, the underlying motivation to maintain social distance has been one of the main reasons for students enrolling in online courses. Understanding the quality of e-learning and the level of satisfaction of learners during this shift towards e-learning is very important in the midst of the Covid-19 pandemic. The results of the average values of shared values and the average values of R Squares; It shows that: the GOF value is equal to 0.49, which indicates a strong fit of the model.

The results of this research with the research results of Gandolfi (2021), Zhang et al. (2020), Mishra et al. (2020), Sahoo (2020) and Sahoo (2020). A learning management system is a powerful resource that focuses on training and professional development for personnel groups, schools, and companies. Online learning management combines database management with a digital framework for managing curricula, teaching tools, and assessment. Although the technology of education management systems has slowly made its way into the traditional education system, the impact of the education management system is felt more than the system of traditional educational institutions. Virtual education can be provided in all universities and higher education institutions. It is only enough that the platform for its implementation is provided based on the production of the presented content, and culturally, the necessary groundwork can be done. To deal with cheating in virtual learning environments, which has become a serious challenge for teachers today, there are several approaches, including culture and creating a platform, and in some others, preventive and punitive measures are used. In fact, in virtual education, one should seek to prepare diverse

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learning opportunities to call the learners to play different roles in the learning process, and during this role, in addition to managing the learning of the learners, it is possible to collect the required data for measurement and evaluation.

Also, virtual education has removed the possibility of better interaction between professors with each other and between professors and students by removing the distance. In this context, Abtahi Forushani et al. (2019) state that the improvement of technical infrastructure, the necessity of two-way interaction between professors and students for the formation of a favorable teaching-learning process and increasing the efforts of students and professors to adapt more to this type of education as the final solutions to increase the quality of use It is presented from the conditions that have arisen. It can also be said that virtual education has enabled the presence of professors from the educational groups of a university or even other universities. Therefore, the introduction of technology in the field of education will not only be limiting, but it can also create diverse learning opportunities. Today, in our country, like other developing countries, the use of the benefits of information networks for learning in universities and schools is expanding, and it can be said that it is slowly passing from the stage of emergence to the stage of application. The increasing demand for access to higher education encourages a distance learning approach to online teaching. In addition, since the quality of teaching partly depends on the competence of professors in using technology. Teachers must actively learn how to work with technology and must find opportunities to experiment. and evaluate the results based on evidence (Rezazadeh et al., 2018).

Among the limitations of the research was the non-cooperation of some graduate and doctoral students from the geographical region of five provinces of the country. Based on the findings of the research, it is suggested that, if possible, for courses that require professors from other educational groups of the university to be used online at the same time as the main professor of the course. Based on the findings of the research, it is suggested that children be involved in the storytelling process so that their motivation to listen to the story is strengthened. The time of the classes should be flexible and even, if possible, it is probable to change the hours of the classes according to the students' requests. Collect useful links from other universities and resources available on the Internet, and if there are necessary software and hardware resources, these resources should be uploaded on the university website. The technical officials should simulate

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the website traffic and servers of the virtual education systems of the university according to the number of students in order to avoid future problems.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving human participants were reviewed and approved by ethics committee of Islamic Azad University. The patients/participants provided their written informed consent to participate in this study.

Author contributions

All authors contributed to the study conception and design, material preparation, data collection and analysis. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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