

Identifying Factors Affecting the Efficiency of Distance Education: A Qualitative Study

Shabnam Khoramirooz¹ , Abbas Gholtash² , Fatemeh Ahmadbeigi³ 

1. Department of Educational Sciences, North Tehran Branch, Azad Islamic School, Tehran, Iran

2. Department of Educational Sciences, Marvdasht Branch, Islamic Azad University, Marvdasht, Iran, Abbas.Gholtash@iau.ac.ir

3. Department of Educational Sciences, North Tehran Branch, Islamic Azad University, Tehran, Iran

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ABSTRACT

Objective: The primary aim of the current investigation was to elucidate the determinants influencing the efficacy of distance education.

Methods: This research employed a qualitative methodological framework. Purposeful sampling was executed utilizing the expert network technique, culminating in the participation of 13 individuals in the interview process. To evaluate the variables pertinent to the study, a semi-structured interview was administered to ascertain the factors influencing the assessment of the efficacy of distance education. An agreement coefficient of 0.78 for the interviews, alongside the Cronbach's alpha coefficient for each variable within the questionnaire, underscores the high reliability of the research instruments. The analysis of the data was based on open, selective, and theoretical coding.

Results: The conclusive findings of the study, derived from the interview data, indicated that the factors influencing the assessment of the efficacy of distance education encompass: 1) causal factors (modern technology; perceived ease of use; suitable educational software; qualified instructors; learner motivation and interest); 2) contextual factors (legislative frameworks and regulations, adequate technological infrastructure, support mechanisms for distance learning, proficiency in information technology, diversity and relevance of content); 3) intervention factors (internet connectivity speed, shortage of skilled personnel, inadequate planning, limited accessibility, unsuitable educational content, procrastination); 4) strategies (planning, resource analysis, facilities and equipment evaluation, training for educators and students, breadth of access to distance learning); Components for appraising the effectiveness of distance learning comprise learner satisfaction with distance education, relevance of content, adequate internet infrastructure, effective evaluation systems, engaging learning environments and outcomes include enhanced access to education, cost savings, improvement in teaching quality.

Conclusions: The findings from the study collectively corroborated and validated the factors influencing the efficacy of distance education.

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Introduction

The abrupt emergence of the novel coronavirus in 2019 precipitated a series of immediate lockdowns globally across all sectors, notably in the realm of education. In light of the extraordinary circumstances engendered by the COVID-19 pandemic, the ramifications on educational frameworks and their components, encompassing schools, universities, educators, and learners, have garnered considerable scholarly interest internationally. Investigative endeavors pertaining to optimal and efficacious pedagogical methodologies and resultant outcomes have constituted a prolific research domain ([Nseobot et al., 2020](#)). As the pandemic persists and its repercussions proliferate globally, an increasing volume of data is being amassed regarding the implications of protracted institutional closures on pedagogical practices. Generally, online education has perpetually been regarded as either an alternative or a supplementary mode to conventional learning ([KIRKIÄ & YAHÄŽÄ, 2021](#); [Nesari et al., 2022](#)). In contemporary contexts, distance learning has ascended to prominence as a critical pathway for professional training and economic advancement within organizational settings. The phenomenon of learning at any location and at any time is feasible only when it incurs lower costs than traditional face-to-face instruction; thus, distance education can become appealing and economically viable for organizations and academic institutions. Undoubtedly, this modality of e-learning can enhance the acquisition of knowledge and competencies. Nevertheless, if the administrators overseeing this form of e-learning neglect to adequately implement relevant adult learning theories, such educational experiences may pose significant challenges for the participants ([Talebzadeh & Hosseini, 2007](#)). Presently, the significance of universities in fostering a modern and progressive society is widely acknowledged. To realize this ambition, the dual focus on cultivating active, responsible, and democratic individuals, alongside addressing cultural, social, economic, and industrial challenges while promoting scientific advancement and expanding the frontiers of knowledge, has become a priority for nearly all universities and higher education institutions globally. As articulated by [Senturk et al. \(2020\)](#), the foundation for the political-economic growth of societies is established within universities and higher education institutions. This is attributable to the dual role of higher education systems as both custodians and transmitters of societal cultural heritage and values, whilst simultaneously responding to emerging social demands in light of advancements in knowledge and technology ([Stufflebeam & Webster, 1980](#)). However, in

response to paradigm shifts within economic and technological domains and the advent of macro trends, contemporary higher education systems are no longer confined to traditional classroom settings; rather, the proliferation of electronic tools has catalyzed a transition from conventional educational formats towards distance education ([Dwiyoogo, 2018](#); [Heidari Sarahi et al., 2023](#); [Samavi, 2022](#)).

At present, considering the embryonic state of distance education evaluation in Iran and the deficiencies identified in its execution, specialized planning, and technical support, the framework of distance education appears to be exceedingly tenuous. Addressing this contradiction necessitates a methodical and principled approach rooted in scientific inquiry, along with extensive research efforts aimed at eliminating barriers and formulating practical strategies that exhibit sustainable efficacy within this distinct environment characterized by its unique attributes. A considerable body of both domestic and international research has investigated the phenomenon of distance education and has engaged in discussions regarding its current status. While certain studies have analyzed the various factors influencing distance education ([Farzaneh, 2014](#); [Zeighami et al., 2024](#)), each of these investigations has approached the subject from a particular perspective. The present research is differentiated from prior studies by its focus on the evaluation of distance education through a data-driven model, which, to date, has not been identified in either domestic or international contexts as offering a comprehensive examination of this topic. It appears that earlier investigations have overlooked this critical aspect, concentrating instead on the evaluation of distance education without adequately considering the factors that influence such evaluations. This research endeavors to establish a framework for assessing the effectiveness of distance education, thereby enabling the procurement of essential data concerning its efficacy, which can subsequently be disseminated to relevant stakeholders, including students, administrators, and policymakers, to address prevailing concerns and facilitate informed decision-making. Moreover, the current study has the potential to pave the way for novel insights in the domain of distance education effectiveness evaluation models within the national context.

Material and Methods

The statistical population under investigation in this study comprises all staff and faculty members affiliated with Islamic Azad University, North Tehran Branch. A sample of 300 individuals was

meticulously selected utilizing Sample Power sampling software, ensuring a margin of error of 0.01%, a confidence interval of 99%, a test power of 80%, and an effect size of 0.05. Ultimately, from the 300 distributed questionnaires, 295 were returned and deemed usable. The analysis of the data for this study was conducted using SPSS and Smart PLS statistical software, encompassing both descriptive and inferential statistical methodologies.

Instrument: The primary approach for data collection in the current study is field research, facilitated through the administration of a questionnaire. The questionnaire is composed of 106 items, encompassing contextual, interventional, causal factors, strategies, consequences, and the variable of distance education efficiency. This instrument is evaluated based on a five-point Likert scale, ranging from "I completely disagree" (1) to "I completely agree" (5).

Results

Table 1 delineates the validity, reliability, and composite reliability of the research variables.

Table 1. Validity, reliability, and composite reliability of the research variables

Factor	Variable	AVE	Alpha	Composite reliability
Causal	Modern technology	0.622	0.798	0.868
	Perceived ease	0.708	0.708	0.837
	Appropriate educational software	0.559	0.702	0.792
	Qualified teacher	0.564	0.704	0.794
	Learner motivation and interest	0.641	0.726	0.843
Contextual	Laws and regulations	0.595	0.770	0.852
	Appropriate technology infrastructure	0.685	0.770	0.867
	Support for distance learning	0.586	0.804	0.809
	Ability to work with information technology	0.680	0.701	0.809
	Variety and applicability of content	0.634	0.702	0.837
Interventional	Internet speed	0.551	0.725	0.829
	Lack of skilled personnel	0.719	0.710	0.836
	Improper planning	0.609	0.702	0.823
	Lack of full access	0.730	0.723	0.842
	Improper educational content	0.550	0.725	0.829
Strategies	Neglect	0.635	0.707	0.838
	Planning	0.784	0.724	0.879
	Resource analysis	0.566	0.715	0.796
	Facilities and equipment	0.615	0.790	0.864
	Training teachers and students	0.657	0.733	0.850
Distance education efficiency	Extent of access to distance learning	0.713	0.700	0.832
	Appropriate content	0.576	0.727	0.800
	Appropriate internet infrastructure	0.623	0.700	0.832
	Satisfaction with distance learning	0.582	0.763	0.849
	Proper evaluation system	0.835	0.803	0.910
Consequences	Attractive learning environment	0.656	0.751	0.828
	Savings	0.703	0.713	0.825
	Better access to education	0.888	0.874	0.940
	Teaching quality	0.685	0.767	0.865

Table 2 elucidates the model fit indices.

Table 2. Model fit indices

Effect	To	R ²	Q ²	GOF
Modern technology	Distance education efficiency	0.598	0.297	0.549
Perceived ease				
Appropriate educational software				
Education				
Qualified teacher				
Learner motivation and interest				
Laws and regulations				
Appropriate technology infrastructure				
Support for distance learning				
Ability to work with information technology				
Variety and applicability of content				
Internet speed				
Lack of skilled labor				
Improper planning				
Lack of complete access				
Neglect of work				
Inappropriate educational content				
Laws and regulations	Strategies	0.720	0.352	0.549
Appropriate technology infrastructure	Strategies			
Support for distance learning	Strategies			
Ability to work with information technology	Strategies			
Variety and applicability of content	Strategies			
Internet speed	Strategies			
Lack of skilled labor	Strategies			
Improper planning	Strategies			
Lack of complete access	Strategies			
Neglect of work	Strategies			
Inappropriate educational content	Strategies	0.189	0.092	0.549
Strategies	Savings			
Strategies	Better access to education			
Strategies	Quality of teaching			
Strategies		0.146	0.071	
Strategies		0.046	0.008	

Given that R² values are 0.598, 0.720, 0.189, 0.146, and 0.046, it can be inferred that these values range from weak to moderate to high levels. The Q² test serves as an indicator of whether the predictive quality of our analysis is adequate to either corroborate or refute the aforementioned hypotheses. The benchmarks for this value are classified as follows: a value of 0.2 is deemed weak, 0.15 moderate, and 0.35 strong. Based on the findings of this investigation, it is evident that the predictive quality of the research hypotheses is moderately impacted. Subsequently, to ascertain the model's quality, we will analyze the GOF test. The criteria for this value are as follows: a value of 0.1 is considered weak, 0.15 moderate, and 0.35 strong. According to the outcomes of this study (0.549), the overall quality of the model is classified as strong.

The outcomes derived from the structural equation model indicated that the causal conditions (namely, modern technology; perceived ease of use; suitable educational software; learner motivation and interest) exert a positive and statistically significant influence on the efficacy of distance education; however, the impact of a qualified instructor on this efficacy was not found to be significant. Furthermore, the findings of the current study revealed that the contextual conditions (including laws and regulations, adequate technological infrastructure, support for distance education, and proficiency in information technology) positively and significantly affect the effectiveness of distance education, whereas the diversity and applicability of content do not significantly influence this efficacy. Additionally, the results indicated that the intervening conditions (such as internet speed, shortage of skilled labor, inadequate planning, lack of comprehensive access, inappropriate educational content, and procrastination) negatively and significantly affect the efficiency of distance education; nonetheless, inappropriate educational content did not demonstrate a significant effect on this efficacy. The findings also indicated that the contextual conditions (including laws and regulations, adequate technological infrastructure, diversity and applicability of content, and support for distance education) positively and significantly influence the strategies employed in distance education, while proficiency in information technology has a significant impact on the effectiveness of distance education. The variables of information technology and laws and regulations did not exhibit a significant effect on the strategies of distance education. Furthermore, the results indicated that intervening conditions (such as the lack of skilled personnel, poor planning, insufficient access, and inappropriate educational content) negatively and significantly impact the efficiency of distance education, while internet speed and procrastination do not significantly affect distance education strategies. The findings also demonstrated that the evaluation of distance education at Islamic Azad University, North Tehran Branch, exerts a positive and significant influence on educational strategies. In conclusion, the findings of the present study revealed that these strategies significantly enhance outcomes such as improved access to education, cost savings, and the quality of teaching.

Discussion

The results of the current investigation indicated that the causal variables (contemporary technology; perceived simplicity; suitable educational software; learner motivation and interest) exert a positive and statistically significant influence on the efficacy of distance education; however, the impact of a qualified instructor on the efficacy of distance education was determined to be statistically insignificant. Within this framework, no prior research was located that specifically scrutinized factors analogous to the findings of the present study, and only comparable studies were subjected to review. [Yaghoubi \(2010\)](#) demonstrated in his research that suitable educational content, the existence of information and communication technology infrastructure, the utilization of software, and the selection of suitable educational media from the viewpoint of virtual students are influential factors contributing to the success of the e-learning system. [Ahmadkhan Beigi et al. \(2019\)](#), in their study entitled "Investigating the Effect of Distance Education on Motivation for Progress and Academic Progress and Quality of Life of Male High School Students in Alborz Province, Karaj," indicated that a significant disparity exists between the quality of life measured at the pre-test and post-test stages. Based on the derived outcomes, it can be concluded that there exists a significant difference in the motivation for advancement between the pre-test and post-test assessments. The findings illustrated that distance learning positively influences the motivation for advancement and academic achievement among students, applicable not only to those who have disengaged from their studies but also as an alternative educational opportunity for all individuals. [Zamani et al. \(2013\)](#) identified in their research that the variables of subjective perception of ease of use, subjective perception of utility, students' attitudes towards utilization, and decision-making regarding usage as effective attitudinal constructs exert positive effects on the acceptance and application of mobile phones for educational purposes at the 0.01 significance level among students. [Howell et al. \(2004\)](#) in their scholarly investigation delineate the primary strategies necessary for achieving the efficacy and effectiveness of distance education. These strategies encompass: 1- Accountability of faculties and departments in the execution of distance education, 2- Provision of requisite information for the successful implementation of e-learning, 3- Encouragement of faculty members to adeptly employ information and communication technology, 4- Utilization of robust incentives for faculty members engaged in distance education endeavors, 5- Enhancement of the quality of teaching and

learning, 6- Establishment of coordination among faculty members, 7- Support for and promotion of research in distance education.

Distance education, when employing contemporary technology, can augment its effectiveness as a result of the perceived simplicity and the application of suitable educational software. In this educational methodology, it is imperative for the instructor to possess the requisite qualifications to fully capitalize on this instructional approach. Furthermore, the learners' motivation and engagement are critical determinants in enhancing the efficacy of distance education. In contemporary society, the progression of technological innovations has led to a marked increase in the adoption of diverse educational methodologies, notably distance learning facilitated through the Internet and specialized educational software. The perceived user-friendliness and the strategic design of educational software, coupled with improved Internet accessibility, have the potential to substantially augment educational effectiveness. The results of the current investigation indicated that contextual factors (such as legal frameworks, suitable technological infrastructure, support for distance learning, and proficiency in information technology) exert a positive and significant influence on the efficacy of distance learning; conversely, the diversity and relevance of content were found to lack a significant impact on the effectiveness of meaningful distance learning. Within this framework, no prior research was identified that specifically examined factors analogous to the results of this study; however, only related studies were reviewed.

The results of the current investigation indicated that the intervening variables (internet bandwidth, insufficient specialist personnel, inadequate planning, lack of comprehensive access, unsuitable educational materials, and procrastination) exert a negative and statistically significant impact on the efficacy of distance education; however, unsuitable educational materials do not significantly influence the efficacy of distance education. In this regard, no previous studies were identified that scrutinized factors analogous to the findings presented in this investigation, and only research of a similar nature was reviewed. Insufficient internet bandwidth, inadequate specialist personnel, improper planning, lack of comprehensive access, unsuitable educational materials, and procrastination may adversely affect the efficacy of distance education. Insufficient internet bandwidth has the potential to diminish both the quality and speed of educational delivery. The absence of specialist personnel may further contribute to a decline in educational quality and content. Inadequate planning and lack of comprehensive access could also undermine the quality

and content of educational offerings. Unsuitable educational materials may similarly detract from the quality and content of education. Finally, procrastination may also contribute to a decline in both the quality and content of educational experiences. Insufficient internet bandwidth may play a detrimental role in the efficacy of distance education. Considering that distance learning frequently necessitates the downloading of videos and educational files, inadequate internet bandwidth can impede the downloading and viewing processes associated with educational content. This can adversely affect learners' concentration and engagement with the educational material. Furthermore, insufficient internet bandwidth may compromise the quality and fluidity of online training sessions, ultimately leading to a reduction in educational quality and comprehension of the subject matter. Consequently, to enhance the efficacy of distance learning, it is essential to mitigate the issues associated with inadequate internet bandwidth. The findings of the current investigation indicated that contextual factors (legislative frameworks, appropriate technological infrastructure, diverse and practical content, and support for distance learning) exert a positive and statistically significant influence on distance learning strategies; however, proficiency in information technology and legislative frameworks do not significantly impact meaningful distance learning strategies. In this context, no studies were identified that examined factors analogous to the findings of this investigation, and only similar research was reviewed. [Zamani et al. \(2013\)](#) discovered in their study that the variables of perceived ease of use, perceived usefulness, students' attitudes toward usage, and decision-making as influential attitudinal factors have positive effects on the acceptance and utilization of mobile phones for educational purposes at the 0.01 significance level among students. [Howell et al. \(2004\)](#), in their research, highlight the principal strategy for attaining the efficacy and effectiveness of distance education. These strategies encompass: 1- The obligation of faculties and departments in the execution of distance education, 2- The provision of requisite information for the successful implementation of e-learning initiatives, 3- The promotion of effective utilization of information and communication technology by faculty members, 4- The application of substantial incentives for faculty members engaged in distance education endeavors, 5- The enhancement of pedagogical and learning quality, 6- The establishment of coordination among faculty members, 7- The facilitation and endorsement of research pertaining to distance education. Coherent and comprehensible rules and regulations governing distance education have the potential to augment the efficacy of distance education

strategies. An appropriate technological infrastructure coupled with robust support for distance education can further facilitate access to this modality of education. Proficiency in information technology is also critically significant for enhancing the efficacy of distance education. Moreover, the provision of diverse and practical content can likewise contribute to the advancement of distance education efficiency strategies.

The results of the present investigation indicated that intervening conditions (such as a deficiency of skilled personnel, inadequate planning, limited access, and inappropriate educational content) exert a negative and substantial impact on the efficiency of distance education, whereas internet speed and procrastination do not significantly influence the effectiveness of distance education strategies. In this regard, no research has been identified that scrutinizes factors analogous to the findings of this study; only related studies have been reviewed. Intervening conditions can adversely affect distance education strategies. For instance, suboptimal internet speed may precipitate a decline in educational quality, while a scarcity of skilled personnel can diminish the caliber of educational content. Furthermore, inadequate planning and a lack of comprehensive access to educational tools can likewise create challenges within the educational process. Additionally, inappropriate educational content may lead to ambiguities and hinder students' comprehension of concepts, while procrastination can diminish student engagement and motivation to participate in the educational process. Nonetheless, these challenges can be remedied through proper planning and the implementation of suitable tools. For example, the utilization of high-quality educational resources, meticulous planning, and comprehensive access to educational materials can enhance educational quality. Furthermore, the development of compelling and high-quality educational content, alongside the application of effective teaching methodologies, can improve students' comprehension and learning outcomes. The findings of the present study indicated that the efficacy of distance education has a negative and significant impact on distance education strategies. In this context, no research was discovered that examined factors analogous to the findings of this study, and only similar studies have been reviewed.

The findings of the present study indicated that strategies exert a positive and significant influence on outcomes (such as cost savings, enhanced access to education, and improved quality of teaching) at a 99% confidence level. In this context, no research has been identified that explores factors analogous to the findings of this study; only related research has been reviewed.

[Ahmadkhan Beigi et al. \(2019\)](#) conducted a comprehensive study demonstrating that distance education positively influences students' motivation for advancement and their academic success, not solely for individuals who have disengaged from formal schooling, but also as a viable secondary educational opportunity for all learners. The efficacy of distance education programs can be influenced by various contextual factors, which in turn can significantly impact the quality and effectiveness of distance education methodologies. For instance, suboptimal internet connectivity, a deficiency of qualified personnel, and inadequate strategic planning may detrimentally affect the educational quality, consequently impairing the effectiveness of distance education approaches. Conversely, the implementation of high-caliber educational tools and resources coupled with suitable instructional content can enhance the quality and effectiveness of distance education methodologies. Additionally, insufficient access, inappropriate educational materials, and tendencies towards procrastination may diminish student engagement with the content, thereby adversely affecting the effectiveness of distance education strategies. In summary, to augment the efficacy of distance education methodologies, it is imperative to focus on enhancing the conditions of the educational environment and the utilization of high-quality educational resources.

Among the limitations inherent in the current study, it is noteworthy that the absence of control over the demographic characteristics of the sample, along with the focus on the staff and faculty members of the Islamic Azad University, North Tehran Branch, warrants consideration. Thus, the generalizability of the findings should be approached with caution. Accordingly, it is recommended that subsequent studies investigate the demographic characteristics of participants, including age, gender, and socioeconomic status, and that research be expanded to encompass other cities and universities throughout the nation. In conclusion, it is advised that meticulous and systematic planning be employed to enhance the quality and effectiveness of distance education strategies, and that high-quality and appropriate educational tools be utilized to improve both the educational quality and the efficacy of distance education methodologies.

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 the 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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