The Impact of Information System Design Quality on E-Learning Systems Performance

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Abstract—Advanced technology-based educational practices have emerged as a constructive growth trend in the sustainable educational market. As a result, using informational communication practices in a developed market has resulted in better communicative approaches during the global pandemic situation. The creation of at-tractive content in the educational process ensured the student engagement level in an empirical manner. The main aim of this re-search is to identify the impact of in-formation systems on quality emergence aspects in e-Learning system performance, understand the scope of the education process using e-Learning systems, identify the impact of in-formation systems on quality design in the e-Learning platform, and evaluate the advantages and disadvantages of the e-Learning plat-form. The Technology Acceptance Model (TAM) has been used for quality assurance and sustainable growth development in educational practices. Advanced information system design with proper monitoring approaches has improved the situation. A model to illustrate the relationship between information systems de-sign and e-learning performance is proposed. The higher the level of quality in in-formation system design, the higher the level of performance of the e-learning system, and thus the higher the degree of learning quality output.

Keywords—learning management system, system development life cycle, information systems design theory, content management system, information and communication technology

1 Introduction

The implementation of the information system in educational and developmental approaches has enhanced a new path to recreate it. Constructive planning for sustainable educational practices has emerged as a constructive structure in the development process. During the COVID-19 pandemic period, educational services have faced a huge loss that has been reflected in global educational standards. Health emergencies and social distancing phenomena have created a high level of obstruction in the service management process. E-learning platforms have provided significant satisfaction in managing learners' educational quality [1]. The e-learning plat-form's significance has provided quick attributes and quick scalability over long-term educational practices. Over the previous 50 years, significant advancements and improvements in educational

activities at all levels have occurred. The COVID-19 pandemic, on the other hand, has presented probably the greatest challenge to any national education system in history [32]. According to Figure 1, the performance rate of online e-learning platforms in 2019 was US $101 billion. However, this situation can be increased to US$167.5 billion within the year 2026 (Figure 1) [2]. A large number of students and educational authorities rely on e-learning educational practices. It also provided a constructive communication strategy. The COVID-19 virus has changed conventional college and university teaching into virtual classes [48].

In addition, despite recent emphasis on integrating technology into education, teachers are resistant to utilizing it in the classroom as an active learning tool [31]. E-learning platforms play an important role in improving the quality of information and thus the learning procedures. Technological advancement is effective in providing learners with various opportunities related to communication and collaboration processes that are effective in improving learning processes. The development of e-learning platforms is relevant to provide more data and opportunities for learners as well as teachers. Because of the quick innovation and growth of e learning, as well as the numerous benefits it provides, many universities throughout the world have implemented e-learning systems. Over the last decade, e-learning has been widely adopted in higher education [36]. The continual growth of internet technologies and mobile applications has resulted in a shift from traditional to new learning and teaching approaches [37]. Over the last three decades, e-learning has been gradually in-creasing and spreading in various learning institutions, demonstrating its capability to be used and embedded in teaching courses partially or totally. Virtual learning is un-deniably becoming a primary focus in higher education institutions in the twenty-first century [38]. In reality, the availability and utilization of online learning content in the e-learning portal have become a serious concern for many academic institutions. The e-learning system is a crucial knowledge source for dealing with unpredictable conditions due to its pervasiveness (accessible everywhere and at all times), affordability, accessibility, and user experience [39]. New automation has helped develop systems that incorporate learning styles. As a result, it guides and supports learners. Part of the developed system is the learning management system (LMS), adaptive hypermedia system (AHS), and intelligent tutor system (ITS). Learning style-based adaptive technologies have also emerged in recent years. Education system (LSAES). The difference from previous systems is that they form a personalized learning sys-tem and technique [42]. COVID-19 is the world's first pandemic in decades, creating many new barriers to learning and teaching for students worldwide. The world has been affected by COVID 19 outbreak, particularly the world of education and academic education systems [47]. As a result, teachers and students are spending more time online than ever before, exploring and learning information, resources, tools, and frameworks for both groups to adapt to online or distance learning [43]. As a result, the primary goal of this study is to determine the impact of information systems on quality emergence aspects in e-Learning system performance. The use of information systems has enriched the content of e-learning practices on the platform. The following objectives of this research are:

- To understand the scope of the education process using of e-Learning sys-tem
- To identify the impact of information systems on quality design in the e-Learning platform
- To evaluate the advantages and disadvantages of the e-Learning platform

The e-Learning platform has played an important role in promoting flexible learning approaches and learner motivation. The e-Learning system's quality management seeks the benefits of long-term performance management and developmental structure [3]. Service quality enhancement and quality management in content structure have emerged as better structures in the service development scope. A model to illustrate the relationship between information system design and e-learning performance is proposed. The higher the level of quality in information system design, the higher the level of performance of the e-learning system, and thus the higher the degree of learning quality output.

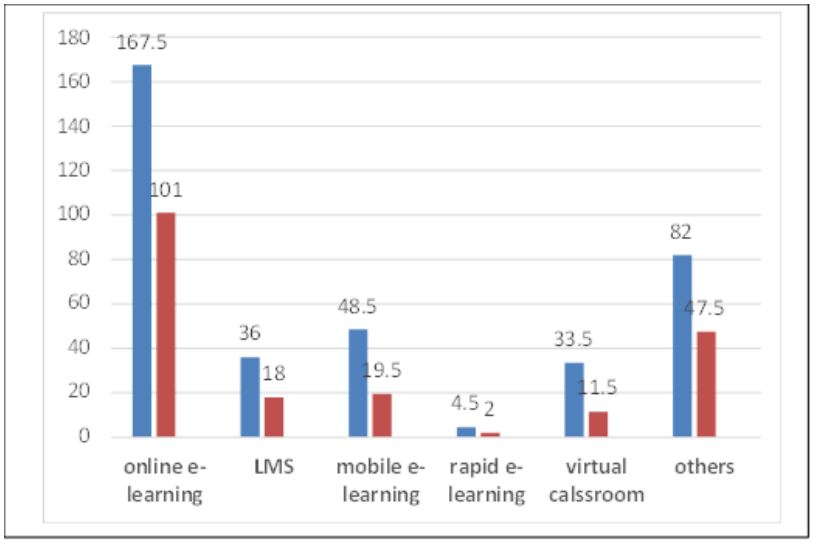

Fig. 1. Segments analysis of e-learning platform [2]

2 Literature review

2.1 The impact of eight dimensions on e-learning system performance

In order to manage the quality of information, different dimensions are identified that have an impact on the learning process. Maintainability, portability, functionality, performance, compatibility, usability, reliability, and security are the main dimensions of the learning systems developed within the e-learning model. Other researchers believe that multidimensional factors can aid in the design of security services within an information system. Maintenance of the e-learning system is effective for managing the

overall data effectively [4]. On the other hand, the modification of the data is effective for the e-learning system to maintain its functionality and overall performance by maintaining the security level in a proper manner. The modification of the e-learning environment is effective in improving the quality of the e-learning process in a proper manner. Several academics regard the technology acceptance model (TAM) as the foundation model, with additional integrated elements geared toward e-learning that can be examined and explored in addition to analyzing behavioral intentions to use it [37]. For a long time, studies on the performance of e-learning systems and their impact on students have been addressed and discussed in the literature. The use of e-learning must be considered from both a technological and a value standpoint. It combines the TAM, which has been used to evaluate user acceptance of modern technology, and the Value-Based Adoption Model (VAM), which has been established to forecast new technology adoption using extrinsic, intrinsic, and monetary effort [41]. A significant number of studies have shed light on various learning processes that are specifically appropriate for a particular field [38].

2.2 Concept of the e-learning process

Electronic learning (e-learning) is a type of education and learning that takes place through computer software and different learning management systems (LMSs) like Blackboard, Moodle, and WebCT. Teachers communicate with their students, grade them, and track their progress using different educational tools [40]. A learning system deals with a formalized teaching process that can be performed through electronic resources. This is referred to as an e-learning process that was carried out using computers and internet services [5].The concept of e-learning is helpful for learners to improve their skills effectively. This can help them manage the study process anytime and anywhere. On the other hand, the schooling system is modified through this process in a proper manner [6]. Four main stages of the e-learning process are identified, including analysis, design and development, evaluation and testing, and an effective LMS hosting process. All these stages are being applied within a concept that can improve the services of the teachers as well as the learners. The connectivism theory is useful in determining the level of development associated with e-learning. Based on this theory, new learning opportunities are being specified by the learners in a proper way. This theoretical support is playing an important role in helping the trainers and learners modify their roles within the educational institute. Most teachers recognized the difficulties encountered during distance learning, particularly in mathematics [34]. This can assist them in modifying their performances during the e-learning process so that they can easily achieve their goals. With the advent of the COVID-19 pandemic. ELearning has become an inevitable technique for institutions of higher learning, imposing alternate learning and teaching process configurations focused on: blended learning, distance learning, online courses, and smart learning. [35]. because the majority of research in the literature proposes novel E-learning methodologies to improve learning outcomes, it is critical to investigate the effects of students' gender on technical abilities. Gender and theoretical expectations regarding E-learning skills [38].

2.3 Development of Information Design System

The information system is being designed using a system development life cycle (SDLC). The complete cycle focuses on different stages that deal with the present stage, the development of requirements, the design of a solution, and the development of the final implementation of the designed solution [7]. Developmental information systems are critical to the ongoing development of any business model. It can help the professionals within the educational system modify their services in a proper manner. The application of advanced electronic training courses is effective in continuing the development of information systems within an educational organization [8]. This type of training process is helpful for individuals to improve their overall services effectively. In an easy way, the Information Systems Design Theory (ISDT) is playing an important role in the services of this system. This type of theory can help trainers and students improve their overall services in a competitive market. This is relevant to achieving their goals in a proper manner based on technological ad-vantages. It is critical to understand whether, during the course of online learning, learners can access the appropriate information about their course of study from the internet in order to achieve the quality and satisfaction they seek [36].

2.4 Effective content of information system in the e-learning platforms

Orientation in e-learning practices has emerged as a more effective method of connecting with different types of learning practices and courses. Purposive developmental growth in constructive learning practices has improved the structure of new con-tent creation approaches [9]. It is crucial to explore how those working in the education sector who execute strategic responsibilities for sustainable education are influenced by the new conditions brought about by the COVID-19 pandemic during this hard and critical era. [33]. Multi-media learning practices have developed better approaches that are related to developmental approaches in market structure. Information and communication technology (ICT) positively contributed to a method that related to the construction management of the service emergence structure under market-level conditions. Problem-solving capabilities and the creative managerial growth of ICT practices have improved the situation for advanced educational practices [10]. The individuals that are relevant to mitigating the learning issues in a proper way develop the Learning Management System (LMS) model. Creating a learning model is more than just putting information on the internet, it also has to make sense and follow learning principles [46]. The development of a specific learning process is relevant to the learning process in order to achieve educational process goals [11].On the other hand; the application of the Content Management System (CMS) model is relevant to improving course content processes effectively. All the solutions within the same educational environment are maintained properly based on a successful learning experience [12]. In all forms of online learning, communication between teachers and students is regarded as a significant difficulty that ultimately affects the degree of knowledge [38]. The utilization of digital technologies has the potential to significantly improve the educational process. Students frequently demonstrate a higher eagerness to participate in the instructional

process while also improving their learning performance [31]. Numerous studies support the idea that adaptable e-learning frameworks based on Learning Styles can help learners in a variety of ways as they learn closer to their desires, needs, and, most importantly, the way they learn. With the use of unused advances and smart gadgets, an increasing number of stages and applications are utilizing versatile e-learning [42].e-Learning changes the nature of teacher-student interaction, demands high levels of motivation and self-discipline from students, opens up new opportunities for ingenious expression in students, implements new ideas and projects, and empowers individuals to evolve [44].

2.5 Literature gap

The previous research papers were able to identify different aspects related to the e-learning process. This can focus on the development of the learning processes within the educational institute. Different theories are being applied to the study that are relevant to improving the quality of e-learning over time. Technological advancements related to the e-learning study model are identified. The issues related to the e-learning process are not specified in this study. On the other hand, the previous re-search papers were not able to focus on the effect of financial structure on the e-learning process. The impact of technological advancement on the e-learning process is also not specified properly. From such perspectives, all of these literature gaps are attempting to be properly identified through this research process. Learning styles provide important support to teachers during the learning process, but personalization presents challenges. Tutors cannot follow traditional methods and provide individualized and adapted lessons based on each student's preferences and needs [42]. Recent technology has authorized the development of systems that help academics design course objects to suit the tastes of their students [42]. e-Learning changes the nature of teacher-student interaction, demands high levels of motivation and self-discipline from students, opens up new opportunities for ingenious expression in students, implements new ideas and projects, and empowers individuals to evolve. The COVID-19 pandemic has clearly disrupted the entire learning process. According to the relevant literature, the magnitude of COVID-19 impact is closely correlated with certain variables such as age, gender, identity, socioeconomic condition, and level of education [43]. A significant objective of e-learning systems is to provide directions that can produce the same or better results than face-to-face learning systems. In order to achieve this goal; more empirical research on the subject has been conducted in recent decades. Consider which variables affect student satisfaction and learning results and examine possible predictors of online learning outcomes [45].

3 Conceptual framework

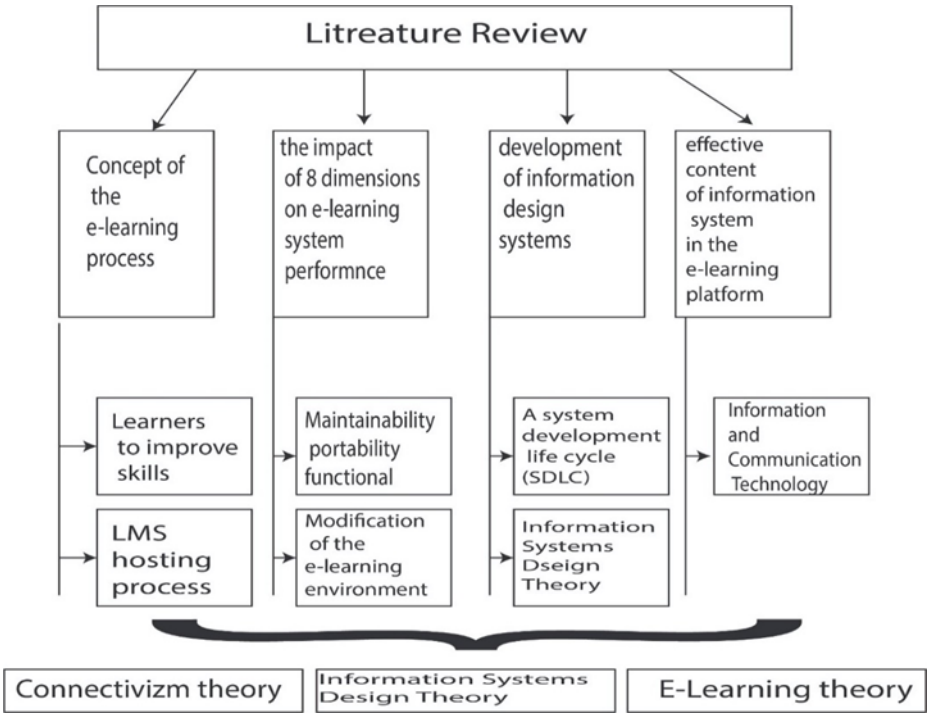

Fig. 2. Conceptual Framework

4 Methodology

4.1 Research philosophy

The positivism research philosophy is playing an important role in conducting this research in a particular way. This type of philosophy is effective at providing different types of factual knowledge that can be gained through the observation method. The changes in the limited data are being specified through this process of research [13]. In this present context, the positivism research philosophy is playing an important role in understanding the roles of learners and trainers over time. This philosophy can assist researchers in conducting an easy interpretation of the collected data related to the study's objective. This process also effectively specifies the law of statements.

4.2 Research approach

The deductive research approach plays an important role in helping the researcher maintain the data within proper premises. The generalized information is also specified

based on the research topic in a proper manner. When evaluating data propositions, various types of theory are properly applied to the data [14].This type of research approach effectively manages various types of data. Through this approach, individuals can modify their level of service effectively within their market position. The structural changes in the e-learning procedure are specified based on this approach in an easy way.

4.3 Research design

Descriptive or qualitative research design is important in the research process because it helps to identify the research process's goals. This research design is helpful for the researchers to explain different perspectives related to the e-learning process to achieve their goals of development [15]. Changes in technology within the e-learning model are having a negative impact on the data required to maintain learner and trainer performance. The evaluation of the data is also helpful for the researchers to figure out different social issues in a proper manner. From this standpoint, the qualitative research design was chosen for this study.

4.4 Data collection

The secondary data collection methodology is utilized by researchers who are interested in improving the performance of technologies in the e-learning process. In this present context, different secondary sources of data like books, journals, articles, and so on related to e-learning platforms are illustrated through this process [16]. This process is effective for managing time as well as cost-effective. The researchers are overcoming the limitations of the financial factors in an easy way. Researchers can collect a variety of data that is effective for conducting data analysis.

4.5 Data analysis

Researchers to achieve their research goals can apply the thematic data analysis process. The changes in the collected data are evaluated through this process, which can help researchers understand the role of learners and trainers in the e-learning process. The changes in the quality information system are also playing an important role in achieving their goals through analyzing the data [17]. The changes in the study materials within the e-learning platforms are also identified through this thematic analysis in an easy way. Modification of the data services can be managed through this process.

5 Finding/Analysis

According to the literature review, major research is unable to focus on the effect of financial structure on the e-learning process. The effect of technological advancement on the e-learning process is likewise not adequately characterized. The following are the important themes to be discussed based on the literature review:

5.1 Quality of information system enriches viewpoint of e-Learning platform

The application of information systems has provided a constructive mood in the educational system enhancement process. However, technological implications and significant performance management aspects have contributed to constructive growth in improving educational practices in the competitive market system [18]. In global aspects, a social networking structure and an effective communication process automatically managed an advanced technology-based service strategy. On the other hand, integrating TAM and DMIS Model approaches collectively affect decision-making approaches in technology-based learning approaches [19]. The technology acceptance model (TAM) has been used for quality assurance and sustainable growth development in educational practices (Figure 3).

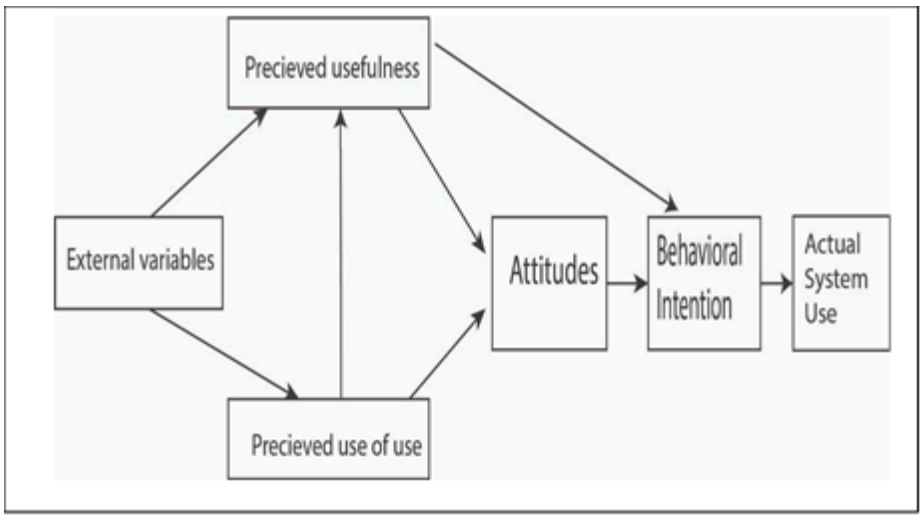

Fig. 3. Technology Acceptance Model (TAM) [37]

It is also effective in the identification of comprehensive approaches that have emerged from a cognitive growth in the long-term service learning process. The development Model of Intercultural Sensitivity (DMIS) structure is attributed to flexible and effective time management approaches in construction development and educational managerial approaches. In the past few years, several evaluations have been done, and each one has given important information about the researchers who helped understand the TAM and how it manages different technologies [37].

5.2 The technological revolution enhanced sustainable growth in modern education practices

Using an e-learning platform in educational services has increased the potential for economic growth in business structures. Entrepreneurship management in the educa-

tion-related business developmental process has improved cognitive stages in the market accumulation process. The introduction of the e-learning platform has reduced the number of child laborers in the global market [20]. Sustainable structural growth enhancement and supplementary knowledge managerial processes related to the educational management process. Financial inclusion after using technology-based approaches in the educational service process has led to better growth in the market's structure.

5.3 E-Learning platforms have opened a new window of education in a pandemic situation

During the COVID-19 pandemic situation, the incorporation of sustainable educational practices into daily life has become a big challenge. As a result, incorporating advanced technological communication systems into education-based service processes has improved cognitive developmental structure growth. The COVID-19 pandemic situation has created a regulatory challenge to the accumulation of candidates and the management of constructive educational practices in service sectors [21]. Technology Acceptance Model (TAM) incorporation in advanced technology-based services has improved constructive growth in the service development process. Online education practices have provided student-centric approaches with flexible content creation during the pandemic situation. The use of constructive methods in e-learning practices has improved the structure for long-term business development [22]. During the pandemic period, the addition of a supply entry precaution in the educational platform provided a safe and secure approach to learning practices. Over the previous 50 years, significant advancements and improvements in educational activities at all levels have occurred. However, the COVID-19 pandemic has presented possibly the most significant challenge to any national education sys-tem in history [32].

6 Discussions

Based on the data analysis, we reached the following model that represents the relation between information system design and e-learning performance (theoretical model) (Figure 4).

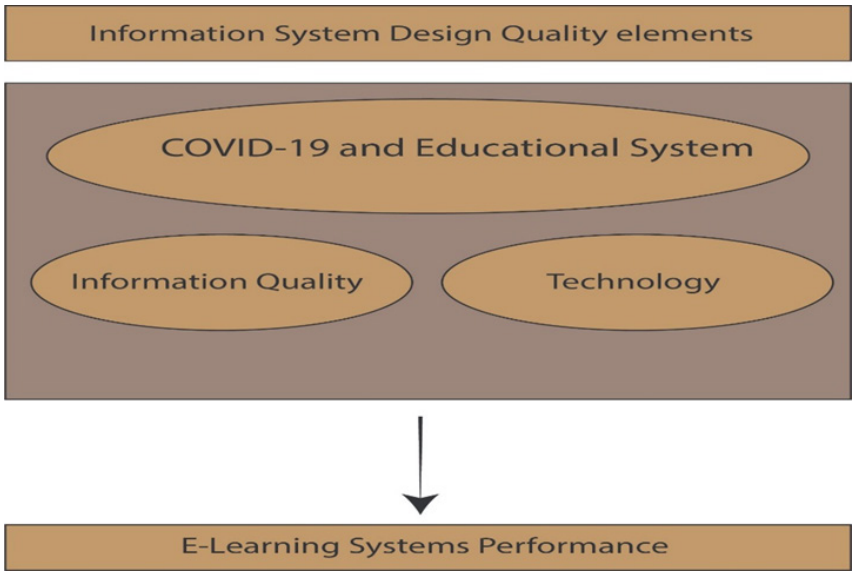

Fig. 4. The relation between information system design and e-learning performance

Information quality, technology, and COVID-19 in the education system are the main elements in information system quality. The following are the effects of the preceding elements on the performance of an e-learning system:

6.1 Information quality

The quality of information is a learning procedure that aims to produce knowledge, skill, and technical aspects throughout the institute. In this present situation of modernization, the online learning system is playing an important role that can help learners improve their level of knowledge. Changes in e-learning platforms are playing an important role in effectively improving information quality. The application of learning software is managed through the modification of different interdisciplinary processes with teachers, authors, and learners (Figure 5).

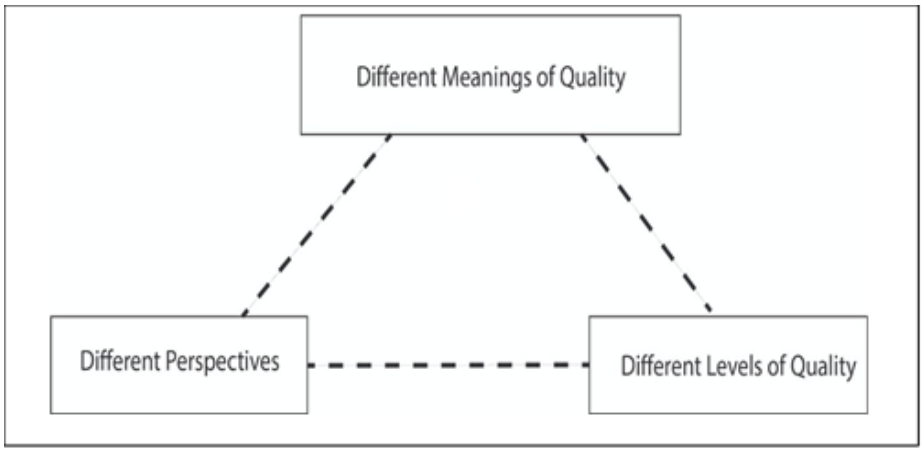

Fig. 5. Quality of information [23]

The quality of information is divided into different levels that have an impact on the learning process of learners. Technological support, tutor support, didactics, cost-effective services, and many more are identified as factors that are having an impact on the improvement of the e-learning procedure [24]. The transparency of the learning process can help individuals modify their services in a proper way. Based on the effective communication process, the individuals are able to modify their services in a way that can provide different types of data to their students. The economic factors are relevant to managing the data effectively to enhance the online e-learning process. The quality standards of data also deal with past data that is effective in modifying the present learning procedures in a proper manner [25].

6.2 Technology

Technological advancement is playing an important role in improving e-learning services, which can provide learners with a vast array of data. This can assist ordinary people in serving the purposes required in educational processes [26]. In this regard, technological advancement is effective in providing learners with various opportunities related to communication and collaboration processes. The application of AI technologies, big data, and machine learning processes is relevant to the transformation of the learning process as well as the e-learning platform. Educational ecologies are changing, and this is helping to create a framework for thinking about educational sustainability. The use of media applications is also successful for researchers who deviate from the traditional learning procedure [27]. This can help to support visualization technologies, which are important for improving learning outcomes.

6.3 COVID 19 and educational system

According to the findings of this study, the COVID-19 pandemic situation is having a significant impact on the educational system and necessitates a significant change in learning procedures. During this, time period, the entire world faced challenges related to the lockdown process. People's social activities, close connections, and economic well-being have suffered because of the COVID-19 pandemic, with everyday life patterns having changed significantly since the outbreak began [32]. The advanced technological communication process can help learners and tutors to serve their purposes effectively [28]. According to We Are Social's 2020 World Inter-net Usage and Social Media Statistics report, the number of individuals accessing the Internet worldwide increased by 7% (298 million additional users) compared to in-formation reported in January 2019, hitting a new total of 4.54 billion users world-wide [33]. The technological development is helpful for the company to manage its overall data effectively. Due to the COVID-19 pandemic, the education system is focusing on different e-learning structures that are relevant to managing company study processes in a particular way. Different kinds of barriers are being specified within a structure that deals with the connectivity of networks, which shows an approximately 40% range, and on the other hand, 32% of technical problems are creating issues for young people to conduct the e-learning process [29]. The application of new technologies is creating some major issues that make it difficult for learners to modify their services in a proper way. The use of smartphones and mobile applications is also included within this structure, which has an impact on the development of quality knowledge [30].

7 Conclusion and recommendations

Technology-based advanced learning practices' incorporation into the market structure has enhanced the growth of educational practices. Innovative technology and advanced systems have managed market emergence and structured supportive growth. Therefore, using advanced information systems in educational practices has increased the structure of learning practices. During the COVID-19 pandemic situation, educational practices have faced a huge loss in comparative advanced technology-based learning practices. Therefore, attractive connection creation with better connectivity approaches has improved the scope of the market condition. Through this process of learning models, the modification of those models can be managed. Using machine-learning approaches can improve the scope of enhancing online education systems all over the world. Awareness creation among students and parents and ethical consideration factors are responsible for better growth and improvement in the comparative market managerial system. In recent years, e-learning companies have faced intense competition in the global market. Therefore, using an advanced information system design with proper monitoring approaches has improved the situation. As a result, future studies should investigate the impact of information system quality as an independent variable that has a direct impact on e-learning system performance. The higher the level of quality in information system design, the higher the level of performance of the e-learning system, and thus the higher the degree of learning quality output.

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