

## Article

# A Proposed Strategy Based on Instructional Design Models through an LMS to Develop Online Learning in Higher Education Considering the Lockdown Period of the COVID-19 Pandemic

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**Abstract:** The COVID-19 pandemic has left more than 1.6 billion children and young people in 161 countries, nearly 80% of students enrolled in education systems globally, out of school. Many countries have resorted to online learning to reduce the repercussions of this shutdown. Many challenges have emerged, the most important of which are infrastructure and communication, and the knowledge of teachers and administrators of the necessary tools and processes are also key factors in providing online learning. In fact, nationwide lockdowns could have been an opportunity to test technological interventions for distance learning. Unfortunately, few systems have reached this point and are ready for implementation. The current study aimed to propose a strategy for distance education using the focus group method to gather the opinions of experts in the field of learning technologies and analyze their responses using text analysis software considering the McKinsey 7S Framework. The study found that the proposed strategy based on instructional design models that use OERs, i.e., blogs, audio recordings, and other resources, can improve the quality and efficiency of learning, provide students with skills, and achieve sustainable development goals in education in the Kingdom of Saudi Arabia.

**Keywords:** instructional design; COVID-19; connectivism; distance education; online learning; learning technologies; LMS; MOOCs



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## 1. Introduction

The COVID-19 pandemic has led to the closure of thousands of schools and universities around the world, and many educational institutions in Arab countries have resorted to the option of distance education, due to the necessity of continuing the prescribed curriculum and filling any educational gap that may result from the aggravation of the crisis [1]. Students and teachers were forced to grapple with an unfamiliar meeting approach, which many found difficult to deal with but was the only way to secure the continuance of any form of education for those living in isolation [2]. There is some evidence that the characteristics of traditional education altered in a short period of time, and it was no longer able to meet the educational system's criteria, accommodate vast numbers of learners at all stages, or allow for new kinds of learning [3]. Hence, many educational institutions have faced unprecedented challenges. Changing the traditional teaching pattern from classroom teaching to teaching via online learning platforms was not easy, especially since we faced the challenge of a culture of change in transforming the pattern of education. In this context, several attempts have arisen to convert several smart applications into remote learning platforms [3]. Tremendous technological advancements have aided in this transformation, which has resulted in a new reality in rethinking the educational system in terms of philosophy, objectives, curricula, and means, as well as studying all future

and expected scenarios in the stage of coexistence with the pandemic and beyond. In this article, we will focus on the challenges created by the COVID-19 pandemic for educational and learning institutions in the Kingdom of Saudi Arabia, the most prominent of which was changing the traditional education method and the trend towards using advanced technologies, which came after the suspension of studies in the classroom as a precautionary measure due to the outbreak of the coronavirus in the country. In Saudi Arabia, e-learning began as a long-term strategy, then became a pressing requirement because of the COVID-19 pandemic, and is now approaching maturity [4]. In some circumstances, such as primary schools that will begin their new year electronically and later transition to in-person study alongside the rest of the country's stages of public education and university education, distance education has become a viable choice [5].

LMS is an acronym for learning management system, which is a digital system designed for online courses and allows for collaborative work between the teacher and the learner. An LMS gives users the ability to create, modify, store, manage, and reuse educational content more effectively, by creating a repository that contains the learning object. It is easy to control, assemble, distribute, and reuse it in a manner appropriate to the elements of the educational process [6]. Innovations in LMSs are happening so continuously and so rapidly in the digital world that universities are struggling to meet the demands of today's learners, who have access to a vast amount of information [6]. Since learners obtain many and varied information in various areas of life, they expect to obtain the same amount of that information in the field of education [7]. In fact, learners prefer learning in active and collaborative environments, and knowing the learners' preferences helps in achieving the best academic performance [6,7].

Through the design of e-learning, there is a need to employ instructional design (ID) models as a kind of practice, development, and presentation of educational products and experiences, consistently and reliably, to provide knowledge efficiently and effectively through attractive and inspiring methods [8]. The process broadly consists of identifying the learner's situation and needs, defining the goal of education, and creating an "intervention" to aid the transition. Although there are many ID models, which greatly help in the design of online content, they were intended for educational design in normal conditions. However, with the existence of crises, especially the complete suspension of study, and the additional effort that this requires, certain issues associated with e-learning limit the effectiveness of the current ID models, which need to be integrated into a new strategy. In this study, we develop a new learning strategy for managing digital content considering crises by analyzing the opinions of education experts and the actual practice of design processes, where we can answer the following questions:

1. What are the educational issues caused by the COVID-19 pandemic?
2. What is the development strategy based on instructional design models to enhance digital learning in Saudi Arabia?

## 2. Literature Review

Educational research aims to support the educational process by formulating curricula and teaching methods considering the philosophy of education and society. The educational experience resulting from the interaction between the students and the environment in which they can respond to it, as well as each learning theory, deals with the process of learning and teaching [9]. The main concepts addressed in this literature review are learning theories, instructional design, instructional design in digital education, and online learning during COVID-19.

### 2.1. Learning Theories for Education Design

In teaching methods, where the concept of the education link has changed at one of its stages of development from the idea that learning occurs through a stimulus and in response to the idea of reinforced behavior, this stage confirms the need to use reinforcers to help the teacher reinforce. Thus, the process of strengthening the learner's experience has

become behavioral by increasing the possibilities of its repetition in the future, by adding positive stimuli or removing negative stimuli after its occurrence instead of being content with throwing, because the teacher is not able to achieve this reinforcement without the presence of a helper [10]. The environment and educational tools help teachers greatly in creating this reinforcement and its educational development [11].

The most common criticism leveled at the behavioral ID models was that they focus on the role of the environment and reinforcers in developing behavior without considering the role of social interaction among learners, and social school scholars have discovered that subjecting the interpretation of human behavior to a set of classical and procedural conditions is a brief explanation of human behavior [12]. As a result, education is a critical human social process that necessitates social contact between students and their peers, and education theories have entered a new phase in which they deal with social theory in education and social constructivism [13].

With the recent development of e-learning technology, other factors have emerged to enhance social learning, including web interaction tools, including the third generation of web tools represented in semantic web, chatbots, blogs, and wikis [14]. Therefore, interaction tools depend mainly on taking advantage of the interactive web as a means of communication, where these tools allow students to present themselves and express their opinions and ideas to others [15]. The Connectivism Learning Theory emerged to adopt a new vision for education in the digital age in a social context, as it saw education as a network of personal knowledge that is created with the aim of engaging learners from all over the world in the educational process, with the aim of building their knowledge and learning interactively as a result of direct communication between them and each other to build their own scientific content without direct intervention from the teacher, thus enhancing the philosophy of student-centered learning [16].

## 2.2. Instructional Design

Instructional design (ID) is a systematic process that aims to plan learning environments according to the systems approach to operate with the highest degree of efficiency and effectiveness to facilitate education and the occurrence of education for students in the light of comprehensive quality standards [17]. Therefore, the connectivism theory invented by George Siemens was not far from ID models, as connectivism theory seeks to explain how learning occurs in online environments based on social networks (blogs, wikis, and discussions) and how it is affected by social changes followed by new technology [18]. Therefore, learning is based on the strength of interactions and connections between group members, as well as making connections between information and specialized knowledge, according to the connectivism theory [19]. Siemens (2005) presented the ID model in the light of connectivism theory in line with the skills of the twenty-first century, which are primarily dependent on the learner and the use of technology and networks. Particularly, Web 3 tools adopt the concept of building nodes and connections, where the nodes represent the information and data available through open learning resources on the network, which are either text, audio, or visuals, and the links are the connections between the nodes. Some of them are supposed to create a personal network with the students [20].

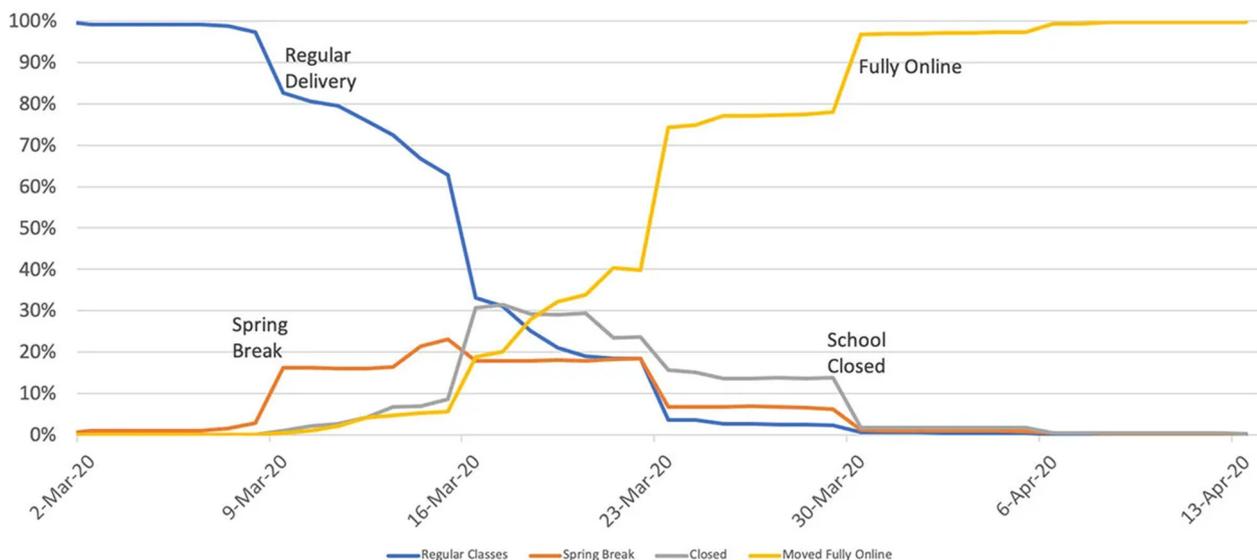
## 2.3. Instructional Design in Digital Education

ID in the digital age is based on describing the outcomes of the educational process, considering the characteristics, tendencies, and learning methods of the learner, when designing learning content for a specific stage [21]. Educational scholars have emphasized the need for a clear and accurate content design model of knowledge, abilities, skills, convictions, attitudes, behavior, etc. that the learner should acquire in the educational process. In the connectivism theory, the situation is very different in design models based on behavioral or constructivist learning theories [22]. Therefore, the ID in the connectivism theory does not give the (prepared) academic content a large role when designing, as the communicative theory considers the student as being active and responsible for their own

learning process within a comprehensive educational system, just as ID in the light of connectivism theory focuses on the learning process, i.e., learning strategies and building social networks (nodes–links). In light of the principles of connectivism theory, students choose content elements from open educational resources on the Internet and the environments in which they participate by making connections on the part of the learner, for example, sharing them through blogs [23]. Therefore, the current research depends mainly on the creativity of students to build their own content with guidance from the teacher, in line with the needs of the twenty-first century, which considers the use of technology and social networks, following the construction of nodes and links between participants for building knowledge, where we find that the environment is a central point. It is built through the nodes that deal with a particular topic by linking the different comments, and the links are formed, so the ability to see the links between different topics, ideas, and discussions is one of the most important principles of networked learning.

#### 2.4. Online Learning during COVID-19

A recent study by Bezerra [24] described how the COVID-19 pandemic forced college and university administrators around the world to innovate new means of offering education while maintaining its high quality. All courses can now use remote techniques for continuity during the academic year. With new challenges and paradigms emerging from this methodological proposal, the user is provided with the feeling of immersion, of being in the classroom, from navigation and interaction in this virtual environment, while the educator, while adhering to educational principles and pedagogical approaches, does not turn this moment into simple distance education. The first serious analyses of the spread of e-learning during the COVID-19 pandemic were created by noted edtech trend-spotter Phil Hill. Figure 1 illustrates that the learning pathways in higher education leaped almost entirely online [25].



**Figure 1.** The spread of e-learning during the COVID-19 pandemic [25].

This rapid transformation required a specific set of specialized skills for instructors. Based on an investigation of instructors' perspectives on virtual university education during the quarantine period, Tejedor et al. [26] did comparative research across three countries heavily afflicted by the coronavirus. Between March and April 2020, the study administered 196 surveys to professors of journalism, communication, and education at the Autonomous University of Barcelona (Spain), University of Torino (Italy), and Technical University of Machala (Mexico) (Ecuador). As a result, the majority of teachers viewed the transition to virtuality as a negative because it was frequently accompanied with an increase in workload. It also required that young university students have basic digital abilities

and that their institutions provide training in the technological and pedagogical-digital component [26].

Moreover, most non-tech teachers jumped into an impressive online mode of education as a result of the quarantine period. However, other challenges emerged, such as “blank screens,” where the lecturer must rely on the students’ response to confirm learning outcomes, as opposed to a classroom where one can assess to some extent whether the students are understanding the transmitted lessons. Nonetheless, for a variety of reasons, only a small percentage of students replied. The way academics have appeared to offer a hand and exchange experiences, know-how, and other forms of assistance to one another may have aided the motivation to lecture online and to learn to use additional tools that are useful for online teaching [27].

In the same context, Khtere and Yousef [3] conducted an extensive study on e-teaching standards at the time of the pandemic, and the study they conducted reached 30 main competencies for teaching and training. These competencies included evaluations of students’ achievements, problem-solving skills, information technology and computer skills, monitoring and motivational approaches, communication, and class management skills, which were all used to determine preparation for online teaching. The findings of their study can be used to build teacher development programs based on individual, departmental, and program or college performance disparities. Furthermore, the stated faculty traits assist higher education institutions in evaluating faculty skills and personal characteristics in order to improve the efficacy of online teaching.

MOOC stands for massive open online courses; it is a new method that enables thousands of students to study remotely and for free in the best universities across the world. The idea of MOOCs is that they are online educational curricula similar to traditional education curricula, where MOOCs have curriculum and content, specific tasks, lectures that are often short videos (6–12 min), access to digital materials, participation in online discussions and forums, course material quizzes, and online educational and training activities [28]. Indeed, MOOCs were successful in achieving the desired outcome during an emergency. They can be a good solution under circumstances where online is the only option and there is additional time for planning and more resources for remote assistance [29].

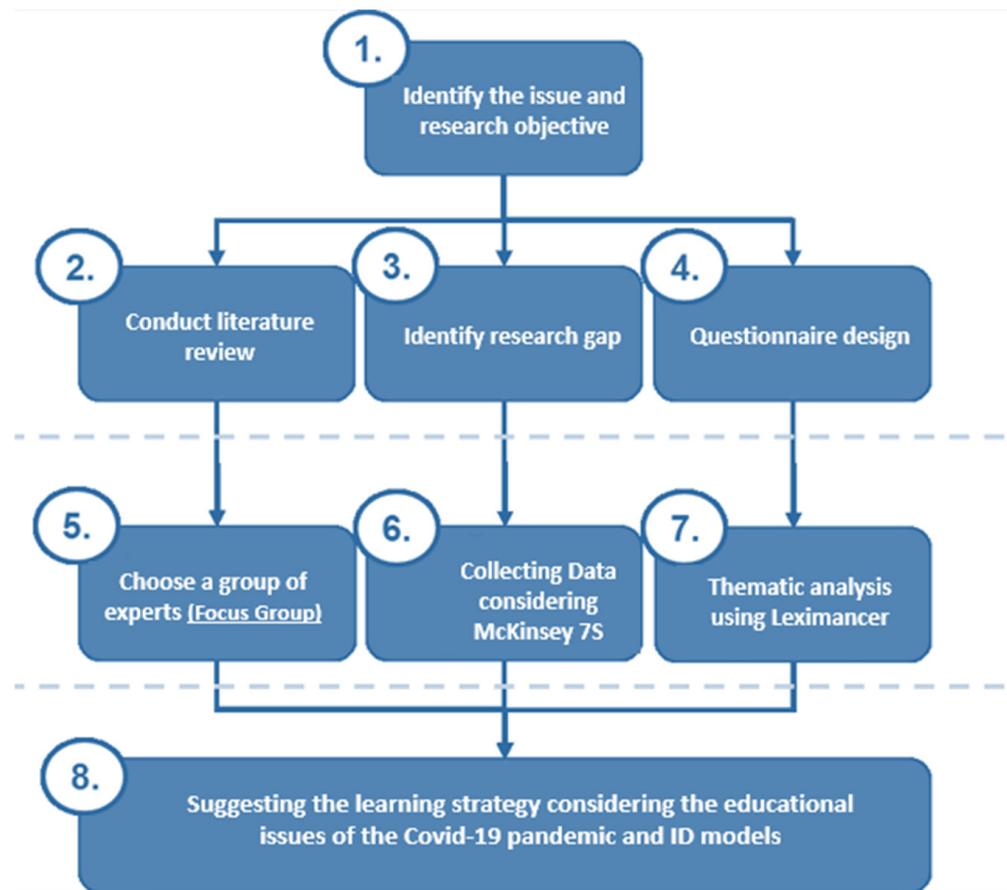
### 3. Methods

This work will provide new insights into the development of novel learning strategies based on ID models. Qualitative analysis, which involves gathering opinions from a group of experts, is a well-known method for determining these issues and suggests new learning pathways for higher education institutions. As shown in Figure 2, our technique comprises eight main tasks. The initial stage was to identify the study goal, which was to develop an online learning method for students in Saudi Arabia. Based on a literature analysis that confirmed the research gap in the current learning design, Steps 2, 3, and 4 are being undertaken partly in tandem and independently of one another. The open questionnaire was then designed, and a panel of experts was invited to participate. This questionnaire depended on specialists with experience in the design and execution of e-learning systems to predict the outcomes of ID scenarios.

#### 3.1. Questionnaire Design

An online open-ended questionnaire has been designed to gather empirical evidence about the educational issues and online learning solutions during the COVID-19 pandemic from a panel of experts regarding the following questions:

- What are the educational issues caused by the COVID-19 pandemic on education?
- What are ID models that lead to the success of e-learning?
- What are the features of the learning strategy for online learning using an LMS?



**Figure 2.** Research method.

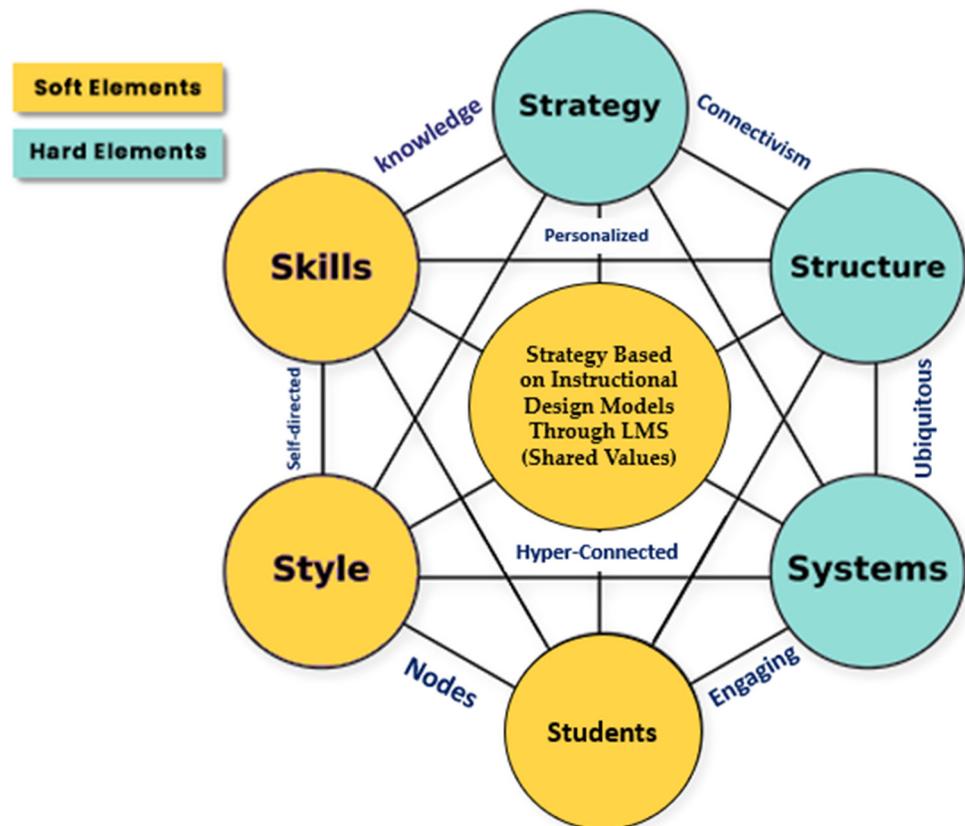
### 3.2. Participatory Experts (Focus Group)

The fifth phase was choosing a group of specialists who would be willing to take part in the open-ended focus group questionnaire [30]. We only requested the presence of professors who had published research or textbooks (in the last five years) on eLearning design, development, or evaluation, those who taught courses about these topics, or those who had responsibilities related to these areas. An invitation to participate in this study was given to 43 e-Learning professionals, and 19 of them accepted, with 15 of them successfully completing the questionnaire. The demographic profile showed that a slight majority of survey respondents were females (53.8%), with almost 70% between the ages of 40–55. The 15 participants in this study were of Arab nationalities, from Saudi Arabia, Egypt, or Oman. The educational specializations were in the field of educational technology and e-learning.

## 4. Results

The responses of the 15 experts were collected, and Leximancer software was used to automatically conduct a coding analysis to identify high-level concepts, presenting the essential ideas and actionable insights of learning challenges through powerful models and interactive visualizations, as shown in Figure 3. Leximancer has the advantage of extracting a populated list from a text document that shows weighted term classifications and linkages between important terms. Considering the analysis of the responses from the experts in Figure 3, we find that their ideas dealt with some related topics that could be analyzed in the light of the McKinsey 7S framework model. This framework was used to identify which elements of the 7-S' the educational system needs to realign to improve performance, or to maintain alignment and performance during other changes caused by COVID-19. These changes could include restructuring, new processes, an organizational merger, and new learning methodologies.



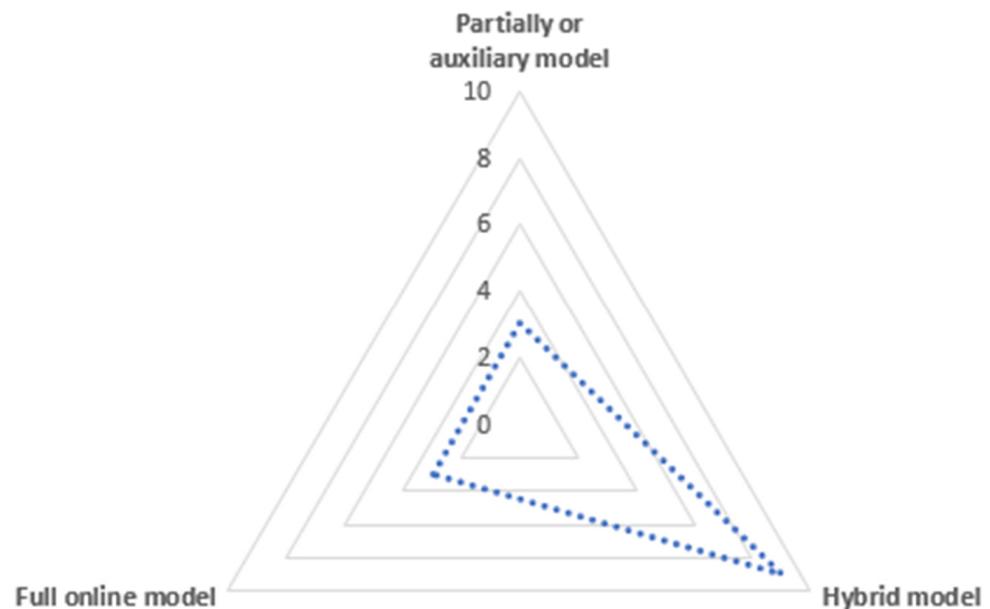


**Figure 4.** The features of the learning strategy for online learning.

E-learning environments vary to suit the diversity of learners as well as the diversity of courses and objectives. However, e-learning should not be dealt with without specifying the strategies used in teaching, i.e., how the educational content is presented to learners, as the e-learning system includes the design of different learning strategies, including third generation web services and online tools for transferring content and events of the learning process [31]. Thus, one of the indicators of teaching quality is the choice of a teaching strategy that achieves the objectives and content of the lesson and fits the needs of the students [3]. Learning strategies include a number of procedures to provide educational content in a way that helps learners achieve educational goals, and these strategies vary according to the goals, as there are many online educational strategies that vary, so there is diversity in the activities carried out by the teacher and student, and it cannot be said that there is one strategy is better than another, as there may be a better strategy depending on the learning environment and the educational conditions, within the limits of certain physical or human capabilities [32]. Therefore, the opinions of experts about the most appropriate options for building a strategy based on educational design models in the light of contemporary educational problems have been analyzed. Figure 5 presents the expert's feedback on the best models on which e-learning can be built.

Through the results in Figure 5, we find that hybrid education has obtained the approval of 60% of the experts. This can be explained by the fact that there is a clear agreement that learning in the classroom is necessary, as is learning via platforms, as hybrid learning is a combination of methods. In the hybrid classroom, students complete part of their work by attending in person and use a virtual learning platform to complete other parts of the class. The way hybrid classes are organized differs from one school or educational program to another. Some schools provide 25–50% of the education inside the school campus or the educational institution, while the rest of the education is done remotely, and in some hybrid classes, students meet once a week [33]. This method of education spreads under special circumstances such as the pandemic conditions or among

people who are looking for more flexible teaching methods, such as employees who receive training programs or supplementary education [34].



**Figure 5.** The best models on which e-learning can be designed in an LMS.

#### 4.2. The Proposed Learning Strategy

Based on the results of the focus group's workshop, a plan for developing e-learning was devised, with three horizontal and vertical levels divided into three categories (low, medium, and high levels). The result in Figure 5 shows that integrating open learning systems into hybrid learning helps to increase the actual value of learning, and this model received the approval of 75% of the experts, whereas providing an LMS as part of the university service came in last place with 7%, because educational material is central and limits students' creativity. Moreover, the main advantage of a MOOC is that it reaches the largest number of students in a shorter time, because, unlike traditional methods, hybrid education does not require the presence of the teacher or the learner at all times, and traditional classroom settings are restricted to a limited number of students at one time [35].

### 5. Discussion

Since its debut in the 1980s, the McKinsey 7S model has been widely used by academics and practitioners, and it is still one of the most prominent strategic planning tools. It aimed to emphasize human resources (Soft S) as a key to greater organizational performance, rather than the traditional mass production tangibles of capital, infrastructure, and equipment. The model's purpose was to show how the university's seven elements, i.e., structure, strategy, skills, students, style, systems, and shared values, could be linked to achieve LMS effectiveness. The model's main idea is that all seven sectors are interrelated, and changes in one area necessitate changes in the rest of the university for it to work efficiently [36]. LMSs differ from one another in that some allow users to use a variety of methods, such as content, activities, networks, linear systems, and branching, others are better at providing synchronous instruction, while others are better at providing asynchronous instruction. Furthermore, while some LMSs can distribute content and allow students to view their marks via mobile devices, others cannot. As a result, trainers must assess which methodologies are currently in use and which may be employed to improve learning in their organizations [37].

The proposed learning strategy utilizing an LMS was based on psychology theories that explain how learning occurs, so the difference in learning theory affected the method used in designing the online learning system. This relied on dividing the levels of e-

learning into three levels: low, intermediate, and advanced. For instance, considering the low level of learning described in Figure 6, the most obvious finding to emerge from the analysis is that the principle that the teacher is the source of knowledge and education takes place through training, practice, receiving information, memorizing it, retrieving it, and presenting information in small parts. Among the patterns in educational software is the pattern of training and practice [38]. On the other hand, one of the world's most famous pioneers of the constructivist theory is Bruner. The theory is derived from the concept of mental construction and assumes that a child gains experiences before entering school and needs help in building and organizing knowledge [39]. Moreover, digital media is a powerful tool that can be used for educational objectives. Thus, media literacy enables us to control, rather than be dominated by, the media, which is why it has become such an important part of the curriculum in higher education around the world [40,41].

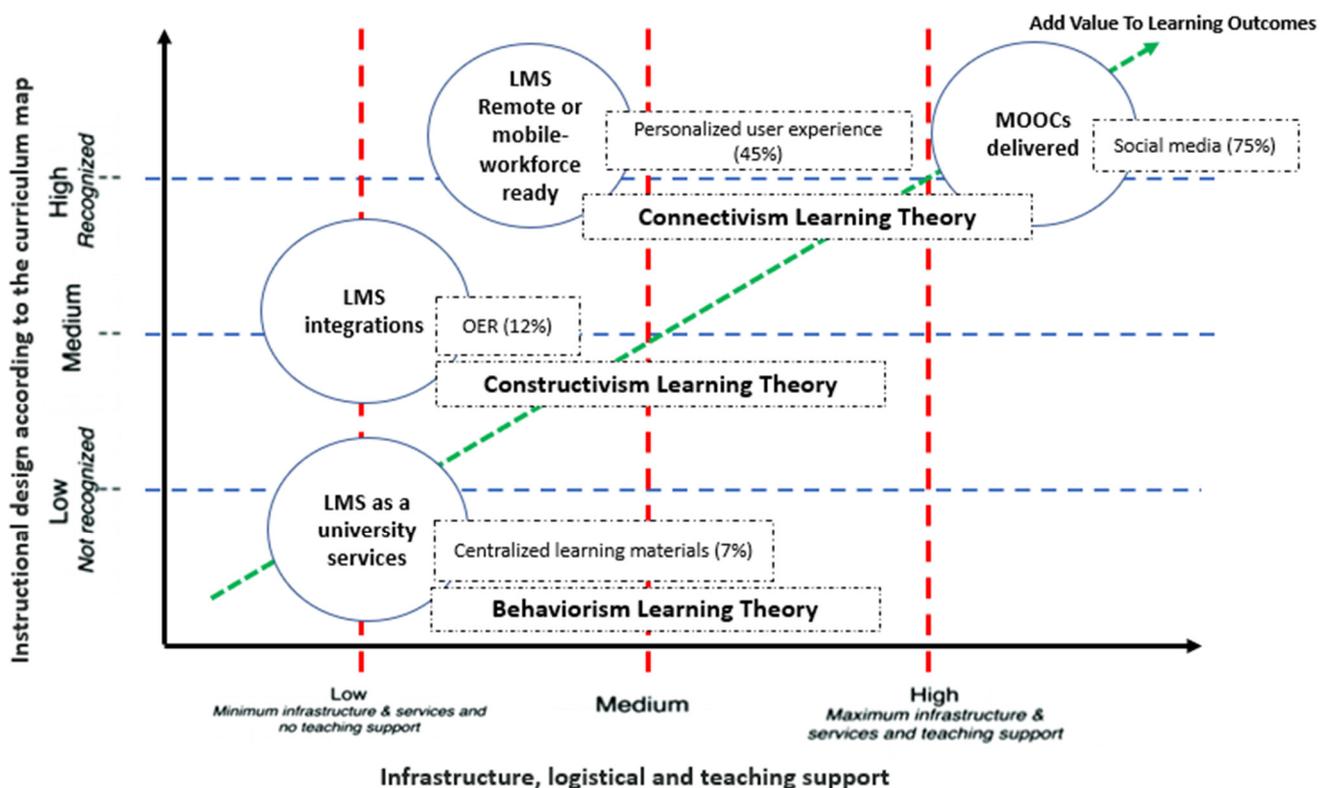


Figure 6. The proposed learning strategies that can be designed in an LMS.

The current conditions that the world is undergoing due to the outbreak of the COVID-19 virus have led to the spread of distance education in many universities and institutes [1]. Online lecture halls have been created through applications that help the lecturer to convey academic content and the educational process with the same quality and effectiveness as traditional methods. Indeed, these new technologies for transferring academic content have helped increase students' creativity and interaction, as they offer new learning methods that suit the needs of this generation, which has a tremendous ability to keep pace with technological progress compared to previous generations [4]. With the complete replacement of traditional education with e-learning, students now need to connect to reality and redevelop their social lives, as many of them have become depressed and have a need for participation in group activities [20]. Therefore, in these social spaces, learning practices are evolving away from "one-size-fits-all, content-centered models" and toward "student-centered models" [42]. The debate over the appropriate tactics for knowledge development in various learning situations continues from various perspectives. Musanti and Pence [43] conducted a series of studies that focused on the function of instructors in knowledge construction in various social environments. According to their findings, how the teacher

creates communication patterns has an impact on how students construct knowledge. They also stated that, in addition to the knowledge-sharing process, students require deeper reflections and critical evaluations to comprehend and generate the deeper meaning of their learning. Moreover, open educational resources (OERs) are teaching and learning resources such as free textbooks, educational materials, audio and video lectures, exams, computer programs, and many other tools or technologies [44]. Open educational resources are available to students as a common public domain that allows the distribution and modification of these resources and cooperation with others for reuse, even for commercial purposes, under special licenses. Considering the findings, this study confirmed that OERs have an impact on how knowledge is produced using the connectivism learning theory.

## 6. Conclusions

Many issues have arisen, the most essential of which is infrastructure and communication, as well as the teachers' and administrators' awareness of the necessary tools and processes in offering online learning. In fact, nationwide lockdowns could have been used to demonstrate when remote learning technology should be used. Regrettably, only a few systems have progressed to this degree and are ready to launch. The current study used a focus group approach to acquire the perspectives of professionals in the field of learning technology, and their responses were analyzed using text analysis tools utilizing the McKinsey 7S Framework. The study discovered that the proposed strategy, which is based on instructional design models that use Open Educational Resources (OERs), e.g., blogs, audio recordings, and other resources, can improve the quality and efficiency of learning while also providing students with skills and achieving the Kingdom of Saudi Arabia's goals for sustainable development in education. These results are in accordance with González-Calvo et al. [45]), who studied new learning procedures and found that students developed sentiments of uneasiness, depression, and uncertainty. On the other hand, by losing on-site classroom attendance and, with it, the essence of those on-site practices, the practicum's training potential and the students' professional identity have been harmed, with potential ramifications for their future professional practices. Thus, educators should consider students' cognitive level, students' behavioral level, and the infrastructure, in addition to their awareness of e-learning [46].

### 6.1. Limitation

Using an e-learning program or switching to another program may lead to significant disruptions within an organization, incurring significant expenses and time, at a time when return on investment (ROI) can be difficult to determine, which calls for a consideration of investment costs in learning management programs and a comparison of the costs of these systems with the costs of managing other departments in the organization. After this comparison, the cost of obtaining them may seem reasonable in view of the budgets of other departments.

### 6.2. Recommendations

Due to the current generation's ability to use the Internet and its interest in modern means of communication, computers, and telephones, e-learning is imperative to show the capabilities and creativity of this generation and for these educational systems to contain many modern methods of learning, where students can view the academic content and information structure anytime and anywhere. This would give them more time to absorb and understand course content with flexibility and without pressure. They would also have more time to discuss the course content in the lecture hall after watching short but useful videos instead of spending a high amount of time in classrooms looking at books and studying notes.

This methodology also improves pupils' self-education and the sense of responsibility that they have for their actions, and it helps them to find solutions to challenges that many have long sought. To learn, a student does not need to go to school or college every day.

Students need to have enough time to interact directly with their peers, teachers, and the outside world, which would encourage them and increase their creativity.

Teachers, on the other hand, must plan and manage all of this and more. As a result, some may believe that the teacher's responsibility has increased dramatically as a result of the implementation of the hybrid education model. That is why selecting distinctive learning or classroom management software is critical. This will assist the teacher in quickly testing learners and recording their results in a database.

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