Pedagogical aspect of e-learning in higher education: A systematic literature review

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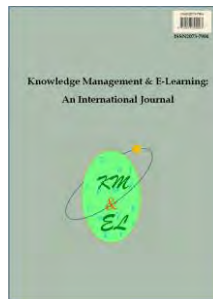
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Abstract: The pedagogy aspect of education has been the key factor influencing the effectiveness and quality of e-learning platforms. However, there is a lack of systematic review with an emphasis on the pedagogical aspect when it comes to e-learning in higher education. This research aims to systematically review seven major databases to identify the existing research studies of e-learning models and theoretical frameworks concerning their pedagogical dimension. Our findings reveal that despite the importance of pedagogical models, only a few articles have incorporated models in their e-learning, and theories are more favoured. Constructivism appeared to be the most important among other learning theories when it comes to the successful implementation of pedagogical aspects of e-learning higher education. Furthermore, we found that the objectives of most studies were audience analysis and instructional strategies. Regarding the factors influencing the student-teacher aspect of the pedagogical component of e-learning, we found several factors that are mainly related to the audience analysis and instructional strategies elements of the pedagogical aspects. Based on these findings, we believe that instructional strategies should be based on teaching and learning theories like constructivism, social constructivism or sociocultural. Finally, we list several existing challenges that can be used as future directions for the successful application of e-learning in higher education.

Biographical notes: Razieh Safarifard is a prominent figure in the field of psychology and education, holding a Ph.D. in Educational Psychology from the esteemed University of Tehran, Iran. She has made significant contributions to the study of pedagogy, e-learning, teaching, and learning, and education. Her research interests also encompass topics such as mindfulness, self-compassion, and anxiety coping in health psychology. Razieh has particularly focused on the design and validation of a model for teaching-learning processes in the electronic platform, conducting an in-depth study at the University of Tehran.

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1. Introduction

e-Learning refers to an educational method that utilizes technology, such as computer-based learning systems, to provide teaching and access to learning resources for all learners. Over the past three decades, e-learning has demonstrated promising results for learners of different age groups, particularly during challenging circumstances like the COVID-19 pandemic, wars, and natural disasters (Alsoufi et al., 2020; Bozkurt et al., 2020; Rajab, 2018; Weldon et al., 2021). In the field of higher education, e-learning has gained popularity as a significant facilitator of the learning process and improved performance for students (Ogbodoakum et al., 2022; Pavel et al., 2015; Turnbull et al., 2021). Whether learners aim to broaden their horizons or earn degrees for future job prospects, e-learning offers the flexibility to pursue education anywhere and at any time.

However, despite its growth and opportunities, e-learning faces challenges related to content management, online exams, and lecture delivery (Islam et al., 2021; Maatuk et

al., 2022). Some argue that e-learning primarily transmits knowledge and may lead to reduced educational effectiveness and social isolation due to the absence of face-to-face classes (Al Rawashdeh et al., 2021). Consequently, high attrition rates in e-learning platforms worldwide highlight the need for models or theoretical frameworks that can control, evaluate, and enhance the quality of e-learning systems (Nicholson, 2007).

The field of education relies on theories, models, and frameworks to guide practice and improve learning environments. Theories such as behaviorism, cognitivism, and constructivism explain learning processes (Anderson & Dron, 2011). Models, such as instructional or curriculum models, provide practical guidelines (Khan, 2005). Frameworks, such as TPACK (technological, pedagogical, and content knowledge), offer systematic approaches for integrating technology (Hosseini et al., 2021; Koehler & Mishra, 2005). While frameworks provide standards, models are more widely used and reliable. Sometimes the terms "*model*" and "*framework*" are used interchangeably. Several models exist that consider various factors or dimensions of e-learning systems, providing comprehensive guidelines to enhance their effectiveness and reduce attrition rates. These models include guidelines for preparing and managing online content, organizing exams and e-learning materials, and addressing pedagogical, technological, ethical, and evaluative aspects (Archambault & Barnett, 2010; Elameer & Idrus, 2011; Hagos et al., 2018; Khan, 2005; Malas & Hamtini, 2016; Seo & Engelhard, 2014; Shaw et al., 2020). Although these models differ in their specific dimensions, they collectively contribute to improving e-learning systems. To provide a more organized overview of the factors and dimensions considered in various e-learning models, we present the following table:

Table 1
Factors affecting e-learning systems in higher education

Framework/model	Main dimensions/factors covered	References
Khan's model	Pedagogical, Technological, Institutional, Ethical, Resource support, Management, Evaluation, Interface design	Khan (2005)
UoMust framework	Pedagogy, Ethics, Evaluation, Technology, Interface design, Institutional, Management, Wireless technologies, Time, Content control, Human resources capacity building, Learner	Elameer & Idrus (2011)
DMDI model	Pedagogical approaches, Digital infrastructure, Stakeholders, Equivalent university experience, Horizon emergent technologies, Online learning design, Learning experiences and gain	Shaw et al. (2020)
Other studies	Various factors or dimensions of e-learning, with four main dimensions commonly agreed upon: Pedagogy, Technology, Ethics, and Evaluation	Archambault & Barnett (2010) Hagos et al. (2018) Malas & Hamtini (2016) Seo & Engelhard (2014) and more

As seen in Table 1, there are four main dimensions that many studies agree upon: pedagogy, technology, ethics, and evaluation (Archambault & Barnett, 2010; Elameer & Idrus, 2011; Hagos et al., 2018; Khan, 2005; Malas & Hamtini, 2016; Seo & Engelhard, 2014; Shaw et al., 2020). Among these dimensions, the pedagogical aspect holds particular

importance as it encompasses students' learning experience, teachers' teaching methods, and the student-teacher relationship. Pedagogy plays a crucial role in both traditional offline education and online environments (Ananga, 2020; Boada, 2022; Castro & Zermeno, 2020; Regmi & Jones, 2020). While many educators claim to be pedagogically driven in their teaching and learning designs, McLuhan (1964) argues that pedagogy is influenced and partly defined by technologies. Anderson (2009) uses the analogy of dance to describe the relationship between pedagogy and technology, where pedagogy specifies the moves and technology creates the music. Some technologies embody specific pedagogies and have a significant impact on learning designs. For example, learning management systems (LMS) require a pedagogical model to manage courses and content, limiting those that lack appropriate content or do not fit into a content-driven course model. The availability of technology can greatly support the delivery of different pedagogical approaches (Ahmed & Opoku, 2022). However, despite the complementary nature of pedagogy and technology, particularly in e-learning, there is a lack of systematic reviews examining the existing research on e-learning systems in higher education from a pedagogical standpoint.

As it is apparent, despite the long history of e-learning environments, there is still a lack of consensus among the educational community regarding a unified e-learning model and its encompassing dimensions and factors. Recent efforts have been made to review e-learning models, examining their objectives, characteristics, strengths, and weaknesses, and proposing enhanced models suitable for higher education. Tham & Werner (2005) conducted a review focusing on the design and evaluation of e-learning systems in higher education, highlighting the importance of addressing institutional, technological, and learner-related issues simultaneously for effective online courses. Similarly, Noesgaard & Ørngreen (2015) developed a model explaining the core factors influencing the effectiveness of e-learning, emphasizing individual motivation and prior experience. In another study, Somayeh et al. (2016) explored the effectiveness of e-learning on learning outcomes and identified general benefits and positive effects on the learning process. Nortvig et al. (2018) conducted a systematic review of factors influencing e-learning and blended learning outcomes, while Bartolomé et al. (2018) found that technology plays a more influential role in higher education research compared to explicit pedagogical perspectives. Alharthi et al. (2019) focused on sustainability requirements for e-learning systems, highlighting the importance of individual aspects while noting the relatively less significant role of environmental and technical dimensions. During the COVID-19 pandemic, Regmi & Jones (2020) performed a systematic review specifically in health sciences education, identifying factors such as learner-facilitator interactions, learner motivation and expectations, user-friendly technology, and learner-centric pedagogy as influencing e-learning effectiveness.

These literature reviews emphasize the need to address the pedagogical dimension in e-learning models to improve the quality of e-learning platforms for higher education. Therefore, this research aims to bridge the existing gap by conducting a systematic review of research studies on e-learning models and theoretical frameworks, specifically focusing on their pedagogical dimensions in higher education.

1.1. The pedagogical aspect of e-learning

Pedagogy involves activities that stimulate changes in learners. Over the past few decades, several definitions of pedagogy have been presented. Watkins and Mortimore (1999)

define pedagogy as teachers' activities aimed at influencing learners' learning. The Department of Education, Employment, and Workplace Relations defines pedagogy as the art and science of teaching and education using instructional methods (Vinson, 2009). Engelbrecht (2003) argues that pedagogy should consider subject matter, learners' needs, objectives, learning theories, interactions, strategy development, and assessment. In essence, pedagogy encompasses the essential steps teachers must take to ensure a comprehensive learning experience during instruction.

Like offline or face-to-face education, the pedagogical aspect of education plays an important role in e-learning (Ananga, 2020; Boada, 2022; Castro & Zermeno, 2020; Regmi & Jones, 2020). Even though many educators consider themselves pedagogically driven in both their teaching and learning designs, McLuhan (1964) argues that pedagogy is influenced and to some extent defined by technologies. Anderson (2009) defines the pedagogical and technological aspects of education using an analogy, he considers it to be a dance, where pedagogy specifies the moves and technology creates the music. Some technologies may embody pedagogies and be more influential (e.g., in learning designs). For instance, in learning management systems (LMS) a pedagogical model is required to manage the courses and content, constraining those that lack content and do not fit into a content-driven course model. Needless to mention the availability of technologies can be of great support to properly deliver different pedagogical approaches (Ahmed & Opoku, 2022). Yet, while both pedagogy and technology are necessary, complementing each other, especially in e-learning, there are little to no reviews on e-learning systems in higher education that systematically analyze the extant body of research from the pedagogical point of view.

1.2. Research questions

To fill the existing gaps and build upon the existing works, we have set three main research questions as below:

RQ1: What are the theories and models used for the application of e-learning in higher education?

RQ2: From a pedagogical perspective, what are the objectives for the application of e-learning models and theories in higher education?

RQ3: What are the important factors influencing the student-teacher aspect of the pedagogical component of e-learning in higher education?

The structure of this article is as follows: the second section describes our systematic method, the third section deals with results, and the fourth illustrates discussions. Finally, section five presents the conclusions.

2. Method

We utilized the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines proposed by Page et al. (2021) to design and conduct this systematic review. The PRISMA guidelines ensure a transparent and rigorous approach to conducting systematic reviews.

2.1. Database and keywords

To review the existing literature on pedagogical aspects of e-learning comprehensively and impartially in higher education, in October 2021, we searched eight major international databases, including Scopus, Web of Science, PubMed, IEEE Xplore, PsycINFO, Taylor & Francis, and ERIC. To ensure the covering of all existing related works, we also conducted a bibliographical search on the final included studies. To do so, we employed several different keyword groups, each tailored to a specific database. This decision was made due to the specific guidelines used by each database, for instance, ScienceDirect's advanced search tool does not allow the use of wild cards, while Web of Science provides this function. Regardless of the database, the core keywords used in our search include:

> *(e-learning OR online OR distance OR virtual OR computer-assisted OR web-based OR internet-based OR technology-enhanced) AND (theory OR model OR framework OR learning model OR teaching model OR instructional model) AND (pedagog* OR teach* OR train* OR curriculum) AND (higher education OR university OR college)*

2.2. Eligibility criteria

To ensure finding highly relevant articles to address our research questions, we defined a set of inclusion and exclusion criteria. The inclusion criteria were mostly predefined and used during the advanced search, while the exclusion criteria evolved during the screening stages. Table 2 illustrates our inclusion and exclusion criteria.

Table 2
Eligibility criteria

	Inclusion criteria
IC1	Publication dated from 1975 to 2021
IC2	Conference publications or peer-reviewed journals
IC3	Conducted in English and accessible
IC4	The study reports at least one model/theory/framework for the integration of e-learning in higher education

	Exclusion criteria
EC1	The study looks at the model/theory/framework for integration of e-learning superficially and lacks details and discussion
EC2	The study looks at the integration of e-learning theory/model/framework from the academic staff's point of view and ignores learners
EC3	Conference publications that were not part of the main conference (e.g., workshop papers)
EC4	More than one version of the study was published in different venues (reporting similar results)
EC5	The study merely revolves around blended learning, flip classroom, virtual course, or game-based learning
EC6	The study merely focuses on some components of e-learning and does not discuss the pedagogical component
EC7	The study only uses evaluation frameworks (e.g., TAM)

2.3. Study selection and data analysis

As shown in Fig. 1, we performed three main selection stages: identification, screening, and eligibility evaluation. After importing the findings to our reference management

software (i.e., Zotero), we employed automatic and manual duplicate searching to find and remove similar studies imported from different databases. During the first screening, two researchers analyzed the suitability of the article's abstracts, and titles, based on our eligibility criteria. If unsure, the articles were sent for a second round of screening. During the second round of screening, the full text of the articles was retrieved and carefully analyzed using our eligibility criteria. During this stage, our exclusion criteria were refined and completed, had we identified any new criteria. Both researchers discussed their disagreements regarding the inclusion of specific articles until an agreement was reached. Once the included studies were finalized, relevant information was extracted by the researchers. Disagreements were resolved by discussion between the researchers.
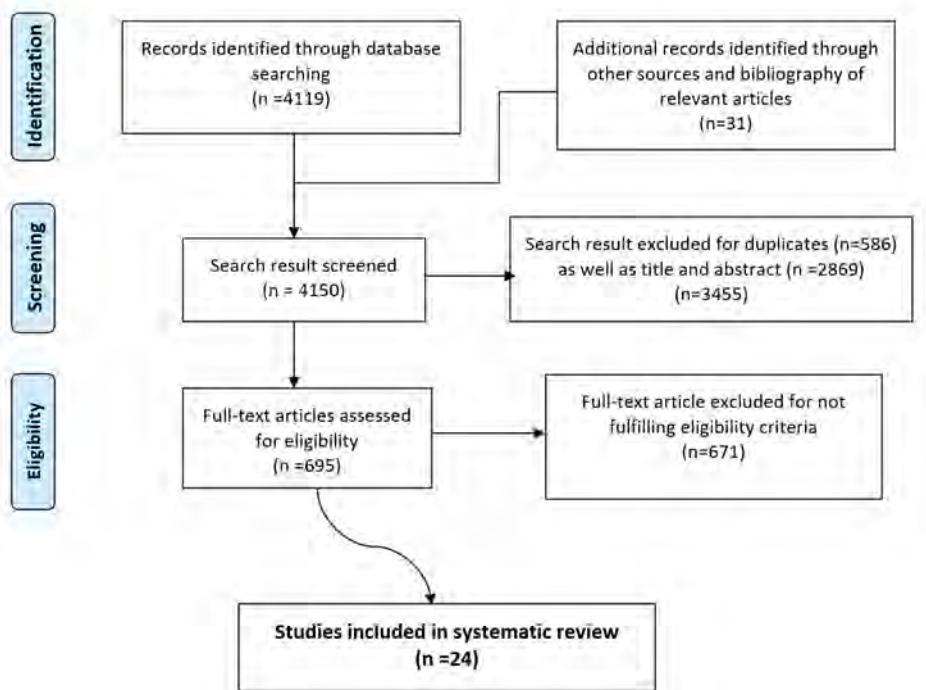

Fig. 1. Study selection procedure

In our systematic review, we extracted various information including article characteristics (e.g., author names, country, year of publication, publication type, and citation), characteristics of the models or frameworks (e.g., objectives, fields of study, types, and participants), characteristics of the pedagogical component, findings, challenges, and future works, among others. We observed a wide range of diverse models and frameworks employed in the reviewed articles. Many of these articles developed their own specific models tailored to the context of their respective universities or educational settings. However, during the initial years of e-learning, a significant number of articles particularly followed a specific model, specifically the comprehensive Khan model. Over time, the models and frameworks evolved towards becoming more specialized, with a distinct focus on the pedagogical component. This specialization allowed for a more detailed examination of the facilitating elements within these models, aligning with the

objectives of this article. Notably, the exploration of challenges and future works played a vital role, and these aspects have been addressed in the concluding section of this article. To provide readers with a comprehensive overview of these findings, the extensive information is presented in the form of a detailed table included in Appendix I.

2.4. Visualization of results

To effectively address our research questions, we utilized bar charts for visualizing the results. Bar charts were chosen as they provided a clear representation of the data in relation to our pedagogical perspective. These charts allowed for the identification of theories and models used for e-learning in higher education (RQ1) as well as the objectives associated with their application (RQ2). The use of bar charts facilitated a comprehensive understanding of the pedagogical aspects of e-learning, enabling us to analyze and interpret the findings more effectively. By visually presenting the data in a straightforward manner, we were able to draw meaningful insights and contribute to filling the existing gaps in the literature.

3. Results

3.1. Characteristics of the studies

Table 3 illustrates the overview of the included articles. We found 24 articles meeting our eligibility criteria, including 22 journals and 2 conference articles.

Table 3
Overview of the included articles

ID	Authors	Publication year	Article title
1	Reeves	1997	A model of the effective dimensions of interactive learning on the world wide web
2	Conole & Oliver	1998	A pedagogical framework for embedding c&it into the curriculum
3	Bradley & Oliver	2002	The evolution of pedagogic models for work-based learning within a virtual university
4	Salter et al.	2004	The 'T5' design model: An instructional model and learning environment to support the integration of online and campus-based courses
5	Khan	2004	The people-process-product continuum in e-learning: The e-learning p3 model
6	McCombs & Vakili	2005	A learner-centered framework for e-learning
7	Dixon & Dixon	2005	Principles of online pedagogical effectiveness: The application of a web-based instructional model
8	Teemant et al.	2005	Modeling sociocultural pedagogy in distance education
9	Koehler & Mishra	2005	What happens when teachers design educational technology? the development of technological pedagogical content knowledge
10	Dabbagh	2005	Pedagogical models for e-learning: A theory-based design framework
11	Hernandez et al.	2007	Creating and deploying effective e-learning experiences using LRN
12	Bailey & Card	2009	Effective pedagogical practices for online teaching: Perception of experienced instructors
13	Farajollahi et al.	2010	A conceptual model for effective distance learning in higher education
14	Elameer & Idrus	2011	Elameer-idrus orbital e-education framework for the University of Mustansiriyah (Uomust)

15	Anderson & Dron	2011	Three generations of distance education pedagogy
16	Khan & Badii	2012	Impact of e-learning on higher education: Development of an e-learning framework
17	Seo & Engelhard	2014	Using the constructivist tridimensional design model for online continuing education for healthcare clinical faculty
18	Andersen & Ponti	2014	Participatory pedagogy in an open educational course: Challenges and opportunities
19	Hernandez et al.	2014	Promoting engagement in MOOCs through social collaboration: common lessons from the pedagogical models of Universidad Galileo and Universidade Aberta
20	Toktarova & Panturova	2015	Learning and teaching style models in pedagogical design of electronic educational environment of the university
21	Ahmed et al.	2017	A learner model for adaptable e-learning
22	Azevedo & Marques	2017	MOOC success factors: Proposal of an analysis framework
23	Chergui et al.	2020	Towards a new educational engineering model for Moroccan university based on ICT
24	Sailer et al.	2021	Contextual facilitators for learning activities involving technology in higher education: The c(sic)-model

RQ1: *What are the theories and models used for the application of e-learning in higher education?*

According to our findings listed in Table 3, the included articles have considered different pedagogical models and learning theories. Overall, 11 articles used pedagogical models, whereas 22 articles considered learning theories in their works. As it is apparent, learning theories are more favored and, despite the importance of pedagogical models, they are somewhat less considered.

We categorized the pedagogical models into Reeve, Khan, TPACK, and learning and teaching styles. Briefly, the Reeves model takes into account general goal orientation, authentic task orientation, instinct motivation, facilitative teacher role, integrated metacognitive support, integrated collaboration, respect for cultural sensitivity, etc. (Reeves, 1997). The Khan main model includes seven dimensions (Khan, 2005, 2019), whereas TPACK models mostly revolve around three dimensions related to teaching, including pedagogical knowledge, content knowledge, and pedagogical content knowledge (Chergui et al., 2020; Teemant et al., 2005). It focuses on both technological and pedagogical knowledge, as well as disciplinary skills. The learning and teaching styles entail Kolb (Kolb, 1984), Myers-Briggs (Myers, 1962), FelderSilverman (Felder & Silverman, 1988), VARK (Fleming, 1995), and Gregorc's Mind (Ahmed et al., 2017; Toktarova & Panturova, 2015).

Behavioralism, Cognitivism, and Constructivism were the main theories used in the included articles. Three, five, and fourteen articles considered behaviorism, cognitivism, and constructivism, respectively. Of those fourteen articles, some employed different versions of constructivism like social constructivism, sociocultural, and learner-centered (Amineh & Asl, 2015; Fatimah et al., 2022; Teemant et al., 2005), whereas others employed zones of proximal development (Andersen & Ponti, 2014; Dabbagh, 2005).

To further investigate the trend in employing pedagogical models and theories during the past decades, we developed a bar chart showing the relationship between pedagogical models and theories with the publication year of the included articles. As Fig. 2 illustrates, until 2015, there has been more focus on employing learning theories in the

application of e-learning in higher education. After 2015, overall, less attention has been paid to using both pedagogical models and learning theories. Additionally, the learning model seems to have been favored and fewer theories have been employed in the application of e-learning in higher education.
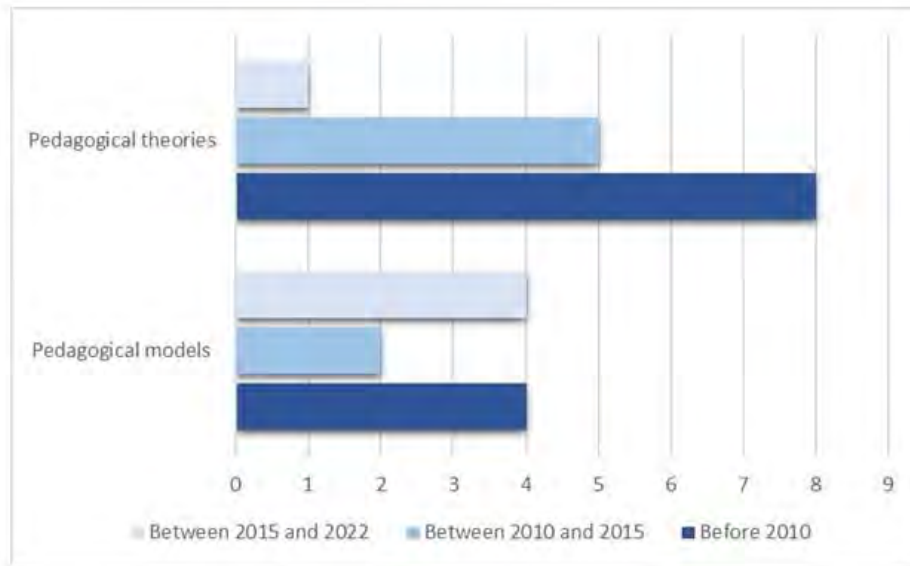

Fig. 2. Focus of e-learning in higher education during the past decades

RQ2: From a pedagogical perspective, what are the objectives for the application of e-learning models or theories in higher education?

To categorize and describe the included articles based on their objectives for the application of e-learning models or theories in higher education, we applied the Khan (2005) framework. The Khan model was selected as it is considered the most comprehensive e-learning model that systematically breaks down the pedagogical model. Regarding the use of Khan's model (2005) in the analysis, it is important to note that Khan's model was originally developed for blended learning environments and includes eight dimensions: content analysis, audience analysis, goal analysis, medium analysis, design approach, organization, learning strategies, and blending strategies. However, in our study focusing on e-learning, we acknowledge that the blending strategies dimension is not applicable. Despite this limitation, we chose to employ Khan's model as it is considered the most comprehensive e-learning model available, systematically addressing various pedagogical aspects. We carefully examined each article to determine if it aligned with any of the seven relevant dimensions of the framework: content analysis, audience analysis, goal analysis, medium analysis, design approach, organization, and learning strategies.

According to our findings, shown in Table 4, audience analysis and instructional strategies were the most frequently targeted elements as they have been the focus of 22 and 19 articles, respectively. For instance, regarding audience analysis, Toktarova and Panturova (2015) proposed considering the effect of learners' learning style – by following models like Kolb and Felder Silverman – on their learning process and adapting specific teaching processes accordingly. Concerning instructional strategies, Salter et al. (2004)

included online support like feedback for the task. On the other hand, organization and goal analysis were only targeted by less than half of the included articles, with 12 articles considering organization elements and 10 the goal analysis. In this regard, Sailer et al. (2021) indicated that the learning content needs to focus on meeting the learning outcome or in other words goal orientation. When it comes to organization, Khan and Badii (2012) highlighted that organization plays an important role in online teaching; and that students need to be able to easily navigate through online courses' websites and identify the required steps that make them successful in the course. Additionally, some studies used a combination of theoretical models (Anderson & Dron, 2015; Azevedo & Marques, 2017; Dixon & Dixon, 2005; Dabbagh, 2005; Farajollahi et al, 2010).

Table 4
Theoretical models and frameworks used for e-learning

Pedagogical model and theories	Sub-categories		Number of articles	Article ID
Pedagogical models	Reeves		2	1, 7
	Khan		4	5, 7, 14, 16
	TPACK		3	9, 23, 24
	Learning and teaching styles (i.e., Kolb, Myers-Briggs, FelderSilverman, VARK, and Gregorc's Mind)		2	20, 21
	Behavioralism		3	10, 15, 22
	Cognitivism (including metacognitive)		5	6, 10, 13, 15, 22
Learning theories	Constructivism (e.g., social, sociocultural, Zone of proximal development (ZPD) and learner-centered)	Social constructivism	2, 3, 4, 10, 17, 19, 22	2, 3, 4, 7, 8, 10, 11, 12, 13, 15, 17, 18, 19, 22
		Sociocultural	8, 18	14
		Learner-centered	6, 7, 19	
		ZPD	10,18	

In addition to the elements listed in the table, some studies proposed other elements enhancing Khan's framework. For instance, Elameer and Idrus (2011) proposed to focus on professional development opportunities for instructors, e.g., support from instructional designers and technology departments. Also, Sailer et al. (2021) suggested adding an element of student-arranged learning opportunities and teachers' knowledge, skills, and attitudes.

To further investigate the relationship between pedagogical models and theories, and the objective of studies, we developed a bar chart showing the relationship between pedagogical models and theories with pedagogical elements. As Fig.3 shows, while audience analysis and instructional strategies have the highest use of pedagogical theories and models, they both have prioritized theory over the model. The primary focus of all pedagogical models has been the use of theories rather than pedagogical models. In other words, overall, most studies prefer relying on pedagogical theories in comparison to models.
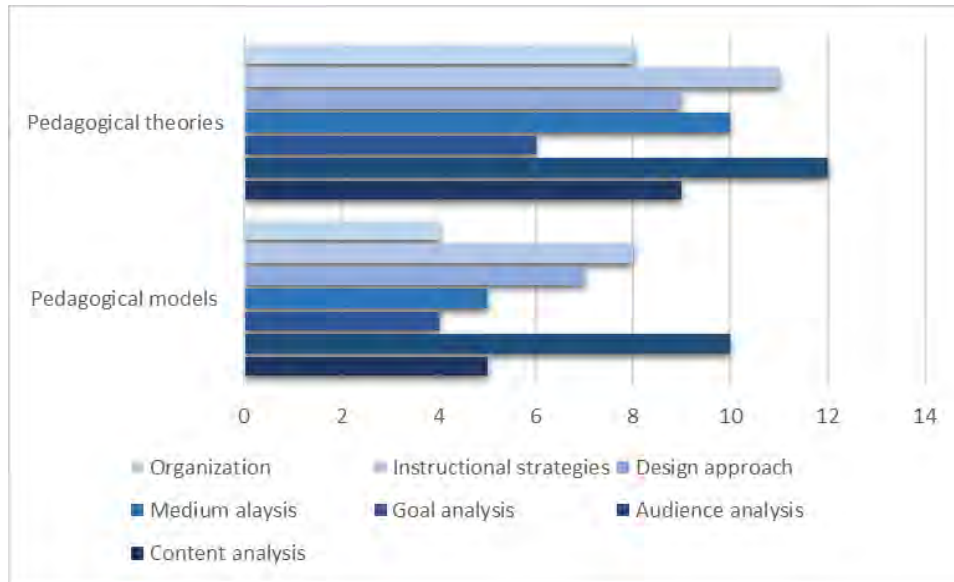
Fig. 3. Objective of articles about pedagogical models and theories

> *RQ3: What are the important factors influencing the student-teacher aspect of the pedagogical component of e-learning in higher education?*

To explore the factors influencing the student-teacher aspect of the pedagogical component in e-learning, we focused on the pedagogical component of the Khan (2005) framework. While Khan's framework offers a comprehensive structure, we aimed to identify additional factors proposed by the included articles that highlight the importance of certain elements within the pedagogical component. Table 5 presents the factors influencing the student-teacher aspect of the pedagogical component of e-learning, as identified in the reviewed articles. It is important to note that not all elements of Khan's framework are represented in the table, as the focus was on the additional factors proposed in the literature. The absence of certain elements in the table indicates that no additional factors were identified for those specific elements within the context of the reviewed articles.

Table 5
Objectives of the studies based on Khan's pedagogical dimensions

Elements	Number of articles	Paper ID
Content analysis	14	3,4,5,8,9,11,13,14,15,16,17,18,21,22
Audience analysis	22	1,2,3,5,6,7,8,9,10,11,12,13,14,16,18,19,20,21,22,23,24
Goal analysis	10	3,6,7,8,9,10,12,13,16,24
Medium analysis	15	2,3,4,5,8,10,11,12,13,14,16,21,22,23,24
Design approach	16	1,2,3,4,5,8,9,10,11,13,14,15,16,20,21,22
Instructional strategies	19	1,2,3,4,5,6,7,9,10,11,12,13,14,15,18,19,20,21,24
Organization	12	2,3,4,7,8,12,13,16,18,20,21,22

Among the elements analyzed, audience analysis and instructional strategies emerged as particularly significant in influencing the student-teacher aspect of the pedagogical component. These elements shed light on various factors that impact e-

learning in higher education settings. More specifically, about the audience analysis element, ten articles recommended additional factors related to training students' skills regarding the use of digital technologies and e-learning, self-assessment activities, student-arranged learning opportunities, self-regulated learning, portfolio component, as well as learner diversity (e.g., Bradley & Oliver, 2002; Dixon & Dixon, 2005; Elameer & Idrus, 2011; Sailer et al., 2021; Seo & Engelhard, 2014). For instance, regarding the diversity factor, while Khan's model emphasizes the importance of cultural debates and how they allow learners to find differences and connections between societies, articles 2 and 6 states that considering differences in social background, culture, and language of learners are essential to have learner diversity (Hariyanto et al., 2020; Conole & Oliver, 1998; Khan, 2004). Additionally, articles 20 and 21 reported that considering the learning style of learners is an important factor in achieving learner diversity (Ahmed et al., 2017; Toktarova & Panturova, 2015).

Table 6
Factors influencing the student-teacher aspect of the pedagogical component of e-learning

Elements	Sub elements	Number of articles	Article ID
Content analysis	-		
Audience analysis	Training students' skills regarding the use of digital technologies and e-learning.	2	14, 22
	Portfolio component	1	8
	Self-assessment activities, Self-Regulated Learning, and Student-arranged learning opportunities	3	3, 17, 24
	learner diversity and learning style	4	2, 6, 20, 21
Goal analysis	-		
Medium analysis	-		
Design approach	-		
Instructional strategies	Supporting learners' and educators' skills of metacognition, emotion, and motivation.	3	1, 4, 14
	knowledge and skills of the teachers, their flexibility, and experiences	4	1, 12, 19, 24
	Conversation-based learning, discussions, exchanges of views, Interactivity and Peer-to-Peer Pedagogy, promoting collaboration and social negotiation, promoting authentic learning activities	6	2, 3, 4, 10, 18, 22
Organization	-		

Regarding the element of instructional strategy, Khan's model emphasizes facilitating discussion among students in a forum as it offers students opportunities to analyze and value alternative ways of thinking, which eventually leads to critical thinking. It further talks about different instructional activities and how they can facilitate learning using digital technologies. According to our findings, shown in Table 6, 13 articles have found and proposed additional factors like considering the knowledge and skills of teachers, their flexibility, and experiences, as well as promoting conversation-based learning, discussions, and exchanges of views, interactivity, and peer-to-peer pedagogy, collaboration, and social negotiation, and authentic learning (e.g., Bailey & Card, 2009;

Elameer & Idrus, 2011; Hernandez et al., 2014; Sailer et al., 2021; Salter et al., 2004). Generally, these additional factors indicate the necessity of including learning theories like constructivism in the element of instructional strategy instructional strategy. Moreover, articles 1, 4, and 14 underscored the need for explicitly supporting learners' and educators' skills like metacognition, emotion, and motivation (Elameer & Idrus, 2011; Reeves, 1997; Salter et al., 2004).

4. Discussion

In this study, we conducted a systematic review of existing studies on e-learning models in higher education, focusing on the pedagogical dimension. Our findings provide valuable insights into the theories, models, objectives, and factors influencing the implementation of e-learning in this context. By analyzing these results from a broader perspective, we can explore their significance and impact on the field.

One of the key findings of our study is the prevalence of constructivism as the most frequently employed learning theory in e-learning. This underscores the importance of creating an active learning environment where students are actively engaged in the learning process and interact with their peers and teachers. The constructivist approach promotes a student-centered and collaborative learning experience, fostering critical thinking, problem-solving skills, and knowledge construction. The significance of constructivism in e-learning becomes apparent as we adapt education to meet the challenges of the modern world. While constructivism played a prominent role, we also found that behaviorism and cognitivism were employed in a smaller number of studies. These theories offer valuable perspectives on learning, with behaviorism focusing on reinforcement and reward-based learning, and cognitivism emphasizing the cognitive processes involved in knowledge acquisition. Although they were less frequently utilized, their inclusion in the e-learning framework can enhance the overall effectiveness of instructional design and support a more comprehensive approach to learning.

Our review also highlighted the importance of pedagogical models in e-learning. While only a few studies explicitly incorporated these models, they offer valuable frameworks for guiding instructional design and delivery. Models such as Reeves, Khan, TPACK, and learning and teaching styles provide educators with a structured approach to aligning learning objectives, instructional strategies, and assessment methods. By integrating these models into e-learning practices, instructors can create more engaging and effective learning experiences that cater to the diverse needs of students. Furthermore, our findings underscored the significance of audience analysis and instructional strategies as essential objectives in the application of e-learning models. Understanding the characteristics and preferences of learners is crucial for designing personalized learning experiences that cater to their individual needs. By tailoring instructional strategies to address the diverse backgrounds, learning styles, and interests of students, educators can create a more inclusive and engaging learning environment. In addition to theories, models, and objectives, our review identified several factors influencing the student-teacher aspect of e-learning, particularly within the elements of audience analysis and instructional strategies. The knowledge, skills, and experiences of teachers, along with the promotion of conversation-based learning, discussions, interactivity, collaboration, and authentic activities, all contribute to a more dynamic and effective e-learning environment. These factors highlight the importance of pedagogical expertise, teacher-student interaction, and the creation of meaningful learning experiences.

Overall, our study has provided valuable insights into the theories, models, objectives, and factors that shape the pedagogical dimension of e-learning in higher education. By analyzing these findings critically, we can appreciate their significance and impact. Constructivism emerges as a dominant theory, emphasizing active student participation and collaboration. Behaviorism and cognitivism provide additional insights into reinforcement-based learning and cognitive processes. Pedagogical models offer frameworks for instructional design, while audience analysis and instructional strategies play key roles in personalizing the learning experience. The knowledge, skills, and experiences of teachers, combined with effective instructional approaches, contribute to the success of e-learning initiatives. Moving forward, it is important to continue evolving and refining e-learning frameworks to align with the changing needs of students and the demands of a rapidly advancing educational landscape.

According to our findings, this research highlights several current challenges and fundamental knowledge gaps that are keeping the area from advancing:

Not properly considering models and theories in the pedagogical aspect of e-learning in higher education. Given the indispensable role of e-learning in higher education in the world, especially during challenging times like the pandemic of COVID-19, it is surprising to see how only a handful of studies considered theories and models related to pedagogical aspects in their e-learning. Based on our systematic review of seven major databases, only 24 articles included theories and models related to pedagogical aspects in their e-learning and had properly investigated its effects in the real world. This shows, that either related studies do not consider the pedagogical aspect of e-learning when it comes to higher education, or they blindly use the existing frameworks without experimenting with their effect on their systems. This could be one reason why there is a high attrition rate for many e-learning systems in higher education. Obviously, there are many practical values to learning theories and educational models in education. Educational theories and models can tell us under *what* conditions and *why* specific teaching or learning methods work in e-learning.

Lack of university-wide staff development regarding the use of e-learning. Despite the immense attention given to advancing e-learning, little care is taken to train staff and audiences of these platforms to use them and their resources more effectively. For instance, instructors are often less competent and lack self-efficacy in using e-learning. Thus, faculty members and educators should be supported pedagogically in designing their learning material, tasks, feedback, and many more. In other words, institutions must consider pedagogical frameworks to provide support for their staff including training to scaffold course development.

e-Learning does not properly consider learner-centered and sociocultural pedagogy. One crucial challenge in moving towards a learner-centered framework is time separation and the distance between students and educators. To have more successful e-learning, they should be equipped with various means to support diverse learners and learning contexts, as well as collaboration at any time and place. Furthermore, sociocultural perspectives of learning should be taken into account. One way to do this is through supporting teacher professional development workshops that provide help in modelling sociocultural pedagogy and understanding learning from a sociocultural perspective. Using the approach of constructivism can increase the continuity of the teacher-learner relationship and help the learner in creating knowledge and changing it continuously.

Ignoring instructors in designing and developing e-learning. Unfortunately, in much extant e-learning, instructors who usually have the practical knowledge to craft e-learning solutions have been ignored. Designing effective and meaningful e-learning requires a grounded design approach coming from practitioners' knowledge and experiences. E-learning developers and instructors should be aware of the much-needed theoretical foundation and be able to collaboratively connect theory to practice in instructional designs. In other words, for effective teaching, there is a need for the cooperation of multimedia educational design specialists.

Ignoring the engagement and communities of students. Implementing peer-to-peer learning is difficult and while students are given the chance for peer learning, it does not necessarily improve their learning experience. E-learning platforms should incorporate a participatory approach to learning that engages students in the learning process by creating tasks that are meaningful to them. The class structure based on constructivism allows learners to participate in the class and reinforces this sense of autonomy. This educational context increases the internal motivation of the learners and makes them engaged in learning activities.

Lack of a clear road map for students' self-regulated learning skills: Even though numerous research studies have provided evidence on the immense role of self-regulated learning skills on learners' learning performance, and the need for explicit facilitation of these tasks, many e-learning platforms ignore considering self-regulated learning in their design and development (Hooshyar et al., 2020). Moreover, there are not many e-learning platforms that promote self-regulatory skills during the learning process using pedagogical tools and interventions. It is necessary to build pedagogical tools like goal setting, deflection tools, prompts, self-assessment, and many more to properly enable students to enact these self-regulatory skills during the learning process.

Need for a unique pedagogical model for each university based on technological differences and students' and teachers' differences. Many e-learning systems across the world have employed well-known frameworks like Khan in the development of e-learning systems. While effective, these systems fail to consider the cultural and societal differences, differences in learning styles of students, and many more. As the findings showed, the necessity of a conceptual framework for e-learning is essential. This framework should be based on the possibilities and requirements of the specific learning system and pay attention to the characteristics and skills of learners and teachers.

4.1. Limitations

We have employed the eligibility criteria to constrain our references. For instance, we only considered studies focused on higher education that included a pedagogical model or theory in their e-learning. Without making this restriction, we would have been dealing with a much larger number of articles. Moreover, we excluded articles that did not have proper experimentation in their study or investigated models or theories for the integration of e-learning, in a superficial way. Finally, we did not consider those articles with evaluation frameworks like TAM or those that revolve around blended learning, flip classrooms, virtual courses, or game-based learning. It is worth mentioning that systematically reviewing evaluation frameworks, models, and theories of e-learning in one single article is impossible.

5. Conclusions

In this research, we designed and carried out the first-ever historical systematic literature review of the pedagogical aspect of e-learning models and theoretical frameworks in higher education. In doing so, we employed PRISMA guidelines and systematically searched seven major databases to ensure that they cover all existing related works since 1975. We carefully specified the eligibility criteria and performed two screening stages. Accordingly, of 4150 articles, we found 24 articles meeting our eligibility criteria.

Regarding our first research question, we found that learning theories are more favored, and despite their importance, pedagogical models are somewhat less considered. A further analysis using heatmap visualization revealed that while there are fewer studies employing pedagogical models and theories in applying e-learning since 2015, theories seem to have been ignored as only two studies employed them in the past seven years. Concerning our second research question, we found that audience analysis and instructional strategies were the main objectives of most articles, whereas audience and goal analysis were the objectives of a few articles. This finding is in line with the use of the constructivist approach which is helping learners to fully understand and internalize the subject. Perhaps this is the reason why learning strategies for e-learning have been proposed in recent years so that the learner can use them to learn more deeply. Further analysis revealed that studies with objectives of audience analysis and instructional strategies give more attention to using theories rather than pedagogical models. With regards to the third research question, we found additional factors influencing the student-teacher aspect of the pedagogical component of e-learning that needs consideration in e-learning. These factors are related to audience analysis and instructional strategies, for example considering the knowledge and skills of teachers, their flexibility, and experiences, as well as promoting conversation-based learning, discussions, exchanges of views, interactivity, peer-to-peer pedagogy, etc. Based on these findings, we believe that the successful implementation of e-learning requires special attention to additional factors like experiences, knowledge, skills, and attitudes of teachers. Needless to mention that following a learner-centered approach that places learners at the center is important.

Finally, we found several existing challenges that require attention when it comes to the successful implementation of e-learning in higher education. These include a lack of considering pedagogical models and theories, a lack of university-wide staff development for utilizing e-learning, a lack of proper consideration of learner-centered and sociocultural pedagogy, ignoring instructors in designing and developing e-learning, a lack of a clear road map for supporting students' self-regulated learning skills, using the same content as face-to-face learning, and finally, the need for a unique pedagogical model for each university based on technological differences and students' and teachers' differences.

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Appendix I

Extension of Table 2 Overview of the included articles

ID	Authors	Article Title, Year, Type, Citation, Country	Objectives	Model and Theory Used	Characteristics of the Pedagogical Component	NEW Pedagogical Component	Challenges and future work
1	Reeves	A Model of the Effective Dimensions of Interactive Learning on the World Wide Web, 1997, {J}, 111, USA	The paper aims to present a model that explains the factors influencing learning in a higher education setting when utilizing the World Wide Web (WWW) as a learning environment.	The paper introduces its own model, specifically focused on learning through the World Wide Web (WWW).	This article proposes a model for interactive learning on the World Wide Web (WWW)	For student and learning: Teacher Support; Metacognitive Support; Opportunity to Construct Learning; Task Ownership; Sense of Audience; Knowledge and Skills; Mental Models	Challenges: Developing unconventional WWW applications in higher education poses significant challenges. Future work: Encouraging more educators and students to embrace and contribute to this innovative approach.
2	Conole & Oliver	A pedagogical framework for embedding C&IT into the curriculum, 1998, [J], 130, London, England	This paper proposes an effective methodology for integrating communication and information technologies (C&IT) into the curriculum, emphasizing the need for staff development and training to ensure successful implementation.	Open Learning Foundation framework	The framework consists of four interrelated elements: institutional infrastructure, learning environment, human and institutional relationships, and learning materials.	Mutual understanding and knowledge are crucial in e-learning. Descriptive information about participants enhances the pedagogical process. The teacher sets the framework, and students operate within it.	Overcoming institutional barriers and fostering a culture of innovation in integrating C&IT at all levels within universities, including staff development and training, to effectively utilize new technologies and resources.
3	Bradley & Oliver	The evolution of pedagogic models for work-based learning within a virtual university, 2002, [J], 55, England	To demonstrate the design of online courses that effectively address pedagogic issues and cater to the needs of stakeholders in work-based learning, utilizing a holistic pedagogic model adopted throughout a large-scale project in the virtual university domain.	Flexible learning, Socio-constructivist learning, Experiential learning, Pragmatic synthesis	The article presents a pedagogic model for work-based learning in a virtual university, incorporating master-level modules with adaptable structures, learner choice in study pathways, online discussions, comprehensive learner support, and a combination of self-assessment and tutor-marked assessments for credit allocation.	Delivery system: Provides structure while allowing learner choice of study pathways within modules and units. Online discussions and exchanges: Integrated into the materials, enabling learners to post their views or results, share them with others, and engage in discussions. Learner support structure: Combines online tutor feedback, in-company mentorship, and regional facilitation. Assessment approach: Includes self-assessment activities with computer-generated feedback or model answers, tutor-marked assessments, and credits awarded on a module basis.	Challenges addressed: Flexibility for work-based learning, coherence of accreditation pathways, appropriate use of online learning opportunities, and training needs of project teams. Future work: While the final pedagogic model is more robust, it should not be seen as a definitive example of 'good practice' for other projects. Instead, the appreciation of the evolutionary process outlined, and the lessons learned would be most valuable to future projects.
4	Salter et al.	The 'T5' Design Model: An Instructional Model and Learning Environment to Support the Integration of Online and Campus-Based Courses, 2004, [J], 97, Canada	To help faculty members design pedagogically sound online courses	T5 Design Model	The T5 Design Model is used to support the integration of online and campus-based courses	The T5 model is an instructional approach that focuses on Tasks, Tools, Tutorials, Topics, and Teamwork. It emphasizes engaging students in learning tasks, producing deliverables, and receiving feedback as the main vehicles for learning.	Meeting the demand for technology integration in teaching requires support and guidance for faculty in designing effective online courses. Institutions should provide an online learning system with a pedagogical framework, tools for active learning, and training to promote innovative online course development
5	B. H. Khan	The People—Process—Product Continuum in E-Learning: The E-Learning P3 Model, 2004, [J], 0, USA	The purpose of this article is to discuss the stages of the e-learning process, focusing on the roles of the e-learning team in developing and delivering e-learning materials, using the People-Process-Product Continuum (P3 Model) as a framework for understanding the comprehensive nature of e-learning.	Khan Framework	The article introduces the E-Learning P3 Model, which encompasses the People—Process—Product continuum in the context of e-learning.	In e-learning, individuals play a crucial role in developing and delivering e-learning materials to a targeted audience. This process involves the interplay of People, Process, and Product, which are also evident in Khan's pedagogical elements.	Challenges: Increasing competition in the e-learning market requires institutions to effectively market their courses/programs to attract and recruit students. Future work: Developing innovative marketing strategies to differentiate and promote e-learning offerings in a competitive market.
6	McCombs & Vakili	A learner-centered framework for e-learning, 2005, [J], 560, USA	The purpose of this article is to present a learner-centered framework based on research-validated principles and address concerns through a review of relevant research. The framework encompasses cognitive, metacognitive, motivational, affective, developmental, social, and individual-differences factors, providing recommendations and implications for each domain.	American Psychological Association's Learner-Centered Psychological Principles	The framework is based on the Learner-Centered Psychological Principles developed by the American Psychological Association. It encompasses 14 key principles that address various aspects of learning, including the nature of learning, goals of learning, construction of knowledge, strategic thinking, thinking about thinking, context of learning, motivational influences, intrinsic motivation, motivation and effort, developmental influences, social influences, individual differences, learning and diversity, and standards and assessment.	Motivation plays a vital role in learning, influenced by emotional states, beliefs, interests, and thinking habits. Intrinsic motivation, driven by creativity, curiosity, and higher-order thinking, is stimulated by challenging tasks aligned with personal interests. Effortful learning and guided practice are necessary for acquiring complex knowledge and skills, relying on learners' motivation. Considering learners' linguistic, cultural, and social backgrounds enhances learning effectiveness. Setting high standards and conducting comprehensive assessments, including diagnostic, process, and outcome evaluation, are integral to the learning process.	Challenges: Overcoming the distance and time separation between instructors and students in e-learning communities to foster inquiry and collaboration in an online environment. Future work: Designing educational systems that prioritize learner-centered approaches, ensuring technology serves diverse learners and learning contexts with a focus on safety and support for effective learning.
7	Dixon & Dixon	Principles of online pedagogical effectiveness: the application of a Web-based instructional model, 2005, [C], 0, International	To develop an Online Pedagogical Effectiveness Framework.	Reeves Framework, Khan Framework, Cognitive-based and learner-centered environment	The article applies a web-based instructional model based on the Reeves Framework, Khan Framework, and a cognitive-based and learner-centered environment	This article summarized previously discussed elements such as constructivist philosophy, cognitive learning theory, goal orientation, authentic tasks, motivation, teacher role, metacognitive support, collaboration, cultural sensitivity, and flexibility.	The framework will be applied to improve learning material delivery and inform future course development. Challenges include validation and adaptation to evolving needs, while future work involves applying it to different contexts and expanding its impact on online education.
8	Teemant et al.	Modeling sociocultural pedagogy in distance education, 2005, [J[, 40, USA	This paper introduces a new e-learning quality framework for a multi-campus university, aiming to improve the quality of e-learning sites and enhance online student learning. It focuses on developing the skills of academics involved in site design to ensure better e-learning experiences.	Sociocultural pedagogy model	The article discusses the use of sociocultural pedagogy in distance education. The ProfessorsPlus model introduces various innovative techniques, including start-up activities for predicting relationships between prior knowledge and new content, novel ways of analyzing prior knowledge, case studies for	The article emphasizes assessment, feedback, student interaction, and facilitator support as crucial aspects of effective online education. It suggests incorporating portfolio components and providing training for facilitators to enhance the learning experience.	Developing a distance education approach that embraces sociocultural perspectives and pedagogy has been a challenge. The ProfessorsPlus model, created by Brigham Young University, addresses this challenge by providing a sociocultural pedagogy framework for distance education. This model supports the professional development of teachers and promotes an understanding of learning

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					understanding new content, pair-and-share activities for collaboration, and class session previews for future topics. These strategies aim to enhance learning experiences in distance education.		from a sociocultural standpoint. Future work can involve refining and expanding the ProfessorsPlus model to cater to the diverse needs of educators.
9	Koehler & Mishra	What Happens When Teachers Design Educational Technology? The Development of Technological Pedagogical Content Knowledge, 2005, [J], 2294, USA	This article introduces Technological Pedagogical Content Knowledge (TPCK) for teachers and highlights the importance of authentic design-based activities in developing this knowledge. The study reports data from a seminar where faculty and master's students collaborated to create online courses. Results indicate that participants experienced positive changes in their technology knowledge and TPCK through design-based problem-solving. In summary, learning by design is an effective approach for understanding the interplay between content, pedagogy, technology, and their contexts.	Technological Pedagogical Content Knowledge (TPCK)	The article explores the development of Technological Pedagogical Content Knowledge (TPCK) and the role of design-based activities in its development	This article focuses on the evolution of knowledge components related to technology integration in education, as proposed by the TPCK framework. The research suggests that participants' understanding of technology integration becomes more advanced and complex over the course of a semester. Therefore, it indicates that incorporating all components of Technological Pedagogical Content Knowledge (TPACK) is the solution to enhance technology integration in education.	Challenges in representing teacher knowledge around technology include capturing its collaborative and co-constructed nature, as well as its dynamic and evolving characteristics. Previous representations relied on intensive qualitative research, but this article introduces a survey questionnaire to observe the process and product of learning-by-design seminars. This instrument holds promise for future research on the development of Technological Pedagogical Content Knowledge (TPACK) and understanding the functioning of design teams. Additionally, instructors and instructional designers face the challenge of providing appropriate levels of supportive assistance in a learning environment.
10	Dabbagh	The online learner: Characteristics and pedagogical implications, 2007, [J], 617, South Korea	This paper presents a design framework for E-Learning that emphasizes the transformative interaction between pedagogical models, instructional strategies, and learning technologies. It advocates for using situated cognition as a foundational perspective and provides practical guidance for incorporating it into E-Learning design.	Views on Cognition and Knowledge	The article examines the characteristics of online learners and their pedagogical implications based on views on cognition and knowledge	This article discusses instructional strategies, pedagogical models or constructs, and learning technologies, with a focus on promoting collaboration, social negotiation, and authentic learning activities. The emphasis is on engaging learners in realistic and meaningful tasks that are relevant to their interests and goals.	Challenges and future work in designing effective and meaningful E-Learning include adopting a grounded design approach, incorporating pedagogical models grounded in situated cognition and constructivist views, promoting meaningful action and interaction, and organizing distributed forms of interaction. By embracing these aspects, E-Learning developers and instructors can craft purposeful learning experiences and facilitate meaningful knowledge acquisition.
11	Hernandez et al.	Creating and Deploying Effective eLearning Experiences Using LRN, 2007, [J], 42, Australia	The purpose of this study is to describe an enhanced pedagogical model for effectively delivering courses to a large number of students using the open-source e-learning platform. LRN. Two case studies are presented to showcase the success of this model in increasing the popularity of engineering degrees among high school students and implementing a blended learning approach in an engineering course.	Conceptualization, Construction, and Dialog Model	The article discusses the use of mindtools as learning tools, emphasizing their ability to facilitate multiple knowledge representations for effective learning. The proposed model consists of three elements: conceptualization, construction, and dialog. Conceptualization involves presenting content and objectives, construction involves providing resources for tasks, and dialog emphasizes communication among participants.	The article highlights the cost-reducing aspect of the authoring environment in including various media resources for learning	Challenges and Future Work: Enhancing student-teacher interaction, expanding multimedia integration, and advancing the LRN platform are key areas for further development in engineering education. Emphasizing innovative pedagogical approaches and fostering collaboration among educators and researchers are crucial for future advancements.
12	Bailey & Card	Effective pedagogical practices for online teaching: Perception of experienced instructors, 2009, [J], 408, USA	Institutions have focused on providing faculty with technological training to enhance their online teaching, but many online instructors would like to learn more effective pedagogical practices. This phenomenological study determines what experienced, award-winning South Dakota e-learning instructors perceive to be effective pedagogical practices. This study identified effective pedagogical practices for on	Andragogy, Constructivism, Transformational learning	The article discusses the adult learner, and the pedagogical theories of andragogy, constructivism, and transformational learning	Two new elements identified by faculty members are flexibility and high expectations for faculty members. Flexibility refers to the ability to adapt and accommodate different learning needs and styles in online teaching. High expectations involve setting clear course goals and learning objectives, establishing expectations at the beginning of the course, and maintaining them throughout the online learning experience.	University administrators should prioritize providing pedagogical training and support to instructors who teach online. Many professors lack formal education or training in teaching, and this gap needs to be addressed. Encouraging networking among online teachers can help reduce depersonalization and burnout. Establishing a formalized mentoring program for new online instructors would be beneficial. Further research is needed to advance the understanding and development of effective pedagogical approaches for online teaching.
13	Farajollahi et al.	A conceptual model for effective distance learning in higher education, 2010, [J], 30, Iran	The aim is to enhance the e-education system by addressing gaps and reinforcing areas that require further improvement compared to previous frameworks.	Systemic theory of distance, Cognitive and Social Constructivism theory, Independence theory, Interaction and Communication theory	The proposed model integrates various theories and key elements for effective e-learning, including pedagogy, ethics, technology, interface design, and learner considerations. It categorizes e-learning elements into technological, organizational, and educational trajectories, each with distinct characteristics	The proposed model incorporates pedagogical components inspired by Khan's framework.	Challenges and future work in distance education involve individual differences, learning style alignment, group and individual activities, evaluation stages, and improving the learning-teaching process through learner-centered approaches, effective communication, flexibility, active learning, technology utilization, and continuous assessment.
14	Elameer & Idrus	Elameer-Idrus Orbital E-Education Framework for The University of Mustansiriyah (Uomust), 2011, [J], 12, Malaysia	The purpose is to create a virtual faculty as an initial step towards establishing a virtual university.	Modified Khan e-learning framework	The article presents the integration of online learning and learner control within a modified Khan e-learning framework, known as the Orbit Framework. This framework aims to create a student-centered e-Education system at the University of Mustansiriyah, considering various factors such as pedagogy, technology, institution, management, equity, ethics, and interface design.	Key pedagogical components highlighted are: processes, user support, and training. Processes involve defining rules and responsibilities in advance. User support ensures individuals have necessary knowledge for e-learning. Training covers creating e-learning content and preparing educators for new teaching models.	The challenges and future work include adapting the framework to various learning environments, embracing blended learning approaches, upgrading ICT skills, increasing the use of ICT in educational management, addressing budget constraints, and establishing accreditation for distance education.
15	Anderson & Dron	Three Generations of Distance Education Pedagogy, 2011, [J], 1875, Canada	This paper explores three generations of distance education pedagogy: cognitive-behaviorist, social constructivist, and	Cognitive and behaviorist (CB) pedagogy, Social-Constructivist pedagogy, Connectivism pedagogy	The article compares three generations of technology-enhanced distance education pedagogy: cognitive and	nothing really more Just making learning approaches clear understandable in pedagogical elements.	Challenges and Future Work: Adapting to rapidly changing technologies in teaching presence.

			connectivism. It emphasizes the importance of pedagogy in shaping learning experiences and highlights the relevance of these pedagogies for distance education designers and teachers. The article concludes that effective distance education utilizes all three generations of pedagogy based on content, context, and learning expectations.		behaviorist (CB) pedagogy, social-constructivist pedagogy, and connectivism pedagogy		The future of distance education pedagogy influenced by Web 3.0 and emerging technologies. Intelligent methods for connecting and discovering knowledge sources. Object-based and activity-based models of learning. Utilizing collectives and combining human and machine intelligences. Exploring effective utilization of collectives and emerging technologies in learning.
16	K. U. Khan & Badii	Impact of E-Learning on Higher Education: Development of an E-Learning Framework, 2012, [J[, 26, Pakistan	This paper investigates the effects of eLearning on graduate students and proposes a framework tailored to the resources available in Pakistan's IT infrastructure for higher education institutions. The study aims to address the challenges and opportunities associated with eLearning in the context of graduate education in Pakistan.	iMOOC Model	The article introduces the iMOOC Model, which is designed to support independent learners in MOOCs. It draws inspiration from Khan's framework and applies these components to the design of MOOCs.	This article closely aligns with Khan's pedagogical components in its approach and content. This model incorporates key pedagogical components, including content analysis, audience analysis, goal analysis, design approach, instructional strategies, organization, and blending strategies	The challenges and future work in Pakistani higher education institutions (HEIs) include meeting the requirement for timely e-learning applications, adapting Khan's framework to fit the local context, addressing technological advancements and the need for skilled human resources, emphasizing learner-centeredness, refining the learning environment, developing tailored frameworks, and using the modified framework as a baseline for new e-learning in Pakistan.
17	Seo & Engelhard	Using the Constructivist Tridimensional Design Model for Online Continuing Education for Health Care Clinical Faculty, 2014, [J], 10, USA	This article introduces the Constructivist Tridimensional (CTD) model, which offers a new approach to online curriculum design for Clinical Instructors (CIs) in continuing education.	Constructivism, Problem-Based Learning, Adult Learning Theory, Self-Regulated Learning	The article discusses the application of constructivism, problem-based learning (PBL), adult learning theory (ALT), and self-regulated learning (SRL) in an e-learning adaptation model for higher education. This model, known as the Constructivist Tridimensional Design (CTD), integrates PBL, ALT, and SRL principles.	pay attention to PBL = Problem-Based Learning. ALT = Adult Learning Theory. SRL = Self-Regulated Learning. CTD = Constructivist Tridimensional Design. more importantly self-regulation of learning	The study showed successful learning and application of strategies from the online module. It also enhanced motivation, critical thinking, and self-directed learning, improving student mentoring. Future research can explore students' assessment of mentors and the model's applicability to other disciplines, enhancing generalizability.
18	Andersen & Ponti	Participatory pedagogy in an open educational course: challenges and opportunities, 2014, [J], 109, Sweden	The purpose of this article is to investigate the role of peers in creating course content in a Web 2.0 environment within a peer-to-peer online university (P2PU). The study explores the interaction processes and challenges associated with co-creating tasks in the course.	Sociocultural approach	The article adopts a sociocultural approach to networked learning and emphasizes social interaction, situatedness, and distribution of learning	MOOCs have two pedagogical directions: content-based xMOOCs and connectivist cMOOCs. Peer-to-peer learning is challenging, as tensions arise from task creation. However, platforms like P2PU offer a participatory approach that motivates participants. Bridging the gap in task creation and solving is a future research focus.	Peer-to-peer learning presents challenges as the open nature of creating tasks can create tensions between more and less experienced users. Bridging this gap between participants is a valuable area for future research in order to enhance the learning experience and motivation in participatory learning environments like P2PU and cMOOCs.
19	Hernandez et al.	Promoting Engagement in MOOCs Through Social Collaboration: Common Lessos from the Pedagogical Models of Universidad Galileo and Universidade Aberta, 2014, [C], 9, Portugal	Enhancing MOOC Engagement through Social Collaboration: Insights from the Pedagogical Models of Universidad Galileo and Universidade Aberta	Massive open online courses (MOOCs)	The article proposes a pedagogical model for Massive Open Online Courses (MOOCs)	The iMOOC Model, developed by UAb.pt, is based on the university's pedagogical model, focusing on learner-centeredness, flexibility, interaction, and digital inclusion to build a compromise in MOOCs.	The quality improvement of MOOC offerings relies on their flexibility, adaptability, and participant engagement. Common learner engagement strategies can be developed, and future work can explore hybrid pedagogical models and the use of cloud-based social media tools to facilitate enriched interaction among participants in massive learning environments. This would inspire advancements in MOOC design and enhance the overall learning experience.
20	Toktarova & Panturova	Learning and teaching style models in pedagogical design of electronic educational environment of the university, 2015, [J], 35, Russia	The purpose of this study is to address pedagogical design issues in the context of the university's electronic educational environment.	The article explores and compares several learning and teaching style models, including Gregorc's Mind Style Model, Kolb's Experiential Learning Theory, VARK Model (Visual, Auditory, Kinesthetic), and Felder-Silverman Learning and Teaching Styles Model.	The article introduces a framework that integrates different learning and teaching style models to enhance learning in higher education. It discusses various models and their application in designing personalized learning pathways.	This article extensively discusses learning styles and provides a comparison of four prominent theories. It also delves into methods for designing personalized learning paths based on these theories.	The proposed approach for personalized learning and teaching in electronic educational environments shows promise for improving effectiveness in higher education. Further research should focus on the effectiveness of adaptive training and the development of personalized learning environments for lifelong learning strategies.
21	M. U. Ahmed et al.	A Learner Model for Adaptable e-Learning, 2017, [J], 22, Bahrain	This paper presents a learner model for adaptable e-learning and demonstrates its significant impact on enhancing learners' knowledge levels.	The models and theories commonly utilized in this context include Visual Auditory Kinesthetic (VAK), Felder-Silverman, and Kolb's learning style theory.	The study suggests that learners desire freedom, control, and personalized formats in online education. The proposed adaptable learner model integrates technology, knowledge, and pedagogy to enhance course delivery and student engagement	The study highlights the importance of considering learners' preferences in e-learning, as they desire freedom, control, and personalized formats in online education.	The proposed adaptable e-learning model significantly improves student performance, reducing failure rates. Future work involves developing an academic repository with diverse digital content formats, adaptive testing, and a decision support system for personalized guidance. This research sets the stage for future studies in adaptive e-learning.
22	Azevedo & Marques	Mooc Success Factors: Proposal of an Analysis Framework, 2017, [J], 52, Portugal	This paper aims to propose an analysis framework of MOOC success factors, specifically targeting teachers as potential participants. The framework serves as a set of best practices for MOOC developers and contributes to increasing empirical research on MOOCs.	MOOC, MOOC success factors framework	The article discusses learning analytics at the intersection of vision and practice, with a focus on MOOCs and the MOOC success factors framework	New pedagogical components in this study include pre-course information, interactivity, and peer-to-peer pedagogy as the best aspects of MOOC pedagogy.	This article analysis identified key factors influencing MOOC participant success: social, organizational, and pedagogical. For teachers, pedagogical factors, content organization, and course timing were particularly important. The novelty factor of MOOCs also influenced enrollment. Future work involves optimizing MOOCs by considering these factors.
23	Chergui et al.	Towards a New Educational Engineering Model for Moroccan University Based on ICT, 2020, [J], 8, Morocco	This article presents an engineering model for enhancing pedagogical models and utilizing digital tools in Moroccan universities. Developed through a national perception study, it integrates digital tools and pedagogical objects in an educational and entrepreneurial environment to address methodological and content	Technological Pedagogical Content Knowledge (TPCK)	The article presents a TPACK-based action research study for an online professional development course	The pedagogical components discussed in this article are identical to the TPACK model, not more.	The article introduces a pedagogical meta-model for ICT in Moroccan universities. It emphasizes the importance of ICT in higher education and utilizes IMS LD for implementation. The model involves students, teachers, and companies, allowing diverse teaching methods. Initial evaluation shows promising results. Future work includes piloting scenarios to validate the model and developing a smart

						gaps. The model facilitates easy access to information, methods, and techniques for students within a dynamic digital environment that engages with the business world.	Moroccan university learning platform based on this approach.
24	Sailer et al.	Contextual facilitators for learning activities involving technology in higher education: The C(sic)-model, 2021, [J], 115, Germany	The C♭-model aims at systematizing research on digital teaching and learning and offers a roadmap for future research to understand the complex dynamic of factors that lead to successful digital teaching and learning in higher education via suitable learning activities.	Skill Tool Model, Constructivist beliefs	The article proposes a model of cognitive flatness (C♭-model) for designing digital technology support in constructivist learning environments.	Self-regulation of students refers to their ability to set and pursue goals, make decisions, reflect, and engage in social and political deliberation while considering environmental factors. Students can also create their own learning opportunities with digital technology if teachers are unable to provide suitable instructional affordances. The type of self-arranged learning opportunities influences the learning activities students participate in.	Future research on the C♭-model should tackle the challenges of digital transformation in higher education. As learning organizations, these institutions play a vital role in research and teaching. To promote effective digital teaching and learning, a comprehensive understanding of the complex dynamics is necessary. The C♭-model offers a roadmap for future research, allowing a holistic examination of technology-enabled teaching and learning in higher education.