A Survey Investigating the Key Factors and Theoretical E-Learning Frameworks During Crisis Periods

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Abstract—In the previous ten years, there has been an astounding expansion in the study and application of e-learning frameworks. The recent literature and e-learning ideas were investigated in this study, with e-learning research's different parameters being précised. E-learning processes' associated services, technology, as well as stakeholders, are the three principal aspects of e-learning systems. A typology of services comprising e-learning models is presented in a framework, with stakeholders, technology, and learning approaches being included. Accordingly, the aforementioned aspects are considered through a detailed literature review, with e-learning frameworks' relationship with the different classified stakeholder groups also clarified. Finally, ways to resolve the foremost challenges identified through the literature review are posed, with our e-learning system also presented. Furthermore, the proposed answer may direct and facilitate the appropriate appraisal of learners, educators, and educational facilities by decision-makers, drawing on data provided through live interaction.

Keywords—e-learning frameworks, COVID-19 Pandemic, crisis periods, virtual school, equitable education

1 Introduction

Information and Communication Technologies (ICT) rapid development has helped with improving education quality by incorporating the Learning Management System (LMS). The LMS is a product application or electronic innovation that is adopted to arrange, actualize and evaluate a particular learning process. This innovation is alternatively referred to as a Course Management System (CMS), Virtual Learning Environment (VLE), or Knowledge Management System (KMS). Through this innovation, instructors can present, illustrate, explain and transfer learning resources' content, then track and evaluate students' progress. Meanwhile, students can study the lectures according to their own time and location. Additionally, students can submit their assignments, inquire about subject information, as well as cooperate with their instructors. An array of research has been conducted to improve and enhance the E-learning system and integrating it with the regular education system. Universities have demonstrated an increasing ability to strengthen student achievement via the adoption of technologies [1, 2]. E-learning provides one of the best learning opportunities in the modern era [3,

4]. E-learning provides teaching opportunities, promotes teacher-student communication, encourages learning activities for students, as well as permits students to take online lessons[5, 6]. Moreover, e-learning is a network organization and management system allowing students to practice online [7, 8]. Universities are enriching e-learning services to fulfill the unique needs of students and to create a high-quality learning-focused curriculum. Technology developments reflect how e-learning programs may improve conventional teaching[9, 10]. Nevertheless, technology adoption does not guarantee the necessary benefits and achievements of e-learning [11, 12]. E-learning is applied in various universities, yet some are characterized by slow e-learning development and several universities cannot succeed [13, 14]. Furthermore, e-learning dropout rates at universities are typically higher globally compared with conventional education. The delivery of fundamental needs, including education, is hindered by various obstacles in developing nations. The number of facilitators and restricted space [15, 16], as well as a dearth of infrastructure[17], are instances of such obstacles. An appropriate 'sensitive' student classification was formulated as an individualized adaptive e-learning framework by [18, 19]. They applied and investigated the lifelong learning approach of the learner model. Content, Adaptation and Student are the three aspects considered in the model. In [20, 21], clarified, material provided in the system and its rational infrastructure is incorporated in the content model, the regulations and stipulations adopted are incorporated in the adaptation model, while system information regarding the student is included in the learner model. In [22], they considered the biggest universities in Turkey and Estonia concerning e-learning systems, identifying and assessing principal obstacles to their implementation, in addition to e-learning's negative and positive aspects. Consequently, the researchers devised a cohesive theoretical framework for university tutors' implementation of e-learning, with the extended technology acceptance model being the principal component. The authors investigated the perspectives of professors at major universities in Estonia and Turkey pertaining to ten variables affecting the adoption of e-learning. Among these are: ease of use; usefulness; pedagogical level; accessibility, policies and so forth. Unlike Vija et al., Güllü et al. provide a theoretical framework rather than practical framework underpinned by in-depth analysis of these 10 variables. They identified policy adaptation, security, financial support mechanisms and productive cooperation between institutions as significant for adoption [23]. In [20], they conducted research involving adults concerning the development of their digital, technological and language skills, including e-learning tools' adoption. They concluded that the development of technological skills is hindered by the insufficient availability of digital learning tools. Accordingly, the acquisition of basic digital skills necessitates:

- The development of a modern and interactive learning process;
- Online training courses' availability and open access to digital content;
- The development of teaching materials in the state language.

In Latvia, progress towards integrating digital and technological skills throughout the adult educational process is proceeding alongside the project, "National Coordinators of European Implementation of the Programme in Adult Education". This included the development of modular lifelong learning competencies, including digital literacy.

Through this study, the authors confirmed that digital technologies in the work environment are increasing the demand for highly skilled and qualified staff. At the national level, participation in appropriate educational programs available at various education levels assists in both the formal and non-formal education contexts. Following transformative learning theory and andragogy theory—particularly the requirement of self-direction among students—a learner-orientated e-learning framework (CLELF) has been developed by the researchers, for the learning and self-directed study procedures to be facilitated. The study of transformative threshold dynamics and transformative crisis-based learning is assisted by the CLELF. Rather than a teacher focus, the student emphasis enables the prospects for strengthening online learning and the framework's effectiveness to be assessed. However, given that informal student and teacher interviews provided the basis of this research, this was a shortcoming. By adopting a novel strategy for an extant learning management model, it was not the overall framework but the concept that was subjected to initial testing. Frequent testing of andragogical concepts adopted to develop the e-learning conceptual framework has been engaged in. As [24] related, to appraise the capacity of the CLELF to facilitate transformative and self-directed learning, it must be developed further as a web-based education platform. By subjecting existing e-learning research to a detailed qualitative review, identifying obstacles to e-learning's adoption is aimed through the formulated TIPEC framework. 259 articles from 1990-2016 were considered, with 68 distinctive e-learning adoption obstacles being found. [25]four TIPEC conceptual categories, namely, enabling, pedagogical, personal, and technological factors, were applied and developed to categorize the obstacles. To enable the obstacles affecting e-learning adoption's efficacy to be more effectively comprehended by principal education actors, as well as for present field activities to be contextualised, the TIPEC framework has been devised. To assist the investigation and appraisal by stakeholders of the contextual pertinence of obstacles, the TIPEC framework can be quantitatively appraised through an applied questionnaire. By [26], problems associated with e-learning systems' adoption and reformulation should be determined through a final applied questionnaire that has statements that successfully cross-load, which may be achieved by assessing numerous statements per obstacle identified across a broad number of studies.

1.1 Problem statement and proposition

E-learning has been considered remarkable in recent research, although whether e-learning can be applied efficaciously and effectively remains uncertain. First, no empirical research has aimed at systematically investigating and evaluating the critical variables affecting e-learning outcomes. Literature rendered e-learning a challenge as opposed to a straightforward method, while it is not considered to inspire learners, since current learning habits are swiftly replicated by downloading materials from web-based pages [27]. Simply using a learning management system to upload video links and files is not what online learning and instruction are about, with an alternative strategy being necessary for crisis periods with remote teaching. Ultimately, successful remote learning requires educators to possess particular pedagogical and practical knowledge and capabilities [28]. Furthermore, there is a distinctive cultural environment for remote

learning, an environment which is entirely novel to Iraqi learners, educators, and schools, as it is in other nations. Presumptions drawn from established teaching contexts and experiences are especially likely to shape educators and other teaching staff, yet the remote-teaching environment might be unsuitable for certain pedagogical activities they engage in [29, 30]. In terms of learning and teaching technologies' applications, online learning management platforms are suitable. For instance, the Ministry of Education launched the Newton e-learning portal (https://newton.iq/); if the transfer of modules online for remote teaching is to be effective, educational facilities will find the quizzes, discussion forums and other activities on the platform to be essential. In significant part due to the Covid-19 pandemic, fundamental transformations are occurring in Iraq's education system. Educators' cognition of best practices, as well as other aspects of remote learning preparedness, are placing a considerable burden on teachers and educational facilities that are required to swiftly transition to e-learning [31]. To state the problem, the principal issue to answer is: "how can a country like Iraq deliver educational materials during crisis periods to all students, both equitably and with a guarantee of high quality in terms of the continuity of the learning process?" Resultantly, the solution that we have been working on is a proposal that the public authorities in a given county establish a global e-education framework (perceived as a strategic solution) as an alternative to the traditional educational method. Our proposal is called Edu4ALL. It consists of a well-constructed e-educational framework that involves installing and maintaining an equitable (vis-à-vis all students nationally) and high-quality e-education (teaching, learning and evaluation) approach. Such a solution could be especially beneficial in numerous developing countries, including Iraq.

1.2 State of the art

In developed countries, an array of studies has investigated the introduction of e-learning and primary performance indicators in the context of mature western societies. First, [32] introduced a four-four paradigm in Australia as the foundation of a university e-learning approach. Second, the implementation of e-learning technology necessitates comprehensive planning, recruiting, and instruction of personnel and students, alongside the exemplary delivery of knowledge and communication technologies in education systems. We may include in-depth preparation activities, objectives, student expectations, and services as a means of sustaining and improving the program. Furthermore, numerous recent technologies for mobile knowledge sharing and online learning are appropriate for off-campus use. Evaluation, input, and analysis may be undertaken with a modern perception of the use of information formation, sharing, and origin, which may be applied and prove effective for e-learning pedagogy implementation. It necessitates the creation of workers, in addition to innovative technologies and procedures, for e-learning's efficient implementation. Third, each student, irrespective of location or type of learning, must be given fair opportunities and equivalent learning experiences. Fourth, universities must devise innovative approaches to analyzing the productive directions and related challenges[33]. In [34], they examined the role of IT facilities in affecting e-learning systems' performance in the Australian university con-

tent. They proposed a guide for measuring online education systems' effectiveness. According to the report, network quality, relative importance, consumer retention, client loyalty and organisational interest are the major drivers of e-learning programs' performance. Additionally, the report highlighted the expansion of network networks, which were crucial to e-learning platforms' ongoing development given their effect on efficiency, consumer loyalty, and increased customer experience. However, the research also showed that e-learning services for university staff are lacking relevance. Occasionally, academics are unable to use certain functions of e-learning systems and cannot fully comprehend the purpose of e-learning. Consequently, variations in expectations may affect the quantity and consistency of rewards acquired by workers across the scheme, alongside some of the characteristics of e-learning programs. Responding to this issue, Hajiyev and Su recommended that college training courses should include knowledge about utilizing e-learning programs that would be beneficial in reminding them of the advantages. Additionally, greater attention is necessary to the role of IT infrastructure services in supporting students in different directions. For example, concerning the assessment of students and input on the ICT branch, the introduction of various networks would enable students to make contact with ICT workers through conversation, online courses, or instructional videos, while participating in seminars on the usage of e-learning platforms and such programs' key activities. In their study focusing on the evaluation of UK e-learning programs,[35] developed a detailed evaluation model. Their research proposed a hexagonal HELAM that presents a multi-dimensional calculation tool for learning management systems. The study showed that the variables affecting student satisfaction are: quality of the system; quality of service; quality of content; perspective of the learner; attitudes of the instructor, as well as support issues. Additionally, the research highlighted the model's role as a guide for more effectively comprehending the perceived satisfaction of e-learners, which may be improved through the use of learning management systems. Another UK study conducted by [36] discussed the variables for the acceptance of M-learning by university students. A Paradigm thesis has been proposed for the Unified Technology Acceptance and Use Theory (UTAUT), to classify variables affecting the acceptance of m-learning in high schools, as well as to assess how m-learning is affected by previous use of mobile applications. The study identified the main outcomes of m-learning behavioural expectations as being: performance objectives; engagement targets; staff impacts; degree of service, as well as personal imagination. Moreover, it was recognised that the behavioural intent effect of such systems was moderated by prior usage of mobile devices. Moreover, the study showed that higher education institutions will develop policy approaches that provide guidance on student acceptance, thereby identifying certain primary performance metrics for adoption in higher education. In [35], the authors analyzed key factors affecting an e-learning system's adoption by Arab Open University students, analyzing the relevant e-learning variables in the Arab region and defining the interplay between these variables. A modern Technology Adoption Model (TAM) method was established, comprising contextual criteria, internet familiarity, device experience, self-efficiency, technological assistance for sensed value, perceived ease of use, and intended use. The research identified self-efficiency as a major factor in the anticipated ease of usage, including its direct effect. The findings showed a statistically

significant effect on perceived usability, although this did not appear to be useful concerning the student's previous history of the Internet. However, the findings did not show that the program's interactivity affected student acceptance of e-learning. Furthermore, the findings indicate that the degree of technical assistance provided to consumers explicitly affects perceived value, while also having an indirect impact on the purpose of use. The study's overall conclusions were as follows. First, students who regularly use the Internet prefer to adopt e-learning services more regularly. Second, the belief that students can use and benefit from the e-learning system affects their adoption of software. Second, students are welcome to have access to technical assistance. Finally, when the e-learning system is easier to use, students start learning. They investigated the factors affecting the University of Bahrain's adoption and use of an e-learning program. Four parameters have been analysed, focusing on the application of the TAM, including program control, level of information, in addition to social and cultural standards that affect the decision to adopt the e-Learning Paradigm. The results evidenced that students gain immensely from e-learning facilities' appreciative involvement and ease of usage at the University of Bahrain. Moreover, the content and automated equipment model was found as having a substantial indirect effect on the usage of e-learning services in terms of perceived usefulness and perceived ease of use. Nevertheless, arbitrary criteria were used as a strong predictor that the e-learning system will be utilised, given that they have had a substantial direct and indirect effect on the behavioral purpose of perceived utility [37]. Recently developing countries, including Arab countries, have used e-learning in both higher education and classrooms to fulfill the needs of their students and to improve their teachers' expertise. Work on important e-learning variables in the Arab area is addressed in the following paragraphs. They investigated variables that could forecast students' behavioral intentions (BIs) for e-learning in Egyptian universities, based on student e-learning attitudes and variables, to forecast student e-learning intentions. The study identified the strong indicators of e-learning as e-learning attitudes; e-learning usefulness; ease of use; availability of resources, as well as pressures to be used [38]. Additionally, explore the factors affecting the decision of students in Saudi Arabia to seek electrical education as an external opportunity, as well as the use of a distance learning platform in other work relevant to e-learning in GCC countries. The researchers proposed a model focused on the principle of expected behavior, wherein students' preference for adherence to e-learning was made clear by the existence of the Student's Subjective Desire and Presumed Behavioral Power. The study referred to the behaviour's perceived effect as the most significant factor in e-learning and distance learning among Saudi students. Furthermore, the study identified the second major factor, alongside student behaviour, recognised in individual research e-learning that affects student choices. On the other hand, students' attitudes were more significant than the norm of a subjective student when e-learning was used for distance learning [39]. They conducted a study on implementing eLearning at the University of the United Arab Emirates. The study examined core factors of modern e-learning, including students' characteristics, IT infrastructure, as well as technical and organizational impacts. The results evidenced that all of these variables had a major and immediate effect on the approval of the hybrid e-learning course among learners. Further studies have shown that IT technology, in addition to

operational and technological considerations, have been identified as the most significant and critical variables in e-learning's progression and adoption [40]. Below Table 1 shows the studies selected for the review process.

Table 1. Literature mapping

References	Independent	Dependent	Moderator / Mediator / Theory	Methodology and Analysis Tool
[41]	E-learning Quality Standards Aceptance for Online Teaching, Technical Competency, Synchronous, Asynchronous, Collaborative Methods, Online Support,	Performance of Academic Staff	Reliable infrastructure	Questionnaire AMOS
[42]	Student Self-esteem, Student Motivation, Student Cognitive, Performance, Student Satisfaction, Student Control, Student Confidence Student Engagement, Continue Using,	E-learning Impact Level on Students' Achievements		Questionnaire SPSS
[43]	Self-efficacy in Implementing E-learning, Flexibility of Time and Place in Implementing E-learning, Availability of ICT in Implementing E-learning	Academic Performance		Questionnaire SPSS
[44]	Blended Learning, Traditional Method, Achievement, Motivation to Learn English	Teaching via Computer		QuestionnaireSPSS
[45]	ICT Adoption	Students' Academic Performance	Student IT Major, Gender, Students GPA	Questionnaire AMOS
[46]	Metropolitan Areas Rural Areas	Learning Effectiveness		Questionnaire SPSS
[47]	Intrinsic Orientation, Extrinsic Orientation	Learning Outcome		QuestionnaireSPSS
[48]	Learner Interface, Learning Content, Personalisation	Learning Satisfaction	Dynamic Scaffolding Theory	Questionnaire SPSS
[49]		Impact of Using Edmodo		Experimental Design Edmodo software
[50]	Blended Learning	Students in Learning	Theory of Learning Constructivism	Experimental Design Website
[51]	E-learning Gamification	Learning Achievement, Learning Motivation		Questionnaire Smart PLS
[52]	Scientific Attitudes, Attitudes towards 3DL Academic Achievement, Estimation of Classroom Environment, Practical Skills, Visual Thinking, Science Processes	Effectiveness of the 3DL		Experimental Questionnaire SPSS

[53]	Knowledge of the Subject, Course Objective, Lecture Notes, Lecturer Attendance, Lecturer Clarity, Class Activity, Assignment, Examination, Interpersonal Competence, Evaluation and Feedback	Students' Satisfaction		Questionnaire SPSS
[54]	University Readiness, Course Quality, Education System Quality, Technical System Quality, Service Quality, Environmental Factors, Trust	Perceived Benefits	E-learning Actual Use, Intention to Use, Instructor Satisfaction Unified Theory of Acceptance and Use of Technology,Theory of Reasoned Action	Literature reviews
[54]	Impactof YouTube Videos about Academic Writing	Writing Performance of Students		Interviews
[55]	Students' Academic Characteristics, Student Personal Characteristics, Course Features	Learning Outcomes	Learning Activities	Literature reviews
[56]		Impact of Use of Facebook and YouTube on Students' Academic Achievement		Questionnaire SPSS
[57]		Students' Academic Achievement and Practical Skills		Experimental design
[58]		Students' Online Learning Behaviour		Experimental design
[59]	E-learning, E-learning Adoption, Attitude,	Academic Achievement	Academic Engagement, Digital Readiness	Questionnaire SmartPLS
[60]	The Instructors' Perspectives			QuestionnaireSPSS
[61]	The Usefulness of the Internet, Most Used Search Engine, Influence of the Internet	Student Performance		QuestionnaireSPSS
[62]	Student Achievement, Students' Forecast, Students' Hope, Students' Homework, Students' Retry of their Homework, Students' Motivation, Students' Time Perception,	ICT		QuestionnaireSPSS
[63]	Motivation, Content, Learning, Other	FC Model		Experimental designSPSS
[64]	Academic Persistence, Academic Satisfaction, School Connectedness, College Gratitude			Experimental design SPSS

[65]	ICT Integrated Methods, Pure Traditional Methods	Student Achievement in Maths		Questionnaire SPSS
[66]	Social Media's Impact on Students	Academic Performance		Questionnaire SPSS
[67]	Interaction With other Learners, Instructions for Use / Menus, Settings, Help, Satisfaction with E-course, Navigation / Overview of the E-course, Enjoyment / Preoccupation with E-course, Feedback Within the E-course, Adequate Difficulty of E-course, Motivational Incentives, Learning Achievement, Self-Paced and Flexible Learning, Personal Experience with E-course	Evaluation of e-Course	Self-determination theory	Questionnaire SPSS
[68]	Overall Course Satisfaction	Blended Learning Satisfaction	Performance Social cognitive theory	Questionnaire SPSS
[69]	Facebook Usage, Students' Perceptions of Having Facebook Groups	Activities among Students		Questionnaire SPSS
[70]	Student Engagement in Academic Activities, Students' Motivation to Learn, Students' Utilisation of E-Learning Tools, Students' Academic Performance	E-Learning Tools		Interviews, QuestionnaireSPSS
[71]	M-learning	Students' Academic Performance	Facilitation discourse, Flexibility Media Richness Theory	Questionnaire SPSS & AMOS
[72]	Motivation, Usability, Motivation, Acceptance	Impact of ICT and Electronic Gadgets on Young Children		Interviews
[73]	Professional development, Teacher quality, School management, Collegial support, Student quality	Students' Academic Achievement		Questionnaire SPSS
[74]		Virtual Learning Environment		QuestionnaireSPSS
[75]	Blackboard LMS	Teaching Research Method	Constructivist theory of learning	Experimental designSPSS
[76]	Classroom Learning Environment	Academic Achievements		QuestionnaireSPSS
[77]	Teaching Style	Student Academic Performance		QuestionnaireSPSS
[78]		Learning Performance	Theory on multiple intelligences	Experimental designSPSS
(Our proposed solution, 2022)	Technology Experience Support Self-Efficacy Smart Learning Environments E-Teacher Smart Pedagogies	E-Edu4ALL & Continue use	Students' Motivation & performance	In progress: Literature review Design Experiential Prototype

In conclusion, through the review of this literature, we conclude that the following variables affect students' performance and achievements in e-learning: Technology Experience; Support; Self-Efficacy; Smart learning Environments, as well as E-Teacher, and Smart pedagogies. These may be incorporated in the E-Edu4ALL & continue to be used to validate the prototype. E-learning global adoption, as well as its significance, have been concentrated on in the prior literature. The impact on e-learning, its material, pedagogical approaches, technology, and standards due to the perspectives of learners or educators has been concentrated on by certain researchers, while e-learning's constant adoption has been the concern of others. Ultimately, the adoption of an e-learning conceptual framework that is of a high standard and in an equal manner for every learner has not been the focus of any literature. My framework's goals are: Deliver Materials In Crises To All Students; Equitable And High Quality; Ranking And Monitoring During the Teaching Process; achievement of better quality education; provision equal learning opportunities to all students, anywhere and anytime.

1.3 E-Learning framework background

A framework may be defined as an edifice that underpins and shapes something[79]. In this regard, higher education institutions (HEIs) can resolve obstacles to e-learning adoption by implementing the set of specific dynamics organized and recommended by the researchers here, thus defined as the 'framework'. Additionally,[80], defined a framework as categorizing the significant variables in the formulation of information systems, which may be considered as informally linked to the effectiveness of such systems' formulation. People, technologies, and services are the three principal aspects of information systems noted in the theoretical framework for e-learning systems. Various user groups' direct and indirect communication is facilitated through e-learning technologies, with the provision of cooperative apparatus, facilitation of communication, and the amalgamation of content being assisted via such technologies. Instructional approaches and pedagogical models' relevant processes are all amalgamated by e-learning services, with indirect or direct interaction with the e-learning system producing the intricate interaction mixture. Simultaneously, the activity-specific strategies inform the services offered by the e-learning system. Ultimately, the instructional approaches, e-learning pedagogical models, and e-learning activities are amalgamated to produce the service specifications. According to the three principal aspects of services, technology, and people, different e-learning literature is presented in Table 2. The Smart Education System (SES) framework that we propose is also included.

Table 2. Survey of e-learning aspects in the literature

Authors	People	Technology	Services	E-learning focus
[81]; [82]; [83]; [84]		X	X	Module activities and material
[85]; [86]; [87]		X		E-learning and augmented reality
[88]; [89]; [31]	X		X	Collaborative learning contexts and student communication
[90]; [91];	X		X	E-learning and cultural differences
[92]; [93]; [85]; [94]; [95]	X	X		E-learning programs' effectiveness
[96]; [97]	X			The motivational viewpoint of online learning environments
[98]; [97]	X	X		Implementation of e-learning systems
[99]; [92]	X	X		Degree of contentment with the adoption of e-learning systems
[100]; [98]	X	X		The digital divide and e-learning
[93]; [101]	X	X		Degree of contentment with and trust in implemented e-learning systems
[102]; [103]	X		X	E-learning appraisal procedures
[104]; [105]; [106]	X		X	The MOOCs' business models
Our research proposal	X	X	X	Assesses: Estimation of learners' performance; ranking; data extraction; equitable education for every learner; adaptative e-learning system; Quantification and appraisal of all variables concerning system performance

However, given that e-learning's impact on learners' attainment remains poorly understood, the student aspects will be concentrated on in this research. E-learning's challenges and hindrances to the learner experience must be identified. E-learning systems' disappointment, development, or contentment are governed by the learner, given that they are e-learning's ultimate customer. Nevertheless, e-learning development is unfeasible without technology, with its adoption for educational goals and an effective strategy for its utilization being necessary after learners are encouraged. There is a higher prospect of e-learning leading to discontent and even dropping out among learners, if educational facilities, peers and educators seem ever more distanced from pupils engaged in e-learning, meaning there should be the rigorous observation of such pupils' outlooks and engagement. Learners' attainment through e-learning is affected by numerous obstacles. The particular challenges impacting learners' attainment during e-learning are presented in Table 3.

Table 3. E-Learning Components Survey

Authors; Year		Technology Experience	Computer Literacy	ICT Skills	Technical Support	Perceived Usefulness	Perceived Ease of Use	Self-efficacy	Social Support	Administrative Support	Students Characteristics
[107]			X								
[108]					X						
[109]											X
[34]						X		X			
[110]			X								
[111]					X						
[112]		X									
[113]									X	X	
[114]			X								
[115]					X						
[116]									X		
[117]					X						
[118]				X							
[119]				X							
[120]										X	
[121]							X				
[121]		X									
[122]			X								
[123]		X									
[124]								X			
[125]		X									
[126]					X						X
[127]										X	
[128]						X					
[129]		X									
[130]						X	X				
[131]											X
[132]						X	X				
[133]					X						
[134]				X					X	X	
[135]											X
[136]									X		
[137]						X	X				
[138]										X	
[139]			X								
[140]								X			
[141]									X		

[142]										X	
[143]									X		
[144]									X		
[145]											X
[146]							X				
[147]			X								
[148]				X							
[149]							X	X			
[150]			X								
[151]						X		X			
[152]				X							
[153]							X				
[154]											X
[155]					X						
[156]				X							
Our Proposed Work	2022	X			X			X	X	X	

2 Proposed Edu4ALL e-learning framework – outlines

A theoretically-shaped and empirically-based formulation of emergency remote learning—anticipated to reform teaching in the wake of the Covid-19 pandemic—is presented here as the Edu4ALL Learning Framework. This research established themes that underpin the framework. To support the construction of learning communities, autonomous learning, and flexible learning, there is a connection between educational facilities' e-learning technologies and pedagogies with their tenets of remote learning and the philosophy of distance through the developed Edu4ALL Learning Framework. Asynchronous and synchronous tools for collaborative and interactive learning are facilitated by the model. The principal technological apparatus that is available to undertake remote teaching must be known to teachers, while their adoption to provide teaching is something that the faculty and educators should have the necessary knowledge and resources to undertake. By adopting social platforms and learning management systems, learners and educators will be able to continue accessing material and interact with each other, even if direct teaching is not transplanted by emergency remote teaching. Indeed, emergency remote teaching's effectiveness will be crucially influenced by educators' presence, while cooperation and engagement will be vitally shaped by the social presence of learners and educators.

2.1 Anticipated global software architecture

The proposed "Education for All (Edu4All)" consists of a Smart and Strategic E-Education Framework, implementing one unified e-solution as an e-learning institution satisfying and fulfilling the national teaching and learning goals. The proposed solution primarily comprises two software components, as shown in Figure 1:

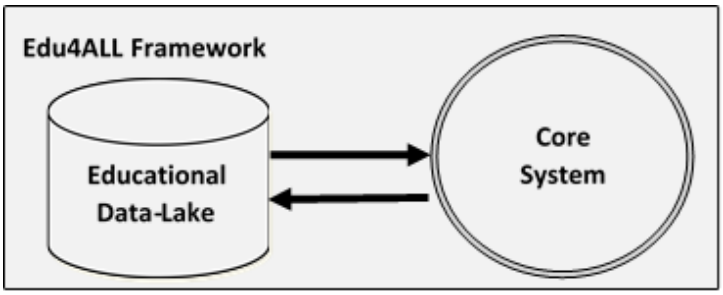

Fig. 1. Edu4All framework

This proposed system's principal aim is to enhance the learning process so that education is made available to all students. The proposed solution primarily comprises two software components.

a) **Educational Data-Lake**: This refers to national data concerning the educational system (curriculums, data about schools, and so forth) with the collection and continual production of beneficial incremental data.
b) **Operational Core System:** Confronting and braving technical obstacles and barriers; applying an appropriate solution for delivering equitable materials, sharing the knowledge of teachers (e-teachers and main teachers) for integration, ranking, and monitoring the students, schools, teachers, and so forth.

2.2 Expected functionalities and achievements

Lucidity regarding the particular difficulties of teaching within a remote learning environment, alongside a framework to ensure accordance between the environment and practice, is provided by the formulation of cognitive, social, and teaching presence in the model. Fundamentally, course resources and lesson provision promptly, as well as educator-learner interaction on a timely and frequent basis, is crucial for the model. An amalgamation of personal and collective learning is promoted by it rather than individualization. Essentially, as [157, 25] clarified, development, cooperation, confirmation, and social negotiation are promoted at the loss of some individualization. Alongside individual learning, it is constantly anticipated that structure will be provided by the educator if they apply individual learning. Thus, feedback and scaffolding are emphasized in the model. In [158], it noted that in remote learning contexts, capability acquisition and knowledge enhancement are deemed to be significantly shaped by scaffolding and formative feedback. Accordingly, these seem to be beneficial strategies for facilitating learners' academic attainment and information acquisition conduct. Presenting an appropriate substitute approach or remedy during emergency events, which differs from established educational strategies, is the research aim. First, the approach should be equitable, while providing a strong standard of e-education nationwide, including study, instruction, and evaluation. Second, education accessibility at each study level, with the proposed study outcomes attained by appraising and identifying the optimal technical solutions. Third, reverse enhancement and quality assurance. Fourth, is

the adoption of e-learning management systems and technology to devise and provide modules and develop syllabuses based on knowledge. Fifth, investigate and train in the e-learning context's practical drafting, planning, and development. Lastly, investigate the instructional design, synchronous and asynchronous learning, educational context, technology resource, legal and other dynamics of the devised e-learning solution.

3 Conclusions

An e-learning system theory framework was devised through this research, with the determination of e-learning-associated services, technologies, and stakeholders being the objective. To identify numerous aspects linked to computers' adoption in learning environments, we carried out a literature review. The principal contribution of our significant literature review is that it provides a theoretical background for e-learning research strategies. The e-learning system theory framework was built on the services provided by information systems' three main components, namely people, technology, as well as the technology itself. The proposed framework will overcome the majority of difficulties that this research has described. Additionally, the proposed system will enable decision-makers to evaluate the schools, teachers, and students in an appropriate manner, in accordance with information gathered from a real interactive system. Our proposal for crisis periods prompted us to create an E-learning system, the Smart Education System (SES framework), that ensures that education is delivered to all people equally, to continue the learning process.

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