

Assessing E-Learning Satisfaction in Saudi Higher Education Post-COVID-19: A Conceptual Framework for e-Services Impact Analysis

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Abstract—After the COVID-19 pandemic, e-learning was adopted by different institutions globally to cope with increasing demands for distance learning, especially in higher education. However, assessing student satisfaction remains challenging due to limitations, such as low motivation without face-to-face interaction. This paper presents a conceptual framework for e-Services Impact Analysis (eSIAF) for higher education institutions in Saudi Arabia. Based on a number of technology acceptance theories, this conceptual framework highlights several models adopted to examine different users’ satisfaction with e-learning service quality among students, teachers, administrators, and e-learning technologists. This paper is part of ongoing research, which will be followed by data collection from eight higher education institutions. After data collection and further processing, a quantitative method will be used to validate the framework. Based on the findings of the study, different approaches can be adopted to increase the satisfaction level of e-learning in higher educational institutes in Saudi Arabia.

Index Terms—higher education, online learning, e-learning.

I. INTRODUCTION

ELECTRONIC services (e-services) refer to services that are provided through information and communication technology. In education utilize the ICT infrastructure in expanding the quality of education delivery, especially by crossing geographical boundaries. One form of e-service is e-learning, referring to learning online activities and resources of educational settings [1]. The COVID-19 pandemic accelerated e-learning due to isolation policies, especially in higher education settings where students are better users of technology. For instance, in Saudi Arabia, e-learning has become part of the education system. Fig. 1 shows e-learning e-services categorized as audio, visual, and data resources. Despite its prevalence, e-learning often fails to satisfy stakeholders. Challenges include lack of face-to-face interaction, technology access issues, and varying digital literacy levels

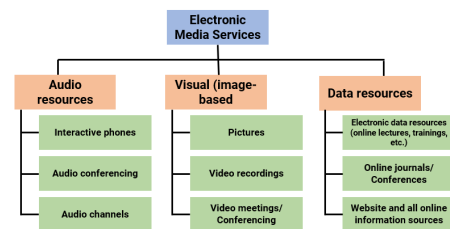


Fig. 1. Proposed Categories of Electronic Services in E-Learning

among students and educators. These issues can undermine e-learning’s effectiveness and lead to stakeholder dissatisfaction [2]. This gap requires analysis. This paper presents a conceptual framework based on various theories.

A. *The research questions of this study are as follows:*

- 1) What factors influence the behavioural intentions of students, teachers, administrators, and e-learning technologists towards adopting e-services for e-learning?
- 2) How do e-services contribute to accessibility, flexibility, and overall satisfaction in the e-learning environment?
- 3) What are the challenges and opportunities associated with the adoption of e-services in higher education institutions?

This study presents a critical framework for assessing e-learning in Saudi Arabian higher education. By applying some theories such as: the Technology Adoption Model (TAM), Technology Acceptance Model (TAM2), and Theory of Reasoned Action (TRA) to examine the views of students, teachers, administrators, and technologists [3]. The study investigates factors affecting stakeholder satisfaction with e-learning in Saudi Arabia, offering globally applicable insights.

Therefore, findings may direct educational institutes to enhance e-learning services and assist in formulating policies [4] while contributing to the theoretical body of knowledge by seeing how models perform in another environment. This paper structured as follows: an introduction to the study's background, a literature review, a review of theoretical frameworks, consideration of proposed e-Service Impact Analysis Framework (eSIAF), and hypothesis. The conclusion discusses the study's implications and suggests future research points.

II. LITERATURE REVIEW

In this framework, 'e-learning' refers to using internet and communication technology to enhance learning [5]. As university student diversity grows, so does the demand for online programs [6]. E-learning transforms learning, increases access, and addresses distance and time issues [7], [8], [9], [10]. With rapid growth, AI instructors may soon become standard [11]. Many institutes face challenges due to a lack of a theoretical framework and limited accessibility [12], [13]. The COVID-19 pandemic led to the introduction of various electronic services in higher education. A recent study highlighted the impact of e-service quality on educational institutions in Saudi Arabia [14]. During the pandemic, Saudi Arabia prioritized education quality through e-learning [15]. However, 56.1% of Saudi medical students found e-learning unsuitable due to poor internet, teacher inexperience, and lack of tools [16]. Engineering students also reported challenges affecting satisfaction [17]. The rise of private higher education institutes has increased competition in Saudi Arabia, prompting improvements [18], [19]. Quality is judged by academic results, teaching methods, teacher behavior, and administrative quality [20]. The focus is on satisfying external stakeholders and meeting requirements influenced by service encounters, time, and competition [21]. Defining and measuring higher education quality is essential to enhance student satisfaction and improve the system [22]. In this context, 'satisfaction' means achieve stakeholders' anticipation and needs regarding e-learning services. We confined the factors which is effect on the satisfaction, which are: content quality, ease of access, communication effectiveness, and support services. 'Effectiveness' refers to how well e-learning achieves educational outcomes, such as student performance, knowledge retention, and skill acquisition. Satisfaction relates to user experience and perceived value, while effectiveness focuses on measurable educational results and learning impact. This framework considers both satisfaction and effectiveness as key components of e-learning evaluation, providing a holistic view of e-learning's impact by addressing quality, user satisfaction, and educational outcomes. Other variables considered in structing the framework are discussed in Section IV.

III. THEORETICAL BACKGROUND

In this section we discuss some theoretical theories that helped in constructing the framework.

A. Technology Adoption Model (TAM)

E-learning can only be effective if it fully makes use available technology [23]. According to Fred Davis (1989), the

TAM highlights only on factors impacting on users' decisions based on perceived usefulness and ease of use [24].

B. Technology Acceptance Model (TAM2)

According to Davis's TAM2, 'perceived usefulness' (PU) is how much a user believes a technology will improve their work quality, while 'perceived ease-of-use' (PEoU) highlights its ease of use. TAM2 has assessed the acceptance of virtual learning environments (VLEs), Moodle, and platforms like Khan Academy [24].

C. Unified Theory of Acceptance and Use of Technology

This theory considers base factors like age, gender, and experience in e-learning. The Unified Theory of Acceptance and Use of Technology (UTAUT) model identified factors affecting e-service adoption in Saudi Arabian higher education institutes.

D. Diffusion of Innovations (DOI)

Rogers' DOI theory (1962) approaches how technology-related ideas propagated within a social system [25]. This theory was used to assess attitudes of students towards adopting e-learning.

E. Theory of Reasoned Action (TRA)

TRA helps understand factors affecting plans [26]. According to TRA, a student's performance is based on their behavioural intention, influenced by their perception and attitude.

F. Technology–Organisation–Environment Framework (TOE)

TOE refers to how companies deal and execute new technologies. TOE helped to examine how Saudi students' e-learning quality is impacted by technology use and outside variables.

G. Chosen Foundation Theories

The Theory of Reasoned Action (TRA) and its extension Theory of Planned Behaviour (TPB) state that a student's intention predicts behaviour, focusing on e-learning. The Technology Acceptance Model (TAM) identifies usefulness and ease of use as key factors in technology acceptance [27].

IV. RESEARCH HYPOTHESIS DEVELOPMENT

A. Research Hypotheses

This section presents the hypotheses based on the factors identified in the previous sections. For this research, hypotheses were developed for each related factor separately.

1) *Student*: Examining e-services in education is crucial due to their flexibility benefits. Traditional models lack flexibility and resources [8], posing challenges for students in accessing resources and attending classes. E-services improve access to resources through e-devices and the internet, doing them available anytime and anywhere [10]. Effective e-service environments to fill the gap between traditional educational restrictions and modern learners' demands. This flexibility and accessibility can positively impact student satisfaction and educational results. identifying how e-services improve

accessibility and flexibility is important to understanding their effect on education.

H1a: *E-services (IV) lead to increased accessibility and flexibility (DV) of education.*

Accessibility and Flexibility:

investigating the relation between accessibility and flexibility in education, and student satisfaction is vital due to increasing challenges in higher education. In the Saudi Arabian context, traditional education often restricted accessibility and flexibility, for instance students may struggle to access learning materials or attend classes for geographical, temporal, or personal reasons, especially female from rural area [23], [24]. E-services address these issues effectively, as demonstrated by the positive results at King Abdulaziz University. The e-learning platform has led to a 30% increase in course enrolment among female students from remote areas [16].

H1b: *An increase in the accessibility and flexibility (IV) of education leads to higher student satisfaction (DV) levels.*

E-Service and Student Engagement: A study at King Saud University found that implementing e-learning services increased student interest by 40% and improved course completion rates by 25% [28]. This is significant in Saudi Arabia. For instance, a survey of Saudi students at Umm Al-Qura University revealed that 78% reported higher motivation when courses included interactive online elements [29]. A nationwide study found that e-learning initiatives increased course participation among female students by 35% and students from rural areas by 28% [30]. While these benefits are applicable globally, their impact is pronounced in Saudi Arabia due to unique cultural and geographical factors.

H2a: *Students using e-services (IV) for the resolution of learning have better engagement (DV) compared to students taking part in physical education.*

Student Engagement and Performance: Here We aims to identify the level of engagement as well as academic achievements in students enrolled in physical education programs with the focus on the effectiveness of educational approaches. In the process of learning, engagement is widely recognised as central to promoting positive outcomes. Therefore, it can be concluded that when students are more engaged, they are more positive, motivated, attentive, and active in their studies [31].

H2b: *Students with better engagement (IV) for the purpose of learning achieve better results (DV) than students taking part in physical education.*

2) *Teacher: : E-Service and Teaching Mechanism:* The study of e-services in the context of Saudi Arabian education is crucial to determining the impact of such technologies on the methods that are used in teaching. Implementing e-learning platform at King Fahd University of Petroleum and Minerals increased student engagement by 30% and improved the overall academic performance of students by 25% compared to traditional physical classes [32]. E-services can control new ways of teaching mechanisms by offering graphic content, response mechanisms based on real time, and a wide range of personalised learning. It is in this aspect that these digital tools support a more effective and individualised learning process

for students.

H3a *E-services (IV) deliver better teaching mechanisms and distinct teaching approaches (DV) than traditional ways of learning or education.*

Teaching Mechanism and Education Quality: E-services have become important in the transformation of Saudi education over traditional methods with consideration to cultural factors. According to the King Saud University survey, the students' performance rate in e-service courses was enhanced by 25% [29]. Effective e-learning also enhanced course completion rates by 40% at Taibah University for students with learning difficulties in compliance [33] with the Kingdom of Saudi Arabia's Vision 2030 learning policies. New practices have to be introduced within the culture that has to be maintained; thus, using Islamic studies and Arabic language modules. Despite the promise that e-services hold for enhancing these outcomes, the results show that local context needs to be taken into consideration.

H3b: *Distinct teaching approaches (IV) result in higher education quality (DV) compared to traditional ways of learning or education.*

E-Services and Customised Learning: E-services surround encompass different existing tools such as learning applications and multimedia, enhancing the teaching techniques. These technologies help the educators to compromise the level of learning abilities. When adopting e-services, teachers can design a differentiated ground where each learner will be provided with the needed support and complexity level corresponding to learner development [34], [31]. Through e-services, teachers are in a position to deliver their teaching curriculum in a way that favours most of the students' demands, with high satisfaction in their educational needs.

H4a: *E-services (IV) permit teachers to utilise additional features and options to customise learning (DV), meeting the diverse requirements of different students.*

Customised Learning and Student Satisfaction: Using e-services in differentiation enhances students' satisfaction as compared to conventional standardized teaching procedures [34]. Thus, it is expected that e-services enhancing student satisfaction, due to the fact that the distinct type of learning is easier and obedient to specific demand than conventional, where each learner is given the similar material.

H4b: *Customised learning (IV) simplified by e-services leads to higher student satisfaction (DV) compared to traditional, one-size-fits-all teaching methods.* *Student Engagement and Teaching Efforts:* Reduced engagement leads to more effort by educators to accomplish instructional efficiency. Students' activity is essential in a conventional learning environment [34]. Yet, there are challenges such as distractions, technological barriers, and absence of face-to-face contact limiting students' interaction. This increased effort translates into a performance effect in relation to educators. A challenge like encouraging students and managing the assignments in online platforms increases the load on teachers, their performance.

H5a: *In online teaching, teachers encounter many obstacles, such as reduced student engagement (IV), which can*

result in more teaching efforts (DV). *Teaching Efforts and Efficiency*: Online classes have many challenges with reduced student engagement and elevated teaching challenges being key issues. Students themselves also feel that teachers spend more of their own time, money, and energy to sustain instructional quality. This include creating content that is appealing, moderating interaction, providing feedback and utilizing virtual class mode. Factors such as decreased interacted contact and increased time spent on teaching translate to inefficiencies in the teaching process[30].

H5b: *The obstacles (IV) faced by teachers in online teaching, including lower student engagement and increased teaching efforts, contribute to inefficiency in the teaching process (DV).*

3) *Administrator: E-Services and Cost for Education*: E-services encompass online tools, applications, platforms, and services to enhance efficiency by digitizing administrative activities, improving communication, and providing access to learning materials. They offer cost savings in various operational areas of educational institutions. E-services reduce costs in administration by decreasing dependency on manpower for tasks like registration, scheduling, and record-keeping. By advancing e-services, institutions can use resources and space more effectively, reducing the need for physical classes and facilities [7]. E-service adoption creates efficiencies and lowers costs. Educational administrators must manage these resources while ensuring quality education.

H6a: *E-services (IV) result in reduced costs (DV) for educational institutes.*

Cost Saving and Revenue: E-services help reduce costs for the institutions and improve resource productivity. E-services help reduce costs for the institutions and improve resource productivity. As opposed to face-to-face models, they help improve on cost savings, efficiency, program enrolment, and student services. A study conducted at King Abdulaziz University showed that implementing e-services resulted in a 25% reduction in operational costs over a three-year period [35]. E-services break geographical constraints, increasing options for enrolment and reaching more students online, which increases the user base of the institution and thus its revenue.

H6b: *Cost (IV) savings from e-services lead to greater revenue (DV) for educational institutions, particularly from students residing in different outlying areas.*

E-Services and Evaluation of Teacher Performance: Other common teacher performance appraisals include file review, check-up or site visit appraisal. However, e-services are more effective and flexible mode of assessment. It offers timely access to data and feedback to support the growth of professionals as well as enhance performance. These tools include polls, e-portfolios, and assessments that allow for the continuous assessment of teaching effectiveness, student engagement, and learning achievements [36]. E-service technology increases transparency and accountability in evaluations mainly due to aggregation of assessment scores and performance data on e-service technology platforms.

H7.1a: *Online methods of e-services (IV) provide a more*

effective means of assessing teacher performance (DV).

E-Service and Control over Teacher Performance:

E-service methods assist administrators and educational stakeholders to keep an eye on, oversee, and assess how teachers perform. Tools like digital dashboards, performance analytics, and remote observations make it easier to supervise [37]. Those in charge can look at data on training content how students engage, homework, and course outcomes to evaluate performance and figure out if help or changes are needed. Online e-service platforms let people set standards for productivity and ways to measure performance, which helps make teacher assessments fair. E-services help match assessments with what institutions require and value giving those in charge more control over teaching quality and making things more uniform. Better tools for supervision and control allow for ongoing performance checks to make sure learning standards are met.

H7.1b: *Online methods of e-services (IV) also develop the ability to exercise control over teacher performance (DV).*

E-Service and Improved Administrative Control: E-services include electronic tools and resources that boost organizational infrastructure, resource management, and fact-based decision-making in education. They let administrators watch and manage education quality assessments. Web-based systems bring together and standardize assessment data, gathering info from student performance, faculty reports, and program studies into single panels [36]. This gathering helps administrators see trends, spot needs, and give out resources well.

H7.2a: *E-services (IV) also result in improved administrative (DV) control over various aspects of education quality assessment.*

Improved Administrative Control and Educational Quality: E-services have significantly enhanced administrative control in Saudi educational institutions, particularly in monitoring, reporting, and certification processes. King Fahd University of Petroleum and Minerals saw a 40% improvement in quality assessment efficiency after implementing a comprehensive e-administration system [38]. In organization environment, Saudi Arabia for instance, where standardization across different regions is vital, e-services have enhanced fairness and standardization. According to the National Center for E-Learning, it experienced a 30% enhancement in cross-campus standardization with a single e-assessment solution. [39]. These processes are valuable in addressing challenges unique to Saudi Arabia, such as the rapid expansion of distance learning. The Saudi Electronic University's data-driven approach led to a 25% increase in student satisfaction and 20% improvement in overall educational quality metrics [40].

H7.2b: *Improved administration (IV) simplifies methods of assessing educational quality (DV) compared to traditional methods.*

4) *E-Learning Technologist*: Augmented Reality (AR) and Virtual Reality (VR) have a big impact on e-learning. They make students more involved and improve how they learn. These tools put students in real-life situations, which makes online classes more interesting and easier to handle

than regular classroom lessons. AR and VR make learning easier by adding more hands-on and real-world elements. Using virtual models and 3D objects lets students work with ideas in a practical way. This helps them understand and remember things better [36]. It is key to understand how these technologies change the way we teach and keep students interested. This knowledge helps us use AR and VR the right way in institutions.

H8a: *Different e-services technologies, such as improved reality and virtual reality (IV), simplify the delivery of online education (DV).*

E-Learning Technologies and Educational Experience: The integration of AR and VR into online education in Saudi Arabia is breaking down barriers to access to quality educational materials. These technologies create virtual classrooms, collaborative platforms, and experiential learning, allowing Saudi students to be exposed to beyond what is around them. At King Abdullah University of Science and Technology (KAUST), the implementation of VR labs for engineering students resulted in a 35% improvement in practical skills assessment compared to traditional methods [41]. AR and VR have the potential to improve learning outcomes among learners from diverse backgrounds thus guaranteeing equal opportunities.

H8b: *Online education (IV) with the use of e-services technologies, such as improved reality and virtual reality, results in an improved overall educational experience (DV) for students.*

E-learning Technologies and Learning Process: Learning has been made more interesting with the introduction of e-learning technologies such as web-based platforms that transform traditional education to fit modern society [36], [42]. The importance of these technologies is felt in the areas of teaching and learning. They make class management less complicated; students can easily communicate, and they take care of their different needs. They help in improving the quality and speed at which education is delivered.

H9a: *E-services technologies (IV) enhance the efficiency of educational delivery and the reorganisation of the learning process (DV).*

Educational Experience and Engaging Learning Environment: Technologies that are multimedia, simulation, collaborative, and adaptive in nature support a heterogeneous student-centred process of learning. Experiments in classrooms and virtual simulations over the internet help learners to understand practical aspects of concepts [42]. These make complete and engaging models of learning that improve the students' autonomy, creativity, critical thinking, and lifelong learning skills relevant to modern times.

H9b: *The combination of e-services technologies adds to the overall educational experience (IV) of students, providing a richer and more engaging learning environment (DV).*

H10a: *The implementation of e-services (IV) in educational institutions leads to significant operational challenges (DV1) and increased resource demands (DV2).*

The final framework is graphically demonstrated in Fig. 6. By utilising the presented framework, an assessment of the impact of e-services on the higher education system can be performed. Intermediate variables that help to analyse the

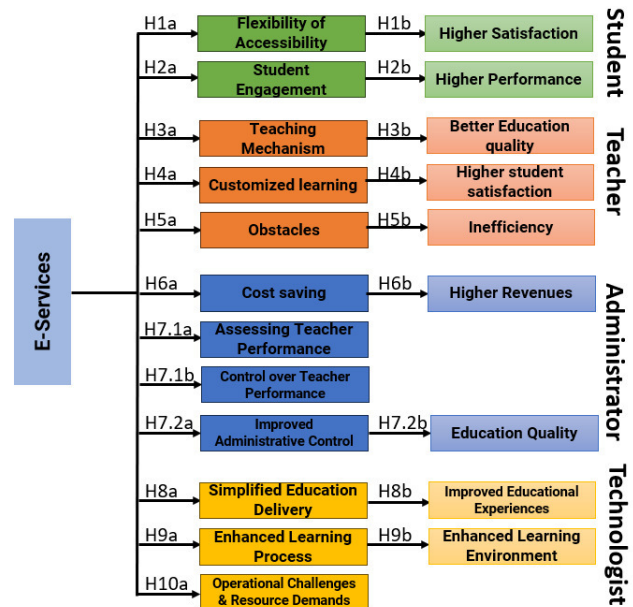


Fig. 2. The Proposed e-Services Impact Analysis Framework (eSIAF)

framework in terms of adoption and satisfaction are variables like technology, student satisfaction, and faculty satisfaction.

V. CONCLUSION AND FUTURE WORK

E-learning involves using information and communication technology in education. This publication provides a detailed conceptual framework for analysing e-learning in Saudi Arabian higher education institutions. It discusses four theoretical models, each addressing different e-learning parameters. The theoretical framework and study hypotheses are developed for four user groups: students, teachers, administrators, and e-learning technologists. This paper is part of ongoing research, with data collection from eight higher education institutions in Saudi Arabia. The study evaluates the impact of e-services on satisfaction levels using questionnaires. It aims to gather insights into e-service efficacy from various perspectives. The second stage will provide a detailed quantitative analysis of how e-services influence educational satisfaction.

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