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TOWARDS A NEW STUDENTS SATISFACTION MODEL IN ONLINE ENVIRONEMENTS FOR ACADEMIC PERFORMANCE

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ABSTRACT

Online learning has established itself as a significant component of education, and models of user satisfaction and continuity of use are critical for assessing the efficiency of online learning platforms. This paper reviews prominent models such as the Technology acceptance model (TAM), The expectation confirmation model (ECM), Delone and Mclean information system success model (D&M ISS), Self-regulated learning (SRL), Task-technology fit (TTF), Self-Determination Theory (SDT), The innovation diffusion theory (IDT), Social Cognitive Theory (SCT), and Community of Inquiry (CoI), these theories have been developed to measure factors that leads to success in the online learning environment. Our study not only criticizes these models but aims to make a significant contribution to the field. The research contribution of this study is to propose a new model of learner satisfaction that leads to improve academic performance, this model is created based on the combination of several models such as CoI, SDT, TAM, ECM, IDT, SRL, TTF, D&M ISS , our model offers a comprehensive understanding of student behavior that allow online learning providers to better understand students' behavior and make defensible judgments to enhance their platforms and boost user engagement. Our research stands as a significant contribution, advancing a more holistic understanding of student satisfaction and contributing to the ongoing evolution of online education platforms.

Keywords: *E-Learning; Models Of User Satisfaction; Continuity Of Use; Performance Impact*

1. INTRODUCTION

The development of online education has been nothing less than phenomenal in recent years. Millions of students worldwide now have access to a variety of educational possibilities through an online learning environment thanks to the widespread availability of internet connectivity and the development of e-learning platforms.

The flexibility of e-learning is one of its key benefits. With an internet connection, students may access the internet from any location and study at their own pace and on their own schedule. Many students find this flexibility to be quite interesting, especially those who have obligations to their families or jobs that make it challenging to attend traditional sessions.

Although this flexibility can be a double-edged sword, it can make it simple for students to lose interest or motivation, which, regrettably, has a very significant impact on abandonment, failure, and dropout rates.

This problem highlights the urgent need to find out if the various needs of students are sufficiently met by the online platforms that are already in use.

Even while there is no denying the advantages of online learning, it is crucial to investigate whether these platforms can satisfy both teachers' and students' needs.

In order to encourage student satisfaction, persistence, continuance, and success on online learning platforms, this study will identify and examine the critical success elements.

Our study is motivated by a gap in understanding the specific factors crucial for success in online learning.

In fact, even though the researchers have looked at relationships between students' satisfaction and other characteristics, there are still some unanswered questions in the literature. Few research has looked at the connection between more than four models of student satisfaction and performance impact.

We aim to identify key factors crucial for success in online learning. By doing this, we seek to gain a deeper understanding of the dynamics in online education. These insights can serve as valuable guidance for educators and administrators, helping them to create more effective and engaging learning environments for students.

This paper is organized as follows: after a brief introduction, section 2 is dedicated to literature review and gives an overview of previous works in e-learning and user satisfaction. Section 3 presents a critical analysis of user satisfaction models. Sections 4 introduces our proposed approach, before concluding this paper.

2. RELATED WORK

2.1 E-learning

Because to the COVID-19 pandemic, which forced many colleges and institutions to move to online instruction, e-learning has become more and more popular.

E-learning has been used in education since the 1950s. It refers to instructional techniques that deliver content using electronic media. E-learning is also referred to by the phrases web-based learning, technology-based learning, online learning, networked learning, and others[1]. E-learning is the use of multimedia technologies and the Internet to enhance learning by increasing access to resources and services, as well as exchanges and collaborations at a distance that can help students in their studies and that can also help teachers predict the weaknesses, strengths, and level of understanding of students. E-learning systems promote learning and training through the use of ICT[2]. The educational system is going through significant transformation as a result of online learning. Students may access course materials, engage with teachers and peers, and complete their assignments whenever and wherever they choose thanks to this technology. Online courses and tutorials, interactive live virtual classrooms, and many other forms are available.

Online education has several benefits, including convenience, adaptability, and the ability to learn at your own speed. But it also needs self-control, time management skills that work, and a reliable internet connection.

2.2 User satisfaction

User satisfaction is one of the most crucial elements in the field of information systems and technology of use. It is defined as the degree to which internet users are satisfied with their decision to use the internet and that it satisfies their expectations. It is an expression of how users feel about a specific computer program that they are directly interacting with. It also has to do with the user's perception of the system's use and willingness to use it again[3].

In this paper, user satisfaction is an indicator of the effective interaction between the online learning system and the learners. The degree to which students believe the online learning system fits their needs for online learning can be characterized as user satisfaction in the context of an online learning system[4]. It also refers to how students feel or act toward learning activities, which is a clear indicator of how well students' expectations are met during the learning process[5].

User satisfaction is a critical factor in the success of online learning. Although there are many advantages to online learning, it is crucial that platforms are created with students' needs in mind. by offering interesting and dynamic content, efficient assistance and feedback, and a highest learning environment.

2.3 Factors influencing e-learning

2.3.1 Online Learner Factors

E-learning is quickly gaining popularity as a way for people to study and develop new skills. Yet, not all e-learning courses are created equal, and not all students respond to it in the same way. In this section, we'll take a closer look at some of the key factors influencing e-learning from the standpoint of learner characteristics.

Learner-related elements, such as student engagement, learner-learner interaction, learner-instructor contact, and learner's involvement with content, have been found to have an impact on online learning systems. Learners' long-term objectives are crucial indicators of how successfully an online learning system will work[5]. Additional key aspects affecting the success of e-learning include interaction with other students, self-efficacy, attitude toward e-learning, and commitment to online studies[6]. Organizations

may develop e-learning courses that are interesting, efficient, and open to a variety of learners by taking these elements into account:

1-learning Style: Every student has a different learning style, thus efficient e-learning programs should take this into consideration. While some students could benefit more from visual aids, others might learn more effectively through listening or tactile input. E-learning programs need to be made with a variety of media in order to accommodate diverse learning preferences[6].

2-Motivation: The learners' motivation determines how well e-learning will work. If learners are driven by a desire to learn, to achieve specific goals, or to improve their skills, they are more likely to be interested in and effective in e-learning. Clear objectives and a sense of progress should be included in e-learning programs to keep students engaged [6].

3-Age: Age can have an impact on how effective e-learning is. Younger students might be more familiar with technology and more receptive to novel teaching approaches than older students, who might favor more conventional approaches [6]. Different age groups and their preferred learning styles should be taken into consideration when designing e-learning programs.

4-Cognitive Ability: Students with cognitive disabilities may require specialized help for successful e-learning. E-learning programs should offer accommodations and assistive technology to help students with cognitive problems. For kids who have cognitive limitations, adding audio descriptions to visual items or providing text-to-speech software can increase participation[6].

2.3.2 Online Instructor Factors

The characteristics of the instructor are also very important in determining the nature of the e-learning experience. The way instructors approach online learning, their depth of knowledge, their ability to organize their lessons and connect with students will all have a big impact on how satisfied their students are with it[5]. Instructor Characteristics focuses on the instructor's environments while teaching. It involves the instructor's attitude, adaptability, familiarity with educational technologies, teaching style, and effectiveness in motivating students[7]. Other crucial elements determining the success of e-learning include the instructors' attitude toward it, easy language communication, and appropriate timely feedback[6]

2.3.3 Online Platform Factors

The online platform that delivers e-learning programs also plays a crucial role in shaping the e-learning experience. Online course interface design has a significant impact on learners' satisfaction and that the more user-friendly the platform interface design is, the more satisfied learners feel toward online learning. The facilities that are offered for both students and teachers are the center of the learning environment. A learning management system, technological setup, interactive learning, access, and navigation are all included[7]. Other significant variables influencing the effectiveness of e-learning include the appropriate system, ease of access, technical support for users, good internet speed, effective technology infrastructure, and reliability[6]. There are many other factors that can influence the effectiveness of e-learning, including online platform characteristics such as user-friendliness, accessibility, technical capabilities, customization, security, integration, and technical support [6].

2.3.4 Online Instructional Design Factors

To achieve the goals of the institution, instructional design focuses on the instructional system. It takes into account the quality of the information, objectivity, learning methods, and learning psychology[7]. Other crucial elements determining the success of e-learning include interactive learning activities, appropriate course design, the use of multimedia instruction, and understandable content [6].

There are many other factors such as clear learning objectives, engaging content, interactive elements, meaningful assessments, personalization, accessibility [5].

2.4 Models of user satisfaction and continuity of use

Models of user satisfaction and continuity of use are used to understand and predict the factors that influence user satisfaction and the likelihood of continued use of e-learning systems [1].

2.4.1 Technology Acceptance Model (TAM)

One of the models that is most frequently used in research on how individuals perceive and use technology is the Technology Acceptance Model (TAM), that was adapted from the Theory of Reasoned Action (TRA) [1].

TAM is a framework that explains how individuals form attitudes and intentions towards using a technology. It suggests that two factors, perceived usefulness and perceived ease of use, determine an individual's attitude towards using a

technology, which in turn determines their intention to use it [1].

[1] Defined perceived ease of use (PEOU) as, "the degree to which an individual believes that using a particular system would be free of physical and mental effort". Moreover, [1] defined perceived usefulness (PU) as "the degree to which a person believes that using a particular system would enhance his or her job performance". The TAM states that a learner's attitude toward using an e-learning platform depends on how beneficial and simple they believe it to be. An intention to use the e-learning platform results from a favorable opinion toward it. The theory also claims that attitudes about adopting technology will eventually affect how it is used in practice [8].

Based on this approach, the designer can typically get feedback from users on the platform's ease of use and usefulness, but not on its qualities, such as flexibility, integration, reliability, information integrity, etc [9].

2.4.2 Expectation Confirmation Model (ECM)

The expectation confirmation model (ECM) is a theoretical framework used to understand how consumers' perceptions of a technology affect their continuous use of it [8].

Bhattacherjee created ECM in 2001 to explain user satisfaction and identify factors that influence users' intentions to keep using information systems. Perceived usefulness (expectation), confirmation, satisfaction, and continuance intention are the four variables in this theory[8].

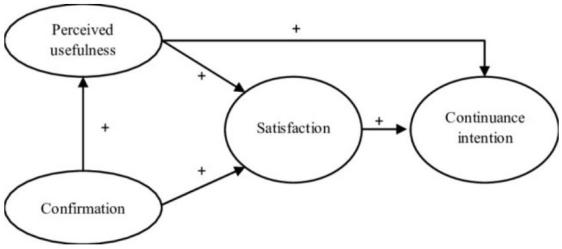

Figure 1: Expectation confirmation model (ECM) [10]

The degree to which consumers perceive that their expectations of a technology's utility and its actual performance are compatible is referred to as confirmation[11]. The degree to which a person believes that using a particular system is valuable and would improve their performance is known as expectation (perceived usefulness) [11]. An affective condition known as the emotional response to a product or service encounter is referred to as satisfaction [11]. The behavior of a user to continue using a service after accepting it is referred to as continuance intention [11]. This model states that the satisfaction level with the user's primary expectations and the user's perception following an online experience, which is displayed as a perceived utility, are what drive the user to continue using some of these technologies [12].

ECM might help us understand why some students stick with an online learning platform while others could stop using it after a brief trial period. According [13] ECM claims that a user's initial expectations of a technology will affect how they employ it in the future. Users are more likely to continue using the technology if their actual experience is consistent with what they had initially anticipated. On the other side, if their experience considerably falls short of what they had anticipated, they might stop using the technology. In conclusion, the expectation confirmation model contends that students' first perceptions of an online learning environment will affect how frequently they use it. So, in order to promote sustained usage of the platform, online learning providers should concentrate on making sure that students' initial expectations are in line with the actual user experience.

The ECM primarily focuses on expectations and how they are met or not met, as well as how this affects satisfaction. It might not include other important factors that affect online learning experiences, like peer collaboration, teacher assistance, social connections, and the efficacy of course contents.

2.4.3 Delone and Mclean Information Success Model (D&M ISS)

The original DeLone and McLean model is built on the basis of six factors, system quality, information quality, use, user satisfaction, individual impacts, and organizational impacts[8]. Use and user satisfaction were influenced by system and information quality. The relationship between use and user satisfaction determines the individual impact, which in turn influences the organizational impact [8].

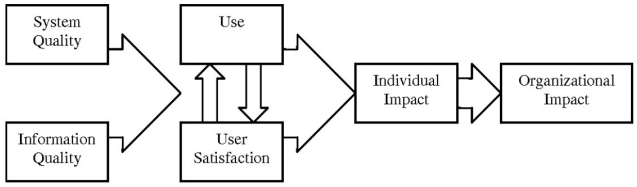

Figure 2: Delone and Mclean information success model (D&M ISS) [14]

D&M proposed an updated information system success model built also on the basis of six factors, system quality, information quality, service quality,

intention to use, user satisfaction, and net benefits [8]. The following are the main variations between the old and new D&M ISS model: (1) The model had service quality added to it to emphasize the significance of service as a factor in IS success. (2) Use as a behavior was replaced by Intention to use as an attitude and actual use. (3) Individual impact and organizational impact were grouped as net benefits [8].

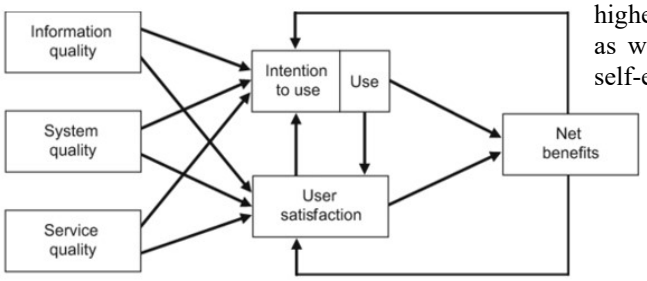

Figure 3: Updated D&M IS Success Model [14]

In the context of online learning, the DeLone and McLean Information System Success Model can be used to evaluate the success of an online learning system, and the net benefits refers to learning outcomes.

Although content quality is essential, online learning effectiveness depends on a broader range of elements, such as course design, instructor-student interactions, peers' interactions, and learner support. These elements weren't given enough consideration.

2.4.4 Self-Regulated Learning Theory (SRT)

Self-regulated learning (SRL) theory is a psychological approach that emphasizes the importance of learners' metacognitive, motivational, and behavioral strategies in controlling and directing their own learning process[8]. Planning, monitoring, and evaluating one's learning while using effective tactics to accomplish goals is a dynamic process that people engage in [8]. According to[15] "It is a set of activities that individuals do by themselves in a proactive way". This model explains how people actively participate in the learning process by defining their goals, tracking their progress, and modifying their strategies as necessary to meet their learning objectives [15]. Cognitive and developmental psychology studies in the 1980s gave rise to the notion of SRL, which has since grown to be a crucial area of study in the field of education [15]. Self-regulated learners, in the words of Zimmerman (2002) "develop an awareness of their thinking and learning processes, set goals, select and use appropriate strategies, monitor their progress, and evaluate their outcomes". In the context of online learning, according to [2] "The word "self-regulation" refers to a student's ability to regulate his or her thoughts and actions". Corresponding to the SRL concept, learners' motivation and cognitive functions play a crucial role in determining how well they learn. It implies that self-regulated learners are better able to direct their learning, to persevere in the face of difficulties, and to accomplish their objectives. Moreover, self-regulated learners frequently display higher levels of academic engagement and success, as well as increased metacognitive awareness and self-efficacy [16].

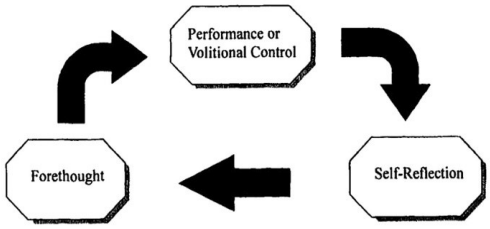

Figure 4: Self-Regulated Learning Theory(SRL) [17]

The forethought (preparation) phase, the performance or volitional phase, and the self-reflection phase are the three phases of the SRL paradigm. Goal detection, strategy-planning, task analysis, and resource identification are all part of the forethought phase of a work [15]. Using the techniques and tools defined in the planning phase to complete the work, assessing progress, and making adjustments as necessary are all part of the performance or volitional phase [15]. Evaluation, identification of what worked and what did not work, and planning for future learning are all part of the self-reflection phase it's where the learner self-assesses, reacts, and adapts for future performance [15].

Learners can regulate their learning process through a variety of ways. Goal-setting, self-evaluation, planning, organizing, self-instruction, and self-monitoring are some of these strategies. A self-regulated learner might, for instance, decide to learn a new skill, and then make a plan to accomplish the task, including selecting the required tools and techniques [2]. The learner might then keep track of their development throughout the process and modify their strategies as necessary to achieve their objectives.

Online instruction frequently lacks the immediate presence of an instructor or peers, which might leave students who struggle with self-regulation without direction and support. It may be difficult for certain learners to successfully control their learning process without consistent engagement and feedback.

2.4.5 Task-Technology Fit (TTF)

The compatibility of the technology and the learning task is one of the most important factors when it comes to online learning. This section looks at the idea of task-technology fit and how it relates to online learning.

[18] described the concept as "the extent to which technologies assist users in their performance of coursework or jobs." Task-technology fit refers to the degree to which a specific technology supports the objectives and specifications of a given learning activity [18]. For instance, while certain learning assignments may call for real-time collaboration, others might involve self-paced reading or video watching. Finding the appropriate fit can have a big impact on how effective online learning is since different technologies might be better suited to different sorts of work. According to [19] The task-technology fit model is based on the requirement for a correlation between technological features and task requirements. It refers to the match between a user's work needs, their abilities, and the capability of the technology to support the task [20].

The compatibility of the technology with the goal is crucial to online learning's success. The learning goals and objectives of the course can be complemented and enhanced by the use of the right technology, whereas a poor fit may lead to reduced engagement and disappointing learning outcomes.

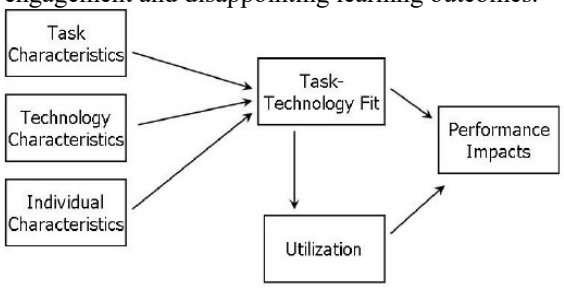

Figure 5: Task-Technology Fit (TTF) [21]

The theory primarily concentrates on the integration of technology with learning activities but may not completely take into account other crucial elements, such social interaction, motivation, and engagement, which also have a big impact on the success of online learning.

2.4.6 Self-Determination Theory (SDT)

Self-Determination Theory (SDT) proposed by Deci and Ryan (1985), is a well-known psychological theory of human motivation that explains why people are motivated and behave in certain ways [22]. According to [22], people are motivated and engaged in a variety of activities by three inborn psychological human needs: autonomy (feeling self-governed and self-endorsed), competence (feeling competent with tasks and activities), and relatedness (feeling connected, loved, interacted, feeling included with others). That encourages them to take action or not [22].

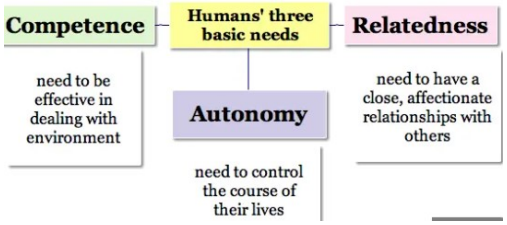

Figure 6: Self-Determination Theory (SDT)[23]

Self-determination theory can be used in the context of online learning to assist instructors and designers in producing a more interesting and productive learning environment [24]. These are some examples of how self-determination theory principles can be applied to online education:

Autonomy: Online students should have some kind of autonomy over their educational process. This can be done by giving them control over the direction of their education. For instance, giving students options for how to complete a course, letting them select their own assignments or projects, and letting them define their own objectives and due dates can all help them feel more in charge and autonomous [25]. Competence: Students must feel confident in their capacity to understand the subject. This can be helped in online learning by giving them honest evaluations of their performance, employing engaging activities, and ensuring that the content is clear and pertinent to their interests and objectives[25]. Relatedness: Students must experience a connection to one another within the learning environment. This can be achieved by creating opportunities for social interaction and collaboration, such as discussion forums, peer feedback, and group projects.

Different age groups may not respond to SDT applications in online learning similarly. For instance, younger students might need more external structure and direction to create intrinsic motivation.

2.4.7 Innovation Diffusion Theory (IDT)

The innovation diffusion theory (IDT) explains how new concepts, goods, or technological advancements propagate within a society. It explains the method through which people gradually develop new inventions and points out a variety of factors that influence this choice [26].

In the context of online learning IDT can be used to comprehend how and why instructors and students accept and use new technologies and online learning tools.

According to [27] The diffusion innovation theory looks into how to spread new technologies throughout a society. It takes into account the elements of relative advantage, compatibility, observability, trialability, and perceived complexity, all of which have the potential to significantly influence corporate technology adoption.

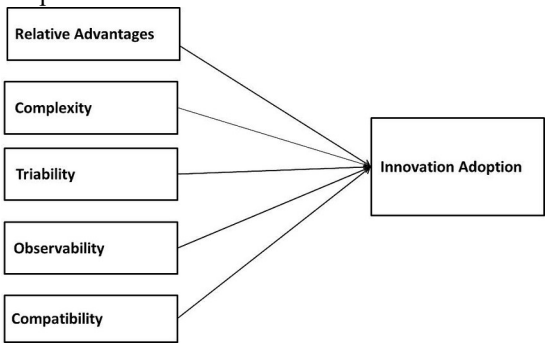

Figure 7: Innovation Diffusion Theory (IDT) [28]

Relative advantage: is the extent to which individuals believe the new innovation is better than the old one. This term so refers to the extent to which students believe that using an e-learning system can improve their academic achievement [26].

Compatibility: relates to how much society believes that the invention is compatible with "existing values, prior experiences, and needs of the potential users" according to providing facts [26].

Observability: refers to the level of which "the results of the innovation are visible to others". A novel concept is more likely to be discussed among peers when it is more well known, as friends of an adopter frequently inquire about innovation evaluation data [26].

Trialability: relates to how much people believe they must experience the innovation before deciding whether to adopt it or not [29].

complexity: is the perceived level of end-user difficulty in comprehending innovations and their use [29]. According to this definition, the terminologies are used in the current study to describe how much difficulty a learner perceives as having an impact on his or her ability to learn.

The theory mainly concentrates on personal adoption choices and tends to ignore the impact of social networks and relationships on the spread of ideas. In actuality, people are frequently guided by their friends, family, coworkers, and other connections.

2.4.8 Social Cognitive Theory

Albert Bandura developed the Social Cognitive Theory based on the concept that learning is affected by cognitive, behavioral, and environmental factors [25].

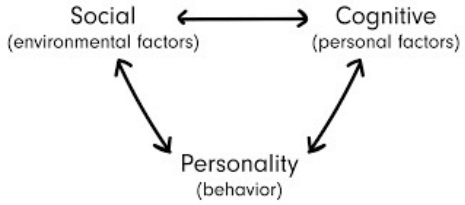

Figure 8: Social Cognitive Theory SCT [31]

"According to social cognitive theory, behavioral competencies, social competencies and cognitive skills are acquired through observational learning" [30]. It explains how people learn and develop through their interactions with others and their environment. "The individual observes the modeled event and forms a cognitive construct, which shape future behaviors" [30].

According to [30] Social cognitive theory's central hypothesis states that learning happens as a result of a mix of observation, imitation, and reinforcement. In other words, when students emulate the behaviors and actions of others, they get positive feedback for doing so, which motivates them to keep improving their skills.

Personal variables especially refer to the cognitive, emotional, and biological experiences of the learner. Environmental events were described as the "instructional environment," which was made up of social and physical components, while behavior was described as the acts used to achieve desired goals, such as "the persistence of achievement-related behaviors [32]

In the context of online learning, social cognitive theory can be applied in a number of ways. For example, online learners may observe and imitate the behaviors of their peers or instructors through online discussion forums, video lectures, and other interactive tools. This can help learners develop a deeper understanding of the course material and engage in collaborative learning activities [30].

The main focus of Social Cognitive Theory is on how individuals behave and learn. While it recognizes that social interactions play a role, it doesn't thoroughly investigate the larger societal and structural influences that can impact behavior.

2.4.9 Community of Inquiry Framework

The Community of Inquiry (CoI) framework is a popular online learning approach that highlights the value of social presence, cognitive presence, and pedagogical presence within a community of inquiry that is composed of teachers and students in building a rich and fruitful learning environment [33].

Garrison, Anderson, and Archer (2000) were the first to suggest the CoI concept, and online education has subsequently adopted it widely they also proposed a number of indicators for each type of presence [33].

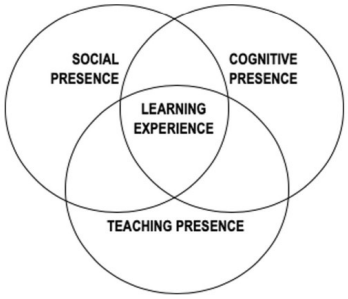

Figure 9: Community of Inquiry Framework (CoI) [34]

Garrison et al. (2001) defined social presence as the "ability of participants . . . to project their personal characteristics into the community, thereby presenting themselves to other participants as 'real people'" it means how connected and involved students feel with their classmates and teachers. This involves both cognitive and emotional connections, such as emotions of mutual regard, belonging, and trust [33]. Many activities, including group conversations, peer reviews, and cooperative activities, can promote social presence [33]. Garrison et al. (2001) defined cognitive presence as "the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse in a critical community of inquiry" that means the ability of students to create meaning and learn something new in an online learning environment. With exercises like problem-solving exercises, case studies, and online discussions, this can be encouraged. It also incorporates critical thinking, investigation, and reflection [33]. A teacher's "teaching presence" is their capacity to encourage and support online learning. This covers tasks like planning and preparing lessons, leading conversations, giving comments, and directing the learning process [33].

The CoI framework highlights the connection of these three elements and claims that a harmonious combination of all three is necessary for an effective online learning environment. For instance, a strong social presence can improve cognitive presence, whereas a strong teaching presence can promote both social and cognitive presence by offering direction and feedback on learning activities.

The Community of Inquiry Framework was initially created for online learning settings. Therefore, its usefulness in other educational situations, like regular in-person classrooms or blended approaches, could be restricted.

3. CRITICAL ANALYSIS

There are several criticisms of models of user satisfaction and continuity of use in online learning, including:

-Individual characteristics like personality traits, cognitive ability, and life experiences have a big impact on how people behave and how they use technology. In these models, these elements are frequently ignored or oversimplified, which results in a lack of individualized understanding.

-These models frequently focus on a limited number of factors or components, which may not adequately represent the complexity and variety of real-world situations.

-Models and theories frequently offer static frameworks, which might not take into consideration the dynamic nature of technology and learning contexts. These models may become soon out of date or less useful due to societal changes and rapid technical improvements.

-Although these models give us insights into how behaviors work, they may not give us any practical advice on how to use that knowledge to build things like technological applications.

-Some models do not properly take into account the social factors that can affect user satisfaction and continuity of use. For instance, they neglect the most important element that can help to reach satisfaction within an online platform which is interactions between users.

-These models frequently rely on quantitative information, which may ignore qualitative insights and the depth of understanding that qualitative research may provide.

The existing literature on online education and user satisfaction models reveals a gap in comprehending the specific factors vital for sustained student engagement, satisfaction, and academic success in online learning environments. While various frameworks have been proposed, they often lack a comprehensive integration of key elements crucial for student success. This study addresses this gap by conducting a targeted investigation into critical success factors that enhance students' satisfaction, persistence, continuance, and success on online learning platforms, contributing to a more nuanced understanding of the dynamics within online education.

After critically analyzing the existing literature, it's clear that there's a need for research questions related to improving the technology in online learning. Many existing frameworks don't

thoroughly explore how computing technologies impact user experiences and academic success.

4. PROPOSED APPROACH

In order to understand student satisfaction and continuity of use that leads to positive performance impact, this study looks at how the models and theories: TAM, ECM, D&M ISS, SRT, TTF, SDT, IDT, CoI can be combined and integrated to reach that goal.

The CoI framework defined "social presence" as the capacity of learners to present themselves to their peers as real persons[35]. And "teaching presence" as the capacity of teachers to plan, facilitate, and guide social and cognitive processes to achieve pertinent and significant learning outcomes [35]. [35], [36] and [37]assumes that the satisfaction of students with online courses relies on the attributes of these presences. Thus, the following hypothesis is worthy of testing:

H1: Social and teaching presence affect positively learners' satisfaction.

The SDT defined "autonomy" as a feeling of control and agency, "competency" as feeling capable in carrying out tasks and activities, and "relatedness" as feeling a part of or connected to others [38]. According to [39] all three fundamental psychological needs central to SDT's basic needs theory—autonomy, competence, and relatedness—were prominent within students' highly satisfying learning experiences and were linked to positive affect. Thus, we can assume that:

H2: competence, autonomy, and relatedness affect positively learners' satisfaction.

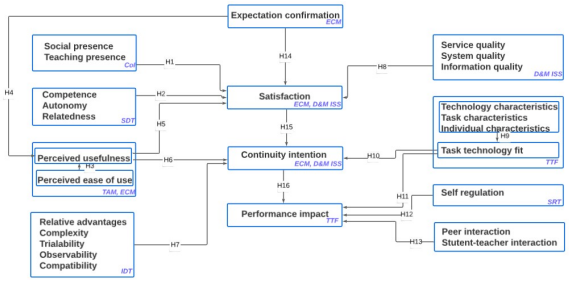

Figure 10: the proposed approach

The TAM defined "perceived usefulness" in the context of online learning as if learners believe that the online learning platform can enhance their academic performance, they are likely to utilize it more extensively as part of their learning journey. And "perceived ease of use" as a learner's perception of the level of effort required for online learning [40]. According to the study conducted by Jee-Hoon Han [41], perceived ease of use showed a statistically positive effect on perceived usefulness and educational satisfaction, and perceived usefulness had a statistically positive effect on educational satisfaction and acceptance intention. These results are quite similar to what [42] assumed and also [43] results that claims that only perceived usefulness had a significant effect on customer satisfaction. Even though perceived ease of use was found not to have a significant effect on user satisfaction, it turned out to have an indirect effect on customer satisfaction through perceived usefulness. Therefore, we can make these assumptions:

H3: Perceived ease of use affect positively perceived usefulness

H5: Perceived usefulness affect positively satisfaction.

H6: Perceived usefulness affect positively the continuity intention

The IDT defined "relative advantage" as the extent to which a new thought is seen as being better than the old one [44], "compatibility" as how well an innovation aligns with current norms, and values [44], "complexity" as the extent to which an innovation is seen as being somewhat challenging to comprehend and apply [44], "trialability" as the degree to which an innovation may be experimented with on a limited basis [44] and "observability" as a measure of how clearly others can see the effects of an innovation [44]. According to the studies conducted by [45], [46], [47] and [48] for users to accept and use the innovation provided, these tools need to provide them relative advantages. Based on [45], [46] and [47] compatibility of the technology with one's values positively affects the attitude toward using the technology which leads to accept and use it, and same thing goes for trialability. [45], [47] and [48] assumes that the adoption of a new technology is positively related to the observability of using the technology. Complexity, on the other hand is seen based on [47] and [48] studies as a parameter that affect negatively the innovation adoption. Thus, we can suppose that:

H7: Relative advantages, trialability, observability and compatibility affect positively the continuity intention and complexity affect it negatively

D&M ISS defined "service quality" as the degree to which service levels satisfy user expectations in terms of empathy, certainty, responsiveness, reliability, and tangibility [49], "system quality" in the field of e-learning is a construct that evaluates the educational aspects of e-learning, encompassing features like usefulness, flexibility, communication tools (chatting and

forums), multimedia integration (video), and other collaborative elements[49], and "information quality" as the information system's ability to provide high-quality outputs [50]. The results of numerous researches demonstrate that the three categories of quality parameters suggested by the D&M model have a direct and significant impact on students' satisfaction with online learning, for instance, the experiments conducted by [49], [51], [52] and [53] propose for instructors and system designers to actively look for ways to improve system, service quality and content quality since they have a big impact on user satisfaction. In the other hand, some studies such as [54], [55] studies insisted on system and service quality as the main predictors of students satisfaction. Hence, we propose that:

H8: System, service and information quality affect students' satisfaction

TTF defined "technology characteristics" as a dimension that focuses on the attributes and capacities of the system being used to complete the task. It covers things like how well the technology works, how easy it is to use, how adaptable it is, and how compatible it is [18] . "Task characteristics" as a certain activity's unique characteristics and requirements, the task's complexity, frequency of execution, and any other special characteristics that characterize how the task is carried out are among these factors [18]. "Individual characteristics" as the qualities and characteristics of the learners who will use the technology to complete the mission , and "task technology fit" as the degree to which technology aids users in completing assignments or performing duties [18]. Several previous researchers such as [56], [57],[58], [59], [60], [61] and [62] come to conclusion in their studies that good technology characteristics improve task technology fit. To the same degree, [57], [59], [61], [62] proved that task characteristics is an important parameter in affecting task technology fit, and similarly [58], [61] manifested that individual characteristics play a crucial role in determining task technology fit. In the other hand, some of the same studies cited above ([56], [58], [59], [60], [61], [62]) and other studies such as [63] investigated the factors influencing the continuity of use intention, and they found out that the behavioral intention of using an e-learning platform is influenced by task-technology fit. The performance impact in our study means that the e-learning system is going to help learners to improve and got better results. This parameter is influenced by a variety of factors including task-technology fit, and that's what the work of [19], [18], [59], [60], [64] and [65] has proven. Therefore, we can suppose that:

H9: technology, task and individual characteristics affect positively task-technology fit.

H10: Task-technology fit affect continuity intention.

H11: Task-technology fit affect performance impact.

SRL according to Zimmerman is a theory that relates to a type of learning that involves metacognition (reflecting on how a learner thinks), strategic activities (planning, monitoring, and evaluating self-progress based on a standard), and the motivation to learn. Prior researches and studies including [36], [66], [67], [68], [69], [70], [71]work demonstrated that self-regulated learning is very necessary for students success in online learning and that the variation in students' capacity for self-regulated learning is the primary factor impacting academic performance. That being so, we suggest that:

H12: Self-regulation learning influence performance impact

In order to test what affect learner satisfaction and continuity of use that leads to success in online learning, the research model aim to combine some models of user satisfaction, and, in addition other factors that may influence directly performance impact such as "peer interaction" that [72] and [73] found that peer group has a significant influence on academic performance of students. [74] and [75] "student-teacher interaction" assumed that the impact of teacher-student relationship on academic performance. Accordingly, we can make this assumption:

H13: Peer interactions and teacher-student interactions influence the performance impact.

Based on ECM, the "expectation confirmation" is correlated with student satisfaction, that what [76], [13], [11], [10] has proven in their research. And also based on the TAM and [13], [10], [77] work, the "expectation confirmation" is also correlated with perceived usefulness. These researchers lead to recommend that:

H14: Expectation confirmation influence students' satisfaction

H4: Expectation confirmation influence perceived usefulness

Based on [10], [11], [13], [41], [51], [53],[59], [76] ,[77] research and experiences, after being satisfied, student behavioral intention of continue the usage of the technology increase, then by being satisfied and continue using the e-learning system, the academic performance improve based on what [78] come up with. So, we can suggest that:

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H15: Students satisfaction leads to continuity intention

H16: continuity intention leads to improve academic performance

The proposed model suggests that these variables dynamically interact to influence learner satisfaction and continuity of use. For instance, outstanding course content may increase students' satisfaction and encourage continued use, whereas a difficult-to-use online learning platform may cause students to lose interest and stop using it. Similar to this, highly involved students who feel like they belong to the platform socially may be more likely to be satisfied with the course and remain with it, but if they don't think the course is helpful, they may eventually stop using it.

The model also aims to evaluate the performance and continuity of use of an educational system by integrating various satisfaction models, namely COI, SDT, TAM, ECM, IDT, D&M ISS, TTF, and SRT, as well as factors such as peer interaction and teacher-student interaction. The ultimate aim is to measure the impact on performance through Expectation Confirmation, which influences satisfaction, which in turn influences intention to continue use, which in turn impacts overall performance.

Scenario:

Step 1: Evaluation of Satisfaction Models:

The user collects data according to the following satisfaction models: COI, SDT, TAM, ECM, IDT, D&M ISS, TTF, and SRT. These models will provide a holistic view of satisfaction.

Step 2: Integration of External Factors

The user also collects data regarding peer interaction and teacher-student interaction. These factors will play a crucial role in the overall perception of satisfaction.

Step 3: Analysis of Expectation Confirmation

Based on the collected data, the user assesses the extent to which users' expectations are confirmed by their actual experience.

Step 4: Evaluation of Satisfaction

Using Expectation Confirmation as a basis, the user determines the level of satisfaction of users with the educational system.

Step 5: Evaluation of Intention to Continue Use

The user measures users' intention to continue using the educational system based on their level of satisfaction.

*Step 6: Measurement of Performance Impact***

Finally, the user evaluates the impact of the educational system's performance, taking into account the intention to continue use.

By combining these satisfaction models with peer and teacher-student interaction factors, the evaluation provides an understanding of the complex dynamics between satisfaction, intention to continue use, and the impact on the performance of the educational system. This approach offers an in-depth perspective to enhance and optimize the overall user experience.

To concisely visualize the crucial interactions within our user experience evaluation experiment in an educational environment, a sequence diagram was created. This diagram graphically represents the exchanges between the key actors - students, teachers and researchers - as well as the educational system and the database. Each stage of the experience is meticulously noted, from the moment the student interacts with the educational platform to the assessment of satisfaction after the improvements have been integrated. This visualization provides a clear and orderly perspective on the interactions that underpin our evaluation methodology.

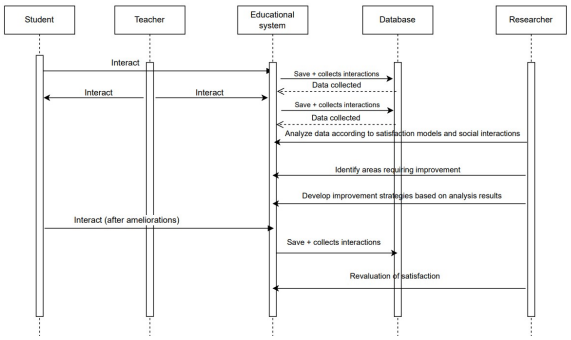

Figure 11: Sequence diagram of the experience

4. CONCLUSION AND FUTURE WORK

This paper has proposed a new model of user satisfaction and continuity of use in online learning ultimately contributing to improve academic performance based on the combination of multiple frameworks such as technology acceptance model (TAM), The expectation confirmation model (ECM), Delone and Mclean information system success model (D&M ISS), Self-regulated learning (SRL), Task-technology fit (TTF), Self-Determination Theory (SDT), The innovation diffusion theory (IDT), Social Cognitive Theory (SCT), and Community of Inquiry (CoI), this proposition came after providing an overview of multiple models and theories that can be used to measure factors in the online learning environment. In this model, we made hypotheses about the relation between the factors proposed by these theories resulting in academic success.

In order to evaluate this model in the context of higher education in Morocco, we suggest carrying out additional research in future studies. The ongoing examination of these hypotheses will not only enrich our understanding but also offer practical insights for refining online learning experiences.

In future work, we intend to validate hypotheses presented above by conducting research in Moroccan universities, the results of this research will allow us to improve our proposed model in order to determine the most relevant factors of academic performance.

Our proposed model is no without limitations because online learning is a rapidly evolving field, and the dynamics of student satisfaction are subject to change. New factors that influence learner satisfaction may be introduced in the future by answering the following questions related to computing contributions:

1. How can computing technologies be effectively integrated into online learning platforms to enhance student engagement?
2. What role do computing-related factors play in influencing students' satisfaction in online learning?
3. How can advancements in computing contribute to the success and effectiveness of online education environments?

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