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SYNTHESIS OF STUDENT ENGAGEMENT ON ELEARNING: A SYSTEMATIC REVIEW OF THE LITERATURE

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ABSTRACT

Restrictions on physical gathering due to COVID-19 has prompted higher education institutions to swiftly adopt e-learning technologies to enhance teaching and learning. While technically, the use of e-learning technologies offers an alternative, importance should be given to such methods' educational suitability, especially how students engage and learn in the spaces provided by these technologies. In this perspective, we evaluated the extent to which e-learning technologies have aided to instructional and learning practices during the recent years. The study conducted a systematic review employing a recently founded tripartite methodology for performing and displaying literature review studies. The paradigm tackles the literature review process systematically and includes three phases for the critical study of literature: description, synthesis, and critique. This review paper focused on student engagement across e-learning platforms. Needed information were gathered from the Scopus and Web of Science databases. We believe that using numerous datasets and diverse methodological techniques can provide deeper insights into student engagement with e-learning technologies.

Keywords: *Student Engagement, E-learning, Online Learning, Student Learning*

1. INTRODUCTION

The entire society has been damaged by the coronavirus pandemic of 2019, which has taken the form of a coronavirus illness. Though our civilization was thrown into instability, we have yet to witness the collapse of most of our institutions. As part of education, instructors and students must switch from face-to-face lectures to online learning environments because of this situation. In the shift to digital educational content, teachers need to carefully plan how they will design new content. Mean-while, students who are graduating and going to work on their own are meeting an entirely new situation. We've seen the same difficulties in moving our university classes online [1].

Computers are playing an increasing role in the way knowledge is constructed as people use the internet more in learning contexts [2]. Terms such as technology-based learning, web-based learning, mobile learning, or online learning have entered the field of learning and teaching due to the current utilization of information and/or communication technologies [3];[4];[5];[6];[7]. "e-learning" has been the most common phrase used to include all types of learning that are made easier through internet technology, both in the recent past and in the future. In other words, "e-learning" is "technology-based learning in which learning materials are transmitted electronically to remote learners via a computer network [8]." "Electronically mediated asynchronous and synchronous communication" is what the present study refers to as "e-learning." When it comes to e-learning, the internet and associated communication technologies serve as the technological underlying [9].

To develop well-designed learning and teaching methodologies and platforms to engage more higher education students in the current generation is a very challenging task, although the current generation is more connected and experienced with technology than the previous generation [10] The teaching process for educators and the learning process for students must be well-designed and well-prepared as it's a very critical issue in any developed country. Education to be successful, it must include and ensure student participation and engagement. Gathering information about engagement will help instructors to adjust their

teaching strategies and to choose the best learning environment that ensures more engaged students [11]

Understanding student engagement is a complex and multidimensional issue, but engagement is necessary for student learning and development. Student engagement has multiple meanings, depending on the person doing the explaining. Additionally, there is little knowledge about how students interact with learning tools and how doing so helps to promote learning [12].

Prior research has provided numerous engagement measurements. But only a small number of measurement techniques have been devised to evaluate students' engagement in e-learning courses. There are many tools that measure students' engagement for learning that happens in classrooms where there are multiple students. These measurements, on the other hand, are inaccurate since they do not indicate how e-learning environments highlight various engagement features rather than face-to-face learning environments. It's important to remember that prior studies on e-learning have relied heavily on behavioral measures to assess student engagement [13].

This article summarizes research over seven years (2015–2021) about students' engagement with different learning technology. Using an in-depth investigation of the definition, meaning, and nature of student engagement in eLearning, as well as researching and investigating measures and methodologies for reporting student engagement, we uncovered valuable findings. This article is a key reference point for understanding how students interact with eLearning and presents approaches to designing eLearning learning environments that are adaptable and flexible. The research area was framed using three guiding questions that were as follows:

1) How are students engaging with different forms of e-learning?

2) How is student engagement on e-learning measured?

3) What are the challenges and opportunities in student engagement on e-learning?

2. METHODOLOGY

Most of the styles are intuitive. However, we invite you to read carefully the brief description below.

This systematic review of the literature follows the systematic PRISMA frame-work and the tripartite model. The PRISMA framework stands for preferred reporting items for systematic reviews and meta-analysis, it's a standard framework. It uses the inclusion and exclusion techniques based on specific criteria to include only the literature related to a specific research area or research questions (Daniel & Harland,2017; [14]. The PRISMA framework consists of four phases: Identification, screening, eligibility, and included (Figure 4). Phase 1 (identification): In this phase the researcher identifies the search strategy which includes research topic keywords or search stings, databases used, and records extracted. Phase 2 (screening): In this phase the researcher determines the selection criteria, or the inclusion and exclusion criteria based on the research subject area and scope. Phase 3 (eligibility): In this phase the researcher performs the quality assessment by reading abstracts of all the articles to exclude any irrelevant article.

Phase 4 (Included): the researcher determines data extraction, which is the actual number of articles that the researcher analyzed in this review. Additionally, the re-searcher implements the tripartite model to analyze and represent the selected literature (Figure 5). This model consists of three parts: description, synthesis & critique. Tripartite I (description): At this stage, the systematic review provides a descriptive summary of the key issues identified in the literature. This process provides the reader with an overview of the evolution of this area, the main areas of discussion, and open research questions. This was followed by a presentation of a carefully justified and identified theme. Tripartite II (synthesis): At the synthesis stage, literature reviews are beyond description. This includes the integration and clarification of relationships between various published literary groups. At this stage, the central focus is on the integration of ideas. This involves extracting the most important ideas and themes and comparing them to identify areas of similarity, differences, and controversies. This allows researchers to clarify and resolve contradictions in the literature, thereby offering the best opportunities. Through integration, researchers ensure that specific issues of interest can be contextualized within the historical context of the subject.

Tripartite III (critique): In the third part, researchers consider the integration of the key ideas identified in the second stage and develop a critical view of the work reviewed in the light of available

claims and evidence. After a thorough explanation and summary, you can apply a level of critical thinking and judgment to your re-views and presentations. Critical involvement requires the development of specific skills and strategies, which primarily means having the ability to investigate claims against alternative evidence or views. It also requires a questionable spirit and tolerance for alternative views and evidence from other sources. The criticism has a positive side, as researchers aim to provide new ideas and alternatives.

2.1 Search Strategy

For this systematic research, the researcher developed a strategy to identify relevant literature. This search strategy was applied on two databases: Scopus, and Web of science. The largest abstract and citation database for peer-reviewed literature, scientific journals, books, and conferences is Scopus which encourages the research-er to depend on it. The database of Web of Science was used as well. This is to provide an extensive set of world-class research literature from a set of carefully select-ed journals, enabling in-depth research of disciplines within the academic or scientific discipline [15]. In this review the researcher investigated the student or learner engagement on eLearning within higher education scope.

So, the search string or keywords used was ("student engagement" OR "learner engagement") AND e-learning AND ("higher education" OR "tertiary education" OR university). This search string produced several records, as shown Table 1, some of them were not relevant to the selection criteria the researcher wants to apply. So, some of these resources are excluded.

Table 1: Primary Search Results

Database	Total results
Scopus	489
Web of science	377
Total	867

2.2 Selection Criteria

The selection criteria were mainly focused on student or learner engagement on eLearning within higher education scope in the field of Business, Management, Social sciences, Humanities Multidisciplinary, Computer science and telecommunications, only English language and open accessed articles have been included. The review included studies published from 2015 to 2021, due to the fast-shifting nature of the literature in the educational field. All articles before 2015 were excluded from search. Table 2 shows the inclusion and exclusion results after implementing the selection criteria.

Table 2: Inclusion and exclusion results after implementing the selection criteria.

Database	Total results
Scopus	56
Web of science	50
Total	106

The following (Figure 1, Figure 2, Figure 3) illustrate the selection criteria for Scopus documents by year, subject area, and type

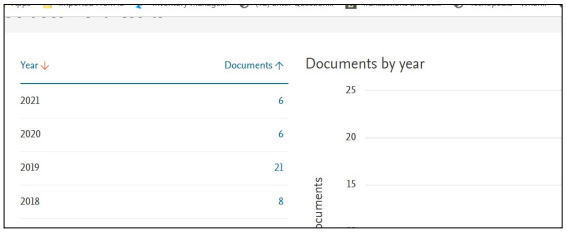

Figure 1: Scopus Documents By Year

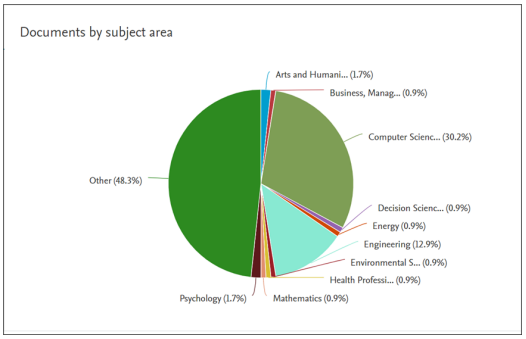

Figure 2: Scopus Documents By Subject Area

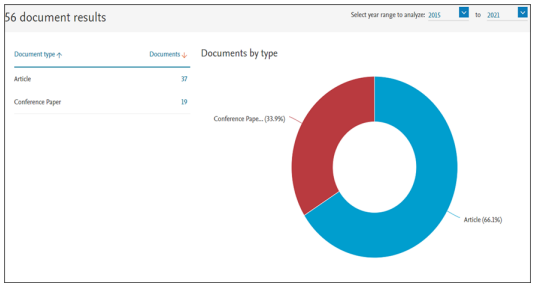

Figure 3: Scopus Documents By Type

2.3 Quality Assessment

This review depends on only peer-review, highly cited papers, original research articles and conference papers from Scopus and Web of science databases. For quality maintenance all articles' abstracts were reviewed deeply to remove duplicates and to be analyzed carefully to ensure the relevance of each article with the review process, to exclude any irrelevant article. Table 3

shows the inclusion and exclusion results after implementing the quality assessment.

2.4 Data Extraction

After reading all Articles' abstracts that exported after conducted selection criteria and quality assessment some of these articles excluded due to irrelevance to the research topic, research subject area or due to duplication. The researcher only included 43 articles in the review process, which are most relevant to the research topic, subject area, and research questions. Table 3 shows the inclusion articles used in the review process.

Table 3: Shows Summary Of The Inclusion Articles Used In The Review Process.

Database	Total results
Scopus	16
Web of science	26
Total	42

The following (Figure 4, Figure 5) illustrate the quality assessment and data extraction

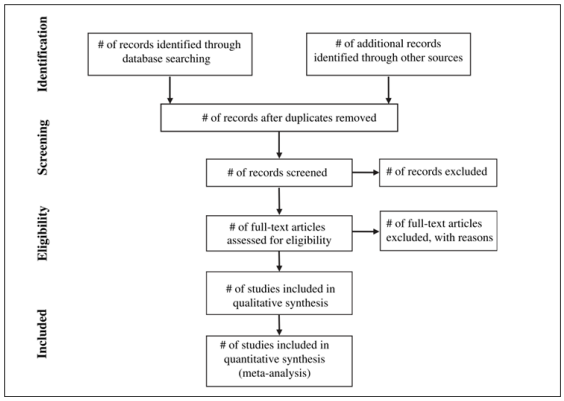

Figure 4: The PRISMA Framework (Liberati Et Al., 2009)

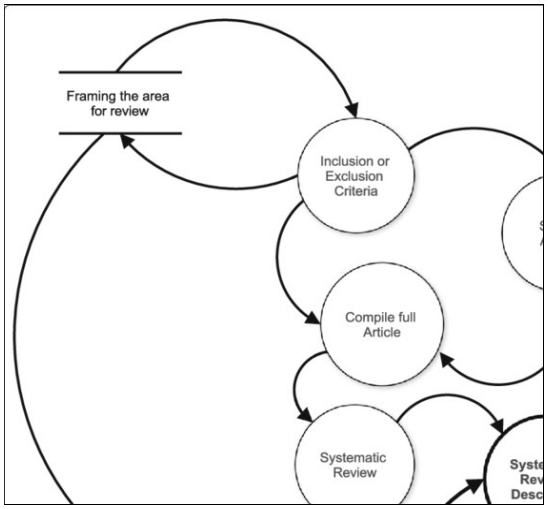

Figure 5: The Tripartite Model: A Systematic Literature Review Process (Daniel & Harland 2017)

3. FINDINGS

learners are most benefited by using motivating e-learning techniques that target goal commitment and volition [2]. Moreover, a course's planning is of critical importance to student enthusiasm [1]. Students' levels of satisfaction with course planning and their motivation both demonstrate a positive and statistically significant association. In addition, a moderate-to-strong statistical link between students' assessment of staff dedication and their satisfaction with course arrangement is observed [16]. satisfaction and engagement are both significantly and positively associated with one another. Furthermore, a marginal but positive association was found between their overall performance satisfaction and their level of engagement. Furthermore, it was discovered that distance education's effectiveness can be enhanced using technological, pedagogical, cultural, social, and psychological factors [17]. Furthermore, the researchers found that student involvement and computer self-efficacy led to increased participation, and student participation led to better learning [18]. Importantly, group satisfaction is a mediator in the relationship between student engagement and group satisfaction.

On the other hand, a study indicated that the flipped classroom students did better in the final tests compared to their traditional classroom counterparts [10]. Moreover, students in the flipped-up classroom structure were 1,61 times less likely than students in the regular classroom format to fail in the module. A better student engagement rate, increased flexibility, and improved student–tutor interactions were all found in this arrangement. On the other hand, a researcher said that e-tutorials were of value because they reinforced classroom learning, giving them opportunity to revise the concepts and contents presented in face-to-face classes, on their own pace and at their own convenience [19]. Students in general enjoyed the e-tutorials, but they preferred a blended learning environment in which face-to-face classes were combined with online classes. However, it was revealed that student user behaviors and LMS engagement levels were extremely individualized and modified depending on their various ages, job statuses, IT abilities, and educational backgrounds. Regarding their LMS satisfaction, the variety, quantity, and quality of content had a strong effect on their initial judgments [20].

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3.1 The Dimensions Of Student Engagement

In conceptualizing student engagement, three components are typically discussed: behavioral, cognitive, and emotional. The behavioral component of student engagement involves participation in extracurricular, social, and academic activities and the effort and tenacity that go along with them. It stresses working on in-class as-assignments, submitting assignments on time, and frequent attendance. It was indicated that the "behavioral part of the engagement that includes exerting effort and attention could be regarded as cognitive engagement" [21]. Cognitive engagement, on the other hand, is associated with self-regulated learning, intellectual curiosity, attention to tasks, and creating objectives. A sense of belonging is when students are emotion-al and engaged during their learning experiences, such as being excited, bored, or anxious. Students' enthusiasm to finish assignments is tied to the feeling of belonging [22];[23]; [24]; [25].

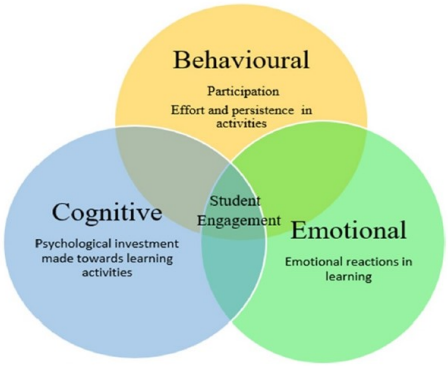

Figure 6: depicts the three dimensions.

These variables are interconnected and help encourage student involvement. The three parts of interaction have separate components, but they are highly interconnected. In addition,[21] concluded that cognitive engagement may be described as the behavioral component of engagement, which involves expending effort and attention. Additional engagement elements have been recognized in literature. [24] talked about academic engagement, but rather than using the broad behavioral engagement that applied to non-academic tasks, he advocated for a more particular approach to the topic. Additionally, [26] discussed social-behavioral engagement as a construct that affects students' performance and enjoyment in collaborative group work. So, it is vital to assess all dimensions when looking at student engagement, as it is important to understand that student engagement cannot be measured by focusing on just one aspect. Behavioral engagement is criticized because of the belief that task participation does not necessarily result in learning outcomes. Student engagement can be recognized as students concentrating on the lecturer, yet a student's attention can be somewhere else [27]. In other words, students can be engaged in their behavior, but not their cognition. the researchers concluded that cognitive engagement is the most strongly associated with learning, and the physical participation of students does not necessarily guarantee cognitive participation [24]. Teachers should encourage cognitive engagement rather than just behavioral engagement [27]. To encourage learning, teachers should guarantee that students thorough, critical, and creative reflection on information, along with reflection on what they know and do not know, occurs. The emotional engagement of students is also disputed because they may or may not feel good about their schoolwork [28]. However, recent study asserts that cognitive engagement is the most critical sort of engagement, and cognitive engagement may involve emotional and behavioral components [24]. One important aspect of learning is for students to be engaged in the subject matter and, in turn, determine whether to use their intellect. The importance and connection be-tween the three engagement factors are further emphasized by this.

3.2 Student Engagement On E-Learning: Descriptive

Engagement, Behavior, Personality (EBP) prediction model was used by the students. students' EBP characteristics affect their academic achievement based on Moodle log data [11]. On the other hand, a researcher focused on determining the extent to which higher education students use volition and goal commitment tactics to avoid online distractions while studying [2]. Educators can learn how to develop and maintain an online course. When previously moved to an online classroom, it was decided to update the research and established multiple digital teaching aspects using current best practices [1]. Furthermore, a study introduced a unique new strategy for predicting student performance: the Learning Fuzzy Cognitive Map (LFCM). By applying this method, we identified the key elements that have the greatest impact on student success, such as student engagement. In addition, this study presented a model of student performance determinants' interrelationships [29].

On the other hand, a study suggested that asynchronous online learning can be a helpful approach for collaborative international studies, with a particularlar emphasis on active class engagement via online discussion boards [17]. On the other hand, a study participated in the creation of a proposed conceptual engagement frame-work for gamified e-learning activities is described in relation to various learning activities and student engagement variables typically applied in e-learning platform [31]. Moreover, a researcher created a predictive model that can forecast student success in a virtual learning environment (VLE) by using four time periods of the online course [31].

A study suggested that the usage of k-means algorithm will be effective in separating learners based on twelve engagement indicators, divided into two categories: inter-action-related and effort-related [32]. On the other hand, a researcher used a flipped classroom model. In response to the knowledge that many undergraduates avoid regular lectures, researchers sought to discover the reason [10].

A researcher aimed to construct a model that illustrates the connection between students' perceived social support and their online English learning engagement to construct a model that shows how students' perceptions of social support correlate with their online English learning participation [33].

Moreover, a study investigates the correlation between student participation and group happiness. This study relies on a structural equation model that places student involvement at the core of determining both predictors and outcomes of this key feature of student learning [18]. Furthermore, a researcher summarized the findings of current e-learning gamification frameworks and explores the different game aspects that are being employed [30]. On the other hand, a study presented a mixed-methods scenario, wherein the use of a pedagogical strategy termed “Digital Moments” (DM) to generate innovative interactive online learning communities is being measured [35].

Another study explored how gamification first affects student learning engagement and the level of interactivity using e-learning technology [36].

Previous research has introduced a range of measures for evaluating students' engagement. Even though very few such models have been constructed to quantify engagement in e-learning settings. In order to meet this objective, A researcher developed a tool for evaluating students' engagement in e-learning environments [13].

A study introduced a novel approach to learning and teaching that blends dynamic learning space (DLS) with mobile collaborative experimental learning (MCEL) to accommodate students' different learning methods. To aid students in keeping up with modern technology, DLS implements state-of-the-art wireless network technologies that allow them to accomplish many tasks, all while handling vast amounts of data and material. The strategy goes beyond a classroom setting by allowing students to extend their learning with the aid of their mobile devices, allowing them to do so anytime and anywhere [37]. On the other hand, a study proposed a conceptual paradigm in the area of e-learning profiling

student behavior based on metadata and the Community of Inquiry Model. This conceptual framework is meant to help students in online learning by evaluating their behavior traits, and therefore better promoting student engagement and online activity design [38].

A study took the best of traditional studio, Virtual Design Studio, and live project methods to produce a unique hybrid process. This blend is designed on generating new possibilities and creating a real design setting to raise various levels of enthusiasm and involvement [39]. On the other hand, a study looked at the efficacy of game-based learning to promote a student-centered educational experience in a Year 2 Personal and Professional Development course. As well as having face-to-face instruction, students were presented with a gamified system with a selection of online learning exercises as additional learning materials [40].

Furthermore, a study explored how learners' engagement and attitude for using mobile learning technology might be increased using the affordance method of material, affective, and social dimensions. The mobile application that was developed in China and had recently been introduced was known as "Rain Classroom." It was used in class to help students with their educational practices both synchronously and asynchronously [41].

On the other hand, a study analyzed the link between virtual learning environment (VLE) engagement and modular degrees at a brick-and-mortar university in the UK [42]. Moreover, a researcher studied the master's course's Web Design and Programming department's gamified learning system [43]. Additionally, a study focused on two undergraduate engineering courses, is of a quantitative nature. Using the Statistical Package for the Social Sciences, Bb activity clicks were compared to classroom attendance, participation in assignments, and performance on the final evaluation for the module [44].

A researcher investigates the different methods of providing a virtual science learning simulation, whether employing immersive or desktop VR [45]. On the other hand, a study attempted to build web-based learning modules to help chemistry and engineering students better integrate sustainability principles and practices [46].

Online video lectures are becoming increasingly popular, with their usage among students increasing. Though, the fact is that students who view video lectures are in the minority, and fewer even finish watching them [47]. Moreover, a study identified how students who are new to the LMS in the Open Education System of Anadolu University perceive the effectiveness and ineffectiveness of the system to inform and guide the improvement of the learning experience inside the system [20]. Furthermore, a researcher focused on the construction and deployment of the Student Relationship Engagement System (SRES), a learning analytics system based on the various course settings [48].

Student intentions to persist have been noted as an area of importance when considering active collaborative learning settings in higher education, to evaluate a model that measures elements that significantly affect the persistence of a student in a virtual collaborative learning environment [49]. On the other hand, A study aimed to get various discoveries about the usage of mobile devices in mathematics and integrate them [50].

A researcher specified the creation and installation of an Interactive Lecture Platform, which employs quizzes that are embedded in the video and uses sensors to measure student interest. To make up for the lack of lecture feedback, we also look at the usage of in-video quizzes as a teaching strategy [51]. On the other hand, a study investigates the variety of teaching techniques employed in 24 MOOCs to determine how well students are engaged in high-quality, collaborative learning activities [52]. Moreover, Lecture Tools, a web-based student response and learning platform, is the subject of this research, which aims to improve the connection between professors and learners [53].

3.3 Student Engagement On E-Learning: Synthesis

Overall performance is linked to satisfaction and engagement, and these things are significantly associated with one another [11], [16], [40]. According to the re-search, exciting e-learning strategies, the appropriate course design, quality teaching materials, and instructors who are dedicated to their students increase student

satisfaction [1], [2], [53]. It was also concluded that the level of achievement and engagement among students was determined largely by the duration of the total online time and the consistency of learning intervals [29], [32], [35], [38], [49]. The findings show that gamification can be utilized as a beneficial approach for motivating learners to use educational tools and to improve their engagement and dedication [30], [36]. Previous studies claim that student engagement involves a blend of behavioral, cognitive, and emotional engagement [13], [33], [34]. Most students were positive towards mobile devices, which enhance their engagement in collaborative learning [37]. It was proven through the investigation that interactive in-video lectures and quizzes were successful in delivering material. To promote active learning, we suggest teachers use quizzes embedded in the videos to help students engage with the content and analyze their own understanding [47].

3.4 Student Engagement On E-Learning: Critique

Adopting an online learning model from the start is an impressive undertaking. Several students encounter many obstacles that diminish their enthusiasm and dedication to a course, and their engagement falls because of their lack of face-to-face connection. Another challenge that teachers have is that they may not have the necessary skills or training to create interesting digital instructional content, which might potentially make the problem worse [1]. Moreover e-learning is developed, promoted, and transmitted in higher education, without providing educators with the time and opportunity to investigate the dangers and benefits of e-learning in education and learning. Studies also show that it might be tough to build and maintain academic engagement [2], [16].

Most students do not have the skills to design a positive learning direction on their own, especially while working on e-learning. In the meantime, if a student finds himself unmotivated while studying anything, the end results may be unappealing [11]. In other words, Students may be isolated in online learning environments and building community may be difficult. Because online students cannot dedicate time for the course, they do not use all their available time to learn, which leads to underinvested effort and diverse learning styles [34]. At the same time a lot of earlier studies reveal that a substantial percentage of students either leave the online learning environment or fail to acquire high grades in it. In addition, online learning courses see a higher rate of dropouts than traditional learning [31]. Further-more, some lack of consistency exists in the literature when it comes to the conception of student engagement, which is a multi-faceted term. While this expansion in distant learning programs enrollment adds a new degree of complexity to student engagement and learning measures. Despite overall growth in demand for distance education, online course dropout rates are typically 10-20% greater than classroom settings. Higher dropout rates may be related to communication challenges, isolation, lower motivation, and students' lack of participation [18], [33].

The practice of gamifying e-learning platforms has different rates of success; thus, some researchers have previously tried to produce standards for this approach. Additionally, it appears that the use of gamification for distance learning has not always been positive because there is no direct touch with the instructor and eye-contact is missing. Therefore, there is a great chance that learners will avoid adopting gamified designs if they fail to match their expectations and needs [30], [36], [43]

As well when it comes to satisfaction, students using virtual learning environments, LMS are less satisfied than students using the traditional classroom setting. Also, it is still somewhat uncommon to use video in on-campus delivery. Regardless of whether lectures are the most appropriate means of assisting students' learning, lectures remain the primary way to provide educational content for students in high-er education. Additionally, an examination of the implications of the use of mobile technology has been limited [20], [45], [50], [51]

4. DISCUSSION AND CONCLUSIONS

As per the findings in this review, the papers highlighted numerous investigations on student interaction with e-learning. A lack of agreement about what defines student engagement in learning, as well as student engagement with e-learning, was discovered during the review. The discrepancies in students' engagement under-standing arose because of differing approaches. Because the variability in meaning and system of measurement was common in student engagement literature, the existence of diverse perspectives was further supported. Studies have utilized different variables and dimensions to evaluate engagement, as ambiguity in meaning makes it impossible to quantify accurately. An example of this is the use of participation as a proxy variable for digital technology student engagement, which is done through click stream data. The behavioral, social,

and cognitive aspects of engagement still dominate as the prominent aspects of engagement, according to the literature. Studies of student engagement that have attempted to operationalize the concept have generally examined only one or two dimensions. Even though it is popular, this strategy does not ensure that the three common characteristics of engagement are interrelated (social, emotional, and cognitive). Furthermore, when one factor of student engagement is measured, a full picture is not obtained. Because its discrete results are trackable, the behavioral dimension is addressed most in the literature. The emotional and cognitive dimensions are completely ignored. People have a hard time observing the emotions and cognitive processes directly, thus they are more likely to rely on self-reported metrics. However, there are certain studies that have employed the use of proxy data in the form of behavioral traces, to a certain extent of success. It has been discovered that engaging the mind leads to more active participation. To gain a complete grasp of engagement, it is important to further explore how to quantify the three characteristics of engagement. Psychological factors of engagement also affect the behavioral dimension of engagement. Several studies employed convenient sampling techniques to conduct their investigations of engagement, with their samples being drawn primarily from single courses and in a particular subject, making the generalizability of their conclusions uncertain. Additionally, some of the research reviewed here suffer from the fact that their cross-sectional design limits their capabilities to explain aspects that can add to our understanding of engagement and how it can be encouraged in e-learning settings. To a better understanding of how students with varied demographic features studying different disciplines engage with digital technology, we suggest a more holistic approach that would include individuals from more diverse domains. In contrast to past generations, students today enter higher education with a wide range of technological know-how, so it is necessary to consider the diversity of the population when examining how students interact with educational technology.

Self-reported measures may not be as accurate as other assessment tools since students may not remember what they did before filling out the self-engagement. Additionally, the reliance on questionnaire-based data that has been predominantly utilized in past studies is subject to the risk of single-source bias. While less intrusive than self-reported assessments, some researches have utilized learning analytics methodologies. Unfortunately, most of these studies have been completed in a little span of time, which means that it's impossible to create lasting patterns. Institutions may also try to comprehend the various student academic performance predictors, which are influenced by several elements such as economic, social, demographic, cultural, and intellectual backgrounds, as recommended by [54]. The variety of fac-tors that influence student engagement is also similar. You could even say that engaging with the learner in a multi-faceted way can lead to an engagement of his or her outcomes. The utilization of data collected on student perceptions only regarding student engagement with e-learning restricts our knowledge of engagement in these environments. Most studies tend to focus on one area of engagement, which might limit their value to researchers. Therefore, using various data sets, such as system logs, may prove to be useful, since e-learning systems typically generate data as a byproduct of their operation.

5. FUTURE DIRECTIONS FOR RESEARCHERS

- In the papers reviewed, there are still a lot of unanswered questions.
- Getting students to use technology in their learning is a difficult task since there is no universally accepted definition of student engagement.
- Current student engagement research does not fully characterize the contextual variety and modalities of student engagement with diverse forms of digital technologies.
- The relationship between student technology use and learning outcomes is unclear and understudied.
- In contrast to existing and emerging technology, multiple modes of engagement (e.g., behavioral, emotional, social, cognitive) are not in sync.

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