A Model of Student Engagement in Online Learning

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***Abstract*— In the field of online learning, the topic of engagement has drawn a lot of attention. According to research, when students engage in their own learning, they experience a variety of benefits, including greater motivation and achievement. Several metrics for gauging student engagement have been proposed in previous studies. Few, however, have been created to assess involvement in online learning contexts. The goal of this study is to create an instrument for measuring student involvement in online learning settings. A critical synthesis of the literature was carried out by categorizing and then critically reviewing the literature in order to construct and integrate the variables that could aid in successful learning outcomes, leading to the development of a framework that can guide in achieving student engagement. This study confirms earlier findings while also directing the development of a student engagement framework for online learning systems. The suggested model would bring value to literature by enhancing and improving understanding of the elements influencing student engagement in an online learning environment, resulting in active student learning.**

Keywords— Student Engagement, Online Learning, Student engagement factors.

I. INTRODUCTION

The coronavirus outbreak of 2019 has an unprecedented negative impact on the modern world at all economic and social levels. The social distancing policy implemented to limit the spread of the virus has significantly disrupted social interactions, especially affecting the educational system. Educational institutes worldwide are grappling to overcome these social limitations put in place as a result of the outbreak [1]. As a measure to ensure continued educational practices, the adoption of online learning platforms is gaining importance at educational institutions worldwide. These online learning platforms offer versatile capabilities of management, planning, delivering and tracking the educational process. The cost-free availability of these tools enables continued learning opportunities during this pandemic [2]. The educational institutions consider the quality of learning conducted via online learning platforms to be equally valuable to the conventional classroom learning. This has led to its widespread adoption by educational institutions of many types. In terms of online course delivery, the medical school curriculum is not unique. Online delivery of course content is also an option, and it may include both theoretical (recorded webinars, video lectures, conferences, etc.) and practical (recorded video components demonstrating manipulations, different forms of medical treatment, or surgical methods) presentations [3].

The COVID-19 epidemic has prompted severe concerns regarding student engagement since many professors experienced difficulty in transitioning to online teaching and learning while preserving the motivation of all students, particularly those from disadvantaged backgrounds [4]. Despite the fact that a number of recent research have examined the variables influencing students' engagement in online teaching and learning [5] [6] [7] [8] [9]. Nonetheless, we are still driven to learn more about this phenomenon since, to the best of our knowledge, no research has empirically studied variables influencing student engagement in online teaching and learning inside higher education institutions during the COVID-19 epidemic.

II. LITERATURE REVIEW

A. Online Learning

One facet of online education is the provision of fully online courses. Online teaching and learning may be traced back to the 1960s at the University of Illinois in the United States. Initially, classes were held utilising a network of connected computer terminals to teach students [10]. Courses that emphasize the development of students' abilities, from knowledge acquisition to assessment, work effectively in a digital format [11]. Because of the availability of the internet, both teaching and learning can take place in a virtual context [12]. Many educators are considering implementing some type of online learning in order to assist their students succeed academically now that such options are available owing to the widespread use of the internet Nguyen [13]. Due to the range and complexity of the concepts at play, it is impossible to

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establish a single definition that encompasses all aspects of online education. Online teaching and learning is a method of training students who are geographically distant from their teachers by utilizing one or more technologies [14]. It is also characterized as a teaching approach in which pupils and teachers are physically separated [15]. Alternatively, it is defined as a method of delivering education using web-based technologies that allow students to engage in learning activities outside of the classroom, from the comfort of their own residences and other off-campus locations [16]. Online teaching and learning can be defined as a type of education in which instructors and students are physically segregated, requiring students to independently acquire course schedules and materials via technological means such as the Internet.

There are many positive aspects of online education and learning. (a) the process of teaching and learning can occur at a time that is more practical and efficient for the student, (b) can occur anywhere with instructors and students world-wide, (c) simplifies and streamlines the process of gaining and imparting knowledge, (d) provides students with access to a broader range of educational materials and information, and (e) can enhance student achievement. High levels of learning success and higher-order thinking abilities are only a couple of the positive outcomes of online learning, which makes learning accessible at any time and from any location [17] [18].

Notwithstanding these advantages, the increased dropout rate in online learning is a major problem [19]. Distance between the teacher and the student means that students are less likely to participate actively in online courses than they would be in face-to-face classes [20]. Because of the challenges presented by the absence of face-to-face interaction between educators and learners, online education is not a viable long-term option [21]. Yet, students who lack the ability to self-regulate their own learning will have a far more difficult time succeeding in an online classroom [22]. Low levels of student engagement have been cited as a contributing factor to the high dropout rate [23].
. As a result, there is a need to identify those factors that hinder sustainability, as well as those that improve it within the higher education institutional settings.

B. Student Engagement

In education, student engagement is defined as the amount of time and energy students put into creating meaningful learning outcomes and experiences [24]. Students who are invested in their studies are more likely to develop their critical thinking skills, obtain higher marks, and find real-world uses for the information they have learned [25]. The level of active learning and education quality may be measured by a student's level of participation in class [18]. Academic achievement, according to experts, requires students' active participation [26]. They stress the need for student' engagement and involvement in order to make universities successful businesses.

There is a lack of research on engagement indicators, despite the fact that student engagement is a critical part of a sustainable campus. As student engagement is seen to have a constructive effect on students' ability to learn and is used as a measure of a university's overall quality of instruction, a reliable method of gauging student engagement is necessary. Both the Motivated Strategies for Learning Questionnaire (MSLQ) and the Student Engagement Instrument (SEI) evaluate diverse attributes of motivation to learn [27]. These tools measure things like students' social skills, their engagement with class activities, their will to study, and their ability to solve complex mental problems. Yet, these measures have their limitations since they do not capture the distinctive features of online learning that contribute to student engagement.

Several studies have examined the level of student engagement in online learning environments; however, these studies are limited because the level of engagement is frequently evaluated by behavioral parameters such as the number of logins, questions asked, lectures taken, articles posted on the bulletin board, and times students participated in online discussions [28]. Yet, some have adapted measures, such as the National Survey of Student Engagement (NSSE), originally designed for use in traditional classroom settings to the online context [18] [29]. Such research, however, has its limitations since it tends to generalise items developed for traditional classroom settings to online learning settings. This makes it unable to capture the nuances of online learning engagement.

C. Dimensions of engagement:

In 2010, the British Higher Education Academy reviewed the research on student engagement and found that there were three main types of engagement that students were more likely to recognise: behavioral engagement, cognitive engagement, and affective engagement [30].

The most fundamental form of engagement is behavioral engagement, which focuses on students' actual actions during lessons. Behavioral aspects of student engagement include students' active participation, hard work, and dedication to academic, social, and co-curricular activities. The bulk of the grade will be determined by how actively and consistently you engage in class activities, tasks, and attendance. Positive student behaviour is the cornerstone of student engagement, as described by Fredricks et al. [31]

Students' ability to understand and direct their own cognitive effort during learning is a key component of what we call "cognitive engagement," and research has shown that employing a variety of different learning techniques leads to distinct types of thought. The term "cognitive engagement" refers to the student's emotional interest in the learning process. Students exhibit this factor when they appreciate the

significance of what they are studying, show an aptitude for a subject, and have an eagerness to improve their knowledge and abilities. The self-directed study, inquiries that test one's true level of knowledge, intense attention to the task at hand, and the establishment of long-term objectives are all hallmarks of the cognitive form of engagement.

Some academics link students' emotional reactions—such as curiosity, boredom, happiness, grief, and anxiety—to a feeling of community and shared ideals; others disagree. Emotional engagement in the classroom relates to how students feel about their learning environments, whether that's excitement, boredom, or worry. Students' motivation to study and succeed in class is often attributed to how well they feel they fit in with their classmates [32].

Although the three components of engagement are unique, they have important similarities. In truth, all three facets of student engagement are interconnected. The interplay between these three types of involvement is not as simple as "why to do (emotional engagement) - what to do (behavioral engagement) - how to do (cognitive engagement)". For example, the effort and attentive behaviour associated with engagement, as described by Filsecker and Kerres [33], might be thought of as cognitive engagement. Behavioral engagement stands out because it is tangible; it conveys and symbolises both intellectual and emotional investment. Active behavioral engagement is more often related to a student's looks than a high degree of cognitive or emotional commitment, and it is not indicative of a student's substantive participation. Yet, if a student shows both emotional and cognitive engagement, it is expected that he would also show involvement in his behaviour. A student's emotional and cognitive involvement must also be low for them to display disruptive behaviour. A student's emotional state is the major factor that determines how invested they will be in the learning process, which in turn affects their behaviour and thought. As a student completes one learning activity, they feel more motivated to go on to the next one and are more likely to apply what they have learned and employ efficient study techniques because of the positive emotions they have experienced.

The research has uncovered new facets of participation. Harris [34] emphasised academic engagement that is exclusive to learning tasks as a means of diverting attention from the broader behavioral engagement that encompasses non-academic activities. Linnenbrink-Garcia et al. [35] introduced social-behavioral involvement as a construct linked to students' feelings and actions in the context of group projects [32]. The idea of "agentic engagement," proposed by Reeve and Tseng [36], accounts for how students actively and positively contribute to the classroom setting. A student's level of agentic involvement influences their initiative and motivation to contribute to the enhancement of classroom practices. Rather than being a third dimension, it might be seen as a combination of the cognitive and behavioral ones. Together the three dimensions show a more complete picture of the students' level of interest [31]. Thus, to have a comprehensive picture of student engagement, we need to take into account more than one factor at a time. Behavioral, Cognitive, and Emotional engagement are highly correlated [31].

In contrast, the research also argues that behavioral engagement such as participation in tasks does not always inevitably lead to effective learning outcomes. An example of involvement in the classroom would be students paying careful attention to the instructor, yet they could also be thinking about something else [37]. Thus, students may be mentally present yet disengaged behaviorally. Nevertheless, Harris [34] argues that cognitive engagement appears to be more directly associated to learning and that it is not always possible to infer a student's level of involvement from their level of physical activity. Teachers, according to Linnenbrink and Pintrich [37], should encourage their students' mental rather than physical activity. Teachers have a responsibility to provide an environment where students may engage in high-level, critical thinking about the content they're studying, as well as self-reflect on their own knowledge and skill gaps, and experiment with different approaches to learning to fill those gaps. The question of whether or not students "feel happy" about attending school and studying has also been debated [38]. Such as the possibility that classroom excitement may not necessarily translate into improved student performance. In addition, research says that cognitive engagement is the most important, although it is thought that emotional and behavioral components may be required to enhance cognitive engagement [34]. For instance, for the activity to be effective, students need to actively take part and voluntarily engage in it intellectually depending on how they feel about it. This further highlights the relevance and interconnectedness of these three types of involvement.

D. Indicators of student engagement:

Cognitive, emotive, and behavioral engagement are the three widely understood elements of student engagement [31], [32]. Participation, perseverance, and good behaviour are all related to cognitive engagement, as are learning approaches, self-control, and understanding; positive responses to the learning environment, peers, and teachers are related to affective engagement, as are a sense of belonging and interest; and behavioral engagement is related to all three.

Following the terminology of Fredricks et al. [31], the term "indicators" is used here to mean something like "demonstrating" or "being a sign of" student engagement, which is stated—and ultimately evident and determined—through cognitive, emotional, or behavioral aspects. These are commonly referred to as "aspects" of engagement. Disengagement must be taken into consideration when discussing engagement, even if it is not properly addressed in this study. It can be stated as a character trait or as an active

action that actively disengages from a learning setting, depending on the circumstances, rather than as a separate notion [39].

Conventional classroom engagement is characterized by the following behaviors: learning effort, contribution in class activities, collaboration, the resolution of intellectual issues, learning satisfaction, a sense of belonging, and learning enthusiasm [40] [41] [41] [42] [43]. Learning effort variables include actions like turning in work on time, reading the assigned material before class, and reviewing notes afterward. When we talk about students' engagement in class, we're referring to things like attendance, making presentations, asking questions, and expressing themselves. To ask questions or get answers on the subject presented in class is an example of an interaction between a teacher and a student. Cognitive problem-solving discusses to the student's reasoning processes, including data formation, comprehension, implementation, and committal to memory, while learning satisfaction is a psychological factor that incorporates the curiosity in learning, outlook about learning, and satisfaction of learning. A student's sense of belonging in class is a function of how successfully they have adapted to their new surroundings and made friends among their classmates. Passion for learning, on the other hand, is a mental attitude that shows itself in the student's eagerness to take on new challenges and their overall enjoyment of the learning process.

Who are the students who are able to get the most out of an online course, and what do they do differently from those who don't? Students' study habits after finishing online courses might be used as a barometer of success in this format. It has been suggested that those who do well in online courses are those who are open with their knowledge, who are self-motivated to learn, who put in enough time for lesson preparation, and who are comfortable with the technology used in these courses [44] [45]. Online students may easily develop their own learning ideas, make effective use of online learning technologies, connect with their peers, learn autonomously, and develop a feeling of community with their fellow students [45]. Hong [46] looked into the routines of the most successful Korean online students to learn more about their strategies. Set a study timetable, talk to your teacher, study in groups, apply what you learn in class to real-world circumstances, develop your own study techniques, pick and choose what you study, and keep a growth mentality.

Dixon [47] suggested that the following aspects contributed to online learning engagement: abilities, feelings, involvement, and performance. Forming efficient study routines, paying attention in class, and taking copious notes are all methods of learning. Emotions include things like effort and the desire to learn. Chatting, talking, and conversing are all examples of actions that count as participation in a course. A project's "performance," in this context, refers to its outcome. Indicators of student engagement in online courses are highlighted by these findings. Students who are self-motivated, who make effective use of their past knowledge, who manage their time well, and who make full use of the available online tools are the ones who succeed in their online courses. They have mastered cooperative learning, can learn on their own, and are outstanding communicators [45] [46] [47].

E. Factors affecting student engagement.

Active engagement on the part of students is crucial for effective learning and teaching. How to motivate students to participate in an asynchronous learning environment is an issue that has received little attention [8]. Dunbar [48] and Roddy et al. [49] have suggested that the success of these projects is driven by students' practical and non-academic skills. The present COVID-19 epidemic and the growth of online education both highlight the need to collect and analyse data on the benefits and drawbacks of online education from the perspectives of all students [50].

Previous research and writings have shown that many different variables affect how actively students participate in online courses. For a case study, Lazareva [8] interviewed 14 persons in Uganda. The study argues that students' levels of engagement in online courses are largely affected by two factors: the accessibility of scaffolding from competent peers and the encouragement of face-to-face classmates. Moreover, the following factors were emphasised by the research: Whether or not students can (a) work together to solve problems and learn (b) if their internet connections are fast and reliable (c) if less-experienced students have access to informal online learning groups where they can seek help from more-skilled peers in order to "stay on board" (d) if they have access to a collaborative learning mode.

Sengsouliya et al. [51] conducted convergent parallel research to examine what factors influence students' commitment to their studies. The data for the study was gathered using a combination of questionnaires (a quantitative research method), in-person interviews, and unstructured observations (qualitative research approach). Students' willingness to learn is mainly affected by teachers' enthusiasm for teaching and by students' capacity to communicate with one another. Several respondents pointed to teachers' warmth and compassion as crucial elements in their own drive to teach and learn. One strategy for doing so is providing students with more opportunities to talk to one another in class. Schrum and Hong [52] study, "Dimensions and Strategies for Online Success: Voices from Experienced Educators" aimed to categorize the characteristics of successful online students through the analysis of primary screening documents and the mapping of those characteristics onto models from the existing literature. The purpose of the survey was to collect feedback from teachers on how they would rate a number of factors and make recommendations for improving their students' chances of

success. Access to resources, technology experience, learning preferences, learning habits and abilities, learning objectives, lifestyle factors, and individual characteristics were all identified and confirmed as significant for successful student engagement.

III. Methodology

This section discusses the methodology and theory that underpin the framework underlying the development of a framework on factors influencing student engagement in an online learning system. The Technology Acceptance Model and the Theory of Reasoned Action were proposed in this study. Several approaches were utilized to collect, synthesize, and analyse the literature in order to build the conceptual framework. The keywords "student engagement in online learning," "factors affecting student engagement," and "indicators of student engagement in online learning" were used in the literature search. Scopus, Google Scholar, ScienceDirect, and Web of Science were used to find the papers.

Following the identification of relevant material, a comprehensive review of the literature was undertaken in order to design and integrate the factors that could aid in the better characterization of student engagement in the online learning system. The epistemological approach was used in this study because it recommends that the findings of the study exist because of the interaction between the researcher and the research issues, as well as because of the researcher's attempt to understand the viewpoints of other studies and researchers and then interpret them [53]. In this study, a method of deductive reasoning was adopted, which was supported by the theories and studies used in the development of the present research. This review process is also consistent with Gilson and Goldberg [54], who stated that the conceptual paper should create a link between existing theories, literature from various fields, multi-level perspectives, and extended the capacity for thinking.

IV. Proposed Framework

The theories, Technology Acceptance Model and the Theory of Reasoned Action support the framework of this study for understanding the factors influencing student engagement. According to the TAM, the user's attitude towards utilizing technology, subsequent behavioral intentions, and actual usage may all be predicted by the user's perception of the technology's ease of use as well as its perceived usefulness. It was also assumed that perceived simplicity of use played a role in determining the usefulness of technology. The preference to technology forms the basis of the learning environment factor as it influences the student engagement.

According to the TRA, an individual's actions are determined by their "behavioral intention," which is influenced by their "behavioral attitude" and "subjective norms" for carrying out the behavior in question. In other words, it asserts that one's attitude towards and perceptions of conduct have a role in shaping both the individual's actual behavior and their intentions regarding that action. As a result, one's actions are a direct result of one's attitudes as well as their beliefs. Previous literature identified that the student engagement is influenced in three dimensions viz., cognitive, emotional, and behavioral dimension. Although extensive studies have been conducted with regards to the factors that influence student engagement, studies from an online learning perspective have prominently gained momentum after the COVID-19 outbreak. The purpose of this study is to identify the factors that affect student engagement in an online learning system at higher education institutes in Malaysia during the COVID-19 pandemic. The information gained through this research can be used to provide useful input for other analyses such as, to develop the action plan to increase the student engagement, guide a coursework for highly engaging curriculum, incorporate tools to improve the student engagement in educational activities in an online learning system.

To comprehensively cover all the aforementioned aspects of learning conducted in an online setup four factors; (1) Faculty Interaction, (2) Peer Interaction, (3) Learning habits and Skills, and (4) Learning environment and technology are proposed. The first three factors Faculty interaction, Peer Interaction and Learning Habits and Skills evaluate the behavioral and cognitive dimensions of student engagement. This is supported by the Theory of Reasoned Action. The technology used to conduct online learning and the class members are the two aspects which together inform the factor of Learning environment and technology. The class members influence the student's sense of belonging and inclusivity which enables a healthy learning environment. This has been well studied in the traditional learning environment and is a crucial aspect of the learning process. Thus, the learning environment and technology factor influences the dimension of emotional engagement in the online learning process. The technology used in an online learning system influences the student perception of comfortability and accessibility in terms of use of the said technology. This is aptly addressed by the Technology Acceptance Model.

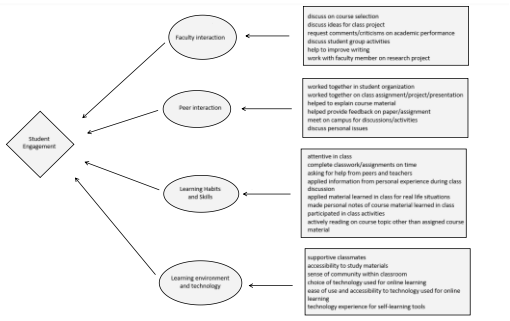

FIGURE 1: RESEARCH MODEL

F. A. Understanding the factors influencing student engagement

The student engagement factors discussed in the literature addressed the indicators that measure the student engagement in an online learning system. This research identified four independent variables (IV), and one dependent variable (DV) for the development of the framework. Table 2.4 below shows the independent and dependent variables of the model.

TABLE 1. STUDENT ENGAGEMENT FACTORS

Variables	***Type of Variable***
Faculty Interaction (FI)	IV
Peer Interaction (PI)	IV
Learning Habits and Skills (LHS)	IV
Learning Environment and Technology (ET)	IV
Student Engagement (SE)	DV

a) Faculty Interaction (FI)

Communication between teachers and students is the most significant element influencing student engagement [55]. Active learning tactics including group projects, problem-solving exercises, and classroom debates are greatly impacted by teachers' dispositions toward their students [56] [57]. Higher academic performance, stronger extracurricular engagement, and more lofty career goals were all linked to students' perceptions of their teachers' support and the feeling of community they felt in the classroom [58]. Student happiness at college is more firmly linked to regular contact with professors than with any other characteristic of students or the institution as a whole. It has been found that students who have regular contact with faculty members are happy with all elements of their educational experience. This includes the intellectual environment, the range of programmes given, and even the administration of the educational institution. So, on the majority of college campuses, it may be a highly profitable endeavour to devise means of fostering enhanced student-faculty engagement [59].

A strong teacher-student connection is key for encouraging students to engage in class, which is why it is so important for students to develop positive connections with their professors [60]. Students are more inclined to participate actively in class if they believe their teachers care more about their success [61], [62]. Any classroom activity in which a teacher works closely with a single student, or a small group of students falls under the category of "teacher assistance" (e.g., one-on-one instruction or group work). For instance, a significant amount of research emphasises the value of teacher-student interaction in promoting higher levels of student engagement [63]– [66].

Higher levels of student engagement are correlated with discussion and dialogic education (e.g., when instructors encourage students to elaborate on their views rather than provide succinct answers to questions) [67], [68]. Class discussions are commonly mentioned by students as being the most satisfying aspect of their educational experience [69].

b) Peer Interaction (PI)

Several studies have shown that students' social networks significantly affect their motivation and interest in their academic performance [70]. Many studies have looked at the importance of close, mutually beneficial friendships as predictors of happiness and academic success [71]–[73], but there is also a growing body of research that looks at the effects of less close relationships among students.

This research explores the idea that peers might influence students' motivation, engagement, and performance via proximal processes that take place in regular social encounters within self-selected peer groups [74]. The core principle of this theory is that, in addition to friendships and dyadic interactions with peers, students' emotional and behavioral engagement in the classroom may also be impacted by their membership in peer groups that are involved in or disengaged from school [75]. Peer pressure may express its effects in many ways, according to various theories. They may be passed down indirectly, such as by gratifying needs for relatedness [76], [77]; or they may be passed down directly, such as by modelling, reinforcing, encouraging, or pressuring individuals to conform to social norms [75]. In the case of engagement and disaffection, students who are already engaged may be exposed to an even greater concentration of engaged peers, while students who are already somewhat disillusioned may be exposed to an even greater concentration of disaffected peers, thus reinforcing their original motivational states. This is due to the fact that peer groups are often chosen based on similarity (i.e., homophily), which may intensify or focus the local environment [76].

While a considerable amount of research demonstrates the relevance of family and school support in the development of educationally relevant outcomes, very less is known about the function of peer support in these outcomes [77]. Olana and Tefera [78] found a correlation between peer support and behavioral involvement, while Bradley et al. [79] explored the correlation between support and emotional engagement. Examinations of peer support and academic and emotional engagement showed no significant differences when parent and teacher support was taken into account [77], [78]. In students from lower socioeconomic situations, social support from peers and friends was related with GPA, but the magnitudes of these correlations were substantially less than those of parental and teacher support [80]. According to Perdue et al. [81], the quality of friendships and social support from peers are both connected to increased school participation. Rueger et al. [82], on the other hand, observed that classmate and friend support was not substantially associated to either GPA or attitude towards school. Peer relationships are often cited as having significant theoretical effects on students' motivation to learn [83]–[85]. Nonetheless, their relationship to engagement has just lately been investigated, and it continues to be a contextual impact with erratic patterns of correlation that is theoretically significant but comparatively understudied [77]. Clarifying these correlations and offering another possible intervention strategy for boosting school engagement may be achieved by doing further study on the impacts of peer contact, especially when contrasted to the effects of other sources of support, such as parents and teachers.

c) Learning Habits and Skills (LHS)

Interactions among students are essential for fostering a positive interpersonal environment, which is positively associated to engagement, and these relationships are critical for student engagement [86]. Teachers that encourage student cooperation on academic assignments report higher levels of student engagement [62], [87]. Also, students are more likely to participate actively in class if they believe that their friends will support them [61].

The participants' and their friends' levels of engagement have been linked to gathering with highly engaged peers [88]. Interaction between both the highly involved students and other students while participating in the same classroom activities would lead to higher levels of engagement for everyone.

Online learning is different from traditional classroom instruction. This is mostly due to the lack of direct communication between the teacher and the student. As a result, teachers in the classroom have little power over the surroundings of their students. Students can customise the course to meet their unique needs and interests because they can learn at their own speed and access the online resources whenever it is most convenient for them. The learning process is made more complex by the online classroom, which provides greater freedom than traditional education [89]. Because they are expected to choose their own learning tactics and manage their own time and resources, online learning settings can be difficult for students who lack the abilities for self-regulation and a deeper grasp of their preferred learning styles.

Due to the wide diversity of life experiences and past educational exposure that students have had, there are many different approaches to learning and teaching techniques that should be used with them. Some students learn best through visual aids, while others are more receptive to text or music; others are more interested in hard data than in abstract notions; some work best autonomously; and so forth [90]. Teachers need to consider the different learning styles of their students in order to succeed in their industry.

A student's individual method of grasping, analysing, and interpreting new information is referred to as their learning style. Students who are aware of and capable of adjusting to their unique learning styles typically perform better in class. The demands of each group can be met by lessons when a teacher is sympathetic to the diverse academic interests and talents of his or her students. A student's academic achievement is currently assessed using a variety of different learning type models. A learning style model, according to the authors, "categorises students according to where they fit on a number of scales concerning the methods in which they acquire and process information" [91].

In any situation, it might be difficult for teachers to identify and accommodate each student's unique learning preferences [92]. To fulfil the requirements of their students, seasoned teachers in a typical classroom almost intuitively employ a number of teaching tactics. Yet, in an online classroom, teachers must work diligently to set up materials and exercises to cater to the various learning preferences of their students.

d) Learning environment and technology

Conventional online learning environments have frequently employed a "one size fits all" approach of teaching, which follows the same teaching techniques for all students. The diverse learning inclinations and techniques are not considered in this type of instruction. Presently, personalised education—in which teaching is adapted to a learner’s unique needs and preferences—is advocated and assisted by the development of online learning systems [93]–[95]. Some individualised methods let students pick subject that fits their personalities [96]. The organisation and delivery of course content is one of the biggest obstacles to individualised learning. A difficult aspect of creating a well-designed, efficient, adaptable online learning system is the complexity of adjusting to the diverse needs of students [97]. It is asserted that switching to adaptive online learning settings can enhance students' involvement whether or not online learning is used. On the other hand, a learning environment cannot be

deemed adaptive if it is not adaptable enough to account various learning preferences [98].

V. Results

Several studies have been undertaken in the past to build a framework for student engagement, with the main focal areas of the research focused on the factors influencing student engagement. Researchers have recognized that key factors for active student engagement are Faculty Interaction, Peer Interaction, Learning Habits and Skills, Learning Environment and Technology. Literature examined for this study shows research focused on different aspects in terms of achievement of student engagement in location-specific conditions, mode-of-teaching conditions, level of education conditions, and language-specific conditions. All of the studies examined have indicated that student engagement is vital for successful learning outcomes.

The studies investigated showed that a large body of work was conducted on accomplishing student engagement. With the changing social scenario due to COVID-19 restriction, the mode of instruction observed a drastic shift to online learning platforms world-wide at all levels of education. This has created an awareness among the researchers regarding the importance of the factors affecting student engagement in an online learning system. This study focused on the factors related to active student engagement in online learning systems. The study identified the critical factors that influence student engagement which are:

1. Faculty Interaction
2. Peer Interaction
3. Learning Habits and Skills
4. Learning Environment and Technology

Thus, successful student engagement in online learning system requires a framework that takes into consideration the elements that are unique to this system. This study will help develop a framework that accurately evaluates the role of these factors in student engagement in an online learning setup.

top leadership, teachers, students, and administration to jointly develop a plan and vision to implement sustainability in the entire institution. It also involves mobilizing existing inter-institutional networks of HEIs and provision of technical as well as financial support, and even training for leadership and administration to ensure successful implementation of sustainability initiatives in the HEIs.

One such study the authors suggest *industrial collaboration* as a way to support the economic sustainability of HEIs, as they present better opportunities for actualising sustainability goals in higher education. The authors add that collaborating with industries can greatly provide HEIs with opportunities and embrace value-addition - an essential aspect of sustainability [4].

In addition to industry collaboration, it is recommended that HEIs should focus on encouraging *entrepreneurial activity* and offer incentives and investments in human resources to help improve the economic and environmental approaches to sustainability. In other words, to address the challenges that HEIs encounter within all three dimensions of sustainability, HEIs must establish an entrepreneurial culture characterised by start-ups and spin-off companies. This to ensure the creation of a compelling entrepreneurial organisational culture or ecosystem that would work towards achieving the sustainability goals of the HEIs.

Moreover, as [16] note, offering *quality education* along with new technologies not only helps students gain knowledge and skills, but it can also motivate them to understand the challenges related to sustainability and work quickly towards addressing these challenges. Most importantly, as Amaral et al. [17] point out, HEIs are places where all future world leaders are educated. Hence, according to the authors, providing adequate training and qualifying these individuals with knowledge about sustainability is highly important. This view has been widely agreed by [18], who state that offering a sustainable experience to students in HEIs can greatly help these students act in ways or lead organisations in the future in a way that will help in addressing the environmental dimension of sustainability, such as mitigating climate change and promote sustainable development.

VI. Implications of the Framework:

The parameters of student engagement in the online learning environment were investigated and identified in this study. In contrast to student engagement measurement methods for face-to-face learning environments, Faculty Interaction, Peer Interaction, Learning Habits and Skills were common. However, the indicators for Learning Environment and Technology are different. In the online learning environment, the Learning Environment and Technology factor is related to peer or community support while considering the technology used for the online learning system and ITS ACCESSIBILITY AND FAVORABILITY TO THE STUDENTS, THUS creating an effective learning atmosphere. Therefore, the assessment tool developed in this study represents the characteristics of online learning, which prioritizes proactive and independent learning activities as an autonomous learning environment while also emphasizing and supporting collaborative learning.

VII. Discussion and Conclusion:

The objective of this research was to discover factors that influence student involvement in online learning and to create a framework for measuring engagement in online learning. The findings revealed that elements influencing student involvement in online learning were faculty interaction, peer interaction, learning habits and skills, learning environment, and technology.

Faculty Interactions depicts the behavioral engagement that occurs when a learner connects with an online course instructor. The degree of engagement in an online learning environment is higher when learners perceive an instructional engagement similar to what they experience in the classroom with the professor [99]. Instructor engagement is enhanced when students communicate with teachers on a frequent basis [100]. Learners in online learning courses succeed when they perceive a high level of instructional engagement through constant contact with the teacher [101]. As a result, faculty interaction appears to be the most important component in improving learner engagement. Supportive actions and instructional support both inspire and increase learners' interest in learning [102]. As a result, the Faculty Interaction factor, which corresponds to interpersonal activities such as requesting extra help from the instructor or asking questions about the lesson topic, can be regarded as a significant predictor of student engagement with online learning.

Peer interaction refers to activities in which students discuss information and work together to solve challenges. Collaborative learning refers to a process of constructing and comprehending knowledge with peers that has been identified as a key component of student involvement [43]. Given the rising importance of collaborative learning and engagement in the online learning environment, it is significant that Peer Interaction emerged as a separate factor in this study. This is further bolstered by the fact that the learning management system offers learners additional functionalities that facilitate collaborative learning than face-to-face learning.

The Learning Habits and Skills course focuses on the behavioral engagement that occurs when students regulate their personal learning during active participation in courses online. This characteristic is associated with proactive and autonomous learning activities for independent learners. According to Parkes, Reading, and Stein [103], engagement in the online learning environment can manifest as behaviors such as removing distractions from the surroundings during the online class, navigating learning using the online system, and keeping track of the learning schedule by following a lecture plan when taking the online class. The indicators in this factor differ from behavior activities used in traditional learning environments. Because they highlight learner-initiated skills in managing online learning, they encompass the number of logins, the number of lectures participated in, the number of assignments handed in, the frequency of presentations, grades, and task performance [43], [104]. This also comprises cognitive problem-solving abilities gained through the process of obtaining, comprehending, and applying knowledge [105].

The Learning Environment and Technology component is related to the learners' psychological condition, such as the relationships or sense of community developed among learners enrolled in the same online courses. Psychological sense of affiliation can play an important role in preventing dropouts and encouraging students to participate in class. A possible explanation for the high rate of dropout is a lack of ties or a sense of community amongst online course students. If students lack a sense of connection or camaraderie with their classmates, they are more likely to fail to attend courses or leave early, which may ultimately lead to dropping out. In other words, to boost retention, instructors aim to establish stronger interpersonal interaction, such as online meetups to dialogue, so that learners experience a feeling of belonging in the learning environment [22]. As a result, various research [45], [46] have stressed the significance of belonging. A Learning Environment also takes into account the actual format of learning, such as face-to-face or online learning. As a result, the technology employed to achieve online learning is equally important. One of the most significant barriers to personalised learning is the arrangement and distribution of course content. The Learning Environment and Technology elements assess the impact of online learning technology selection, ease-of-use and accessibility for students enrolled in an online course, and technological familiarity with online self-learning tools.

Given that student engagement is made of behavioral, cognitive, and emotional involvement, the results of this research are similar with those of earlier studies describing the primary aspects of student engagement. Learning Habits and Skills, as well as Faculty Interaction, are associated with behavioral engagement, Peer Interaction with cognitive engagement, and Learning Environment and Technology with emotional participation and sense of ease or comfort when dealing with the overall environment of the learning system. The distinction is significant because we emphasized on actual learning conditions in the online learning environment and fundamentally segmented the learner's specific engagement behavior, cognitive process, or learner's psychology, alongside the existing three engagement elements.

VIII. References

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