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Effect of E-learning Readiness on Students' Emotional Engagement, Participation, Skills, and Performance

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ABSTRACT

In recent years, higher education institutions have increasingly adopted e-learning courses to remove the barriers of time and space throughout the world, which makes it vital to ensure the conditions for greater student's engagement in online learning environment. In this regard, previous studies have demonstrated a lack of consistent results with respect to the prediction of students' engagement. The goal of this study is to examine the relationship between e-learning readiness and students' engagement for both traditional and non-traditional student and the moderating roles of cultural dimensions and personality traits. The theoretical framework is based upon social constructivist theories. Quantitative method is used, whereby an online survey questionnaire was shared to obtain data from 200 postgraduate students enrolled in an online postgraduate certification course in education at ICE and 200 questionnaires distributed to post graduate students enrolled in University of Karachi. The collected data was analyzed using the structural equation modelling technique in conjunction with multi-group analysis. The results shows computer/internet self-efficacy negatively impacting emotional engagement, Skill and performance. Learners control has positive but insignificant relationship with performance and participation. Motivation for learning has negative relation with participation. Online communication self-efficacy has no significant relation with participation and skill. Self-directed learning has negative relationship with emotion, performance and skill and no significant relationship with participation.

Keywords: Students' Engagement, E- Learning, Online learning, e-learning readiness, Self-directed learning, traditional students, non-traditional students

1: INTRODUCTION

1.1 Research Background

With the recent advancement in technology, e-learning courses are emerging as a new trend to education and learning throughout the world. Moreover the COVID-19 pandemic has created the largest disruption of education systems in history (United Nations, 2020). Keeping in view the evolving academic practices and the sudden shift in the educational norms after COVID, it is prudent that stakeholders determine the best practice for distance education. The importance of E-learning in the Higher Education (HE) is discussed by many researchers (Liaw & Huang, 2013). In this regard, E-learning becomes a major tool for improving educational and training activities (Kanwal, F. & Rehman, M., 2014).

E-learning as an internet and web-based system that facilitates users' learning and teaching with the use of software applications and tools (Cassidy, 2016). The term "E-learning" is defined by Bhuasiri et al. (2012) as "an innovative approach to education delivery via electronic forms of information, which enhances learners' knowledge, skills or other areas of performance" (p.843). With the widespread use of e-learning and educational technology, e-learning is gaining substantial growth in education and for this reason; several educational institutes around the globe have started e-learning courses side by side with their regular courses (Zameni et al., 2011). In developed countries, e-learning has been widely embraced, leading to innovative teaching methodologies and enhanced student engagement. In contrast, developing countries, such as Pakistan, are still grappling with the implementation and optimization of e-learning systems. Despite the evident benefits, the adoption of e-learning in Pakistani universities faces numerous challenges, including technological infrastructure, digital literacy, and cultural acceptance (Qureshi et al. 2012). Unfortunately, Pakistan is still to realize this increasing need to implement e-learning courses in its universities (Qureshi et al., 2012)

Pakistan falls at 160th position among other countries in terms of its literacy rate. With a population of 240 million and an adult literacy rate of 57.9% in the urban area and an alarming low literacy rate of 48% in rural area as a result of lack of educational facilities, quality teachers and low awareness of the importance of education (Economic survey, 2010). Thus, Pakistan's educational sector requires a shift towards incorporating e-learning, especially in the wake of the COVID-19 pandemic, which necessitates remote learning solutions.

E-learning presents numerous opportunities for Pakistani institutions. Online courses make education more accessible to students who cannot attend on-campus programs due to geographical, financial, or personal constraints. It offers flexible learning schedules where students can make their own plan for completing an online course (Dhawan, 2020), accommodating working professionals and non-traditional students (Kanwal et al., 2017). It reduces costs associated with physical infrastructure and travel, benefiting both institutions and learners. Online learning provides opportunities for cross-cultural interactions and global knowledge exchange, preparing students for an increasingly interconnected world. Despite its growing adoption, e-learning in Pakistan also faces significant challenges. Many students lack access to reliable internet connectivity and digital devices, particularly in rural and remote areas. Limited IT infrastructure in institutions hinders the effective implementation of e-learning systems. Both students and

educators often struggle with a lack of technical skills to navigate and utilize online learning platforms effectively. Traditional educational norms in Pakistan may lead to hesitancy in embracing fully online modes of learning (Kanwal et al., 2017).

Nonetheless, to develop higher quality and learner-centered education, universities must built enriching e-learning environments that meet various educational needs (Islam, 2013). These changes reflect the idea that traditional instruction can be enhanced by using e-learning environments. Thus, universities are investing in the development of campus e-learning environments as students' preferred method of course delivery or as a supplementary method to traditional face-to-face courses (Parkes, Stein, & Reading, 2015).

The Government of Pakistan (GoP) has amended regulatory settings to encourage growth of the ICT by ensuring the availability of internet in the country. In the recent years there has been an increase in the local research which has led to emphasize on hardware and technology support. A general adoption and acceptance of E-learning models has been seen in Pakistan. However, the progress has been uneven, with significant disparities between urban and rural areas, public and private institutions, and different levels of education. This disparity highlights the critical need to assess e-learning readiness among students and to understand the factors that influence their engagement with online learning platforms.

1.2 Research Problem

The rapid adoption of e-learning systems in Pakistan has introduced both opportunities and challenges for the education sector. This rapid integration of e-learning programs in Pakistan necessitates a thorough examination of factors influencing their effectiveness. While e-learning provides flexibility and accessibility, maintaining high levels of student engagement in virtual environments remains a persistent challenge. Engagement, which encompasses students' emotional, cognitive, and behavioral involvement in learning, is a crucial determinant of academic success. One key factor influencing engagement is e-learning readiness, which refers to students' technical skills, access to technology, motivation, and ability to manage independent learning.

Despite the increasing adoption of e-learning in Pakistan, there is a scarcity of research exploring how these readiness dimensions impact various facets of student engagement. Understanding this relationship is vital, as inadequate readiness may impede the successful implementation of e-learning initiatives. Therefore, this study aims to analyze the impact of e-learning readiness dimensions on online student engagement dimensions, providing insights that could enhance the effectiveness of e-learning programs in Pakistan. Research indicates that students' perceptions of e-learning, shaped by their experiences, play a significant role in their academic engagement and digital readiness, which in turn affect academic achievement. A study examining university students' perceptions of e-learning found that both academic engagement and digital readiness are crucial within the university context of an e-learning environment for academic success. (Kim, H. J., Hong, A. J., & Song, H.-D., 2019).

In the context of Pakistan, the adoption of e-learning faces several challenges, including technological infrastructure, digital literacy, and cultural attitudes towards online education. A study analyzing the implementation of e-learning in Pakistani higher education institutions highlighted significant hurdles such as inadequate technological infrastructure, resistance to change among faculty, and a lack of training programs for effective e-learning delivery (Aung, T. N., & Khaing, S. S., 2015). Given these challenges, assessing students' readiness for e-learning becomes crucial. A study focusing on the impact of online learning experience on student satisfaction through student engagement emphasized that the extent to which students are engaged in the online learning process significantly influences their academic performance and satisfaction (Venkatesan, J. & Rajalakshmi, A., 2022).

Therefore, this research seeks to fill the gap in literature by analyzing how various dimensions of e-learning readiness affect different aspects of online student engagement. The findings aim to inform strategies that can enhance student engagement and academic success in e-learning environments, particularly within the Pakistani context.

1.3 Gap Analysis

E-learning readiness, encompassing technological skills, motivation, and self-directed learning abilities, plays a crucial role in determining how effectively students participate in online education (Hung et al., 2010). Navani and Ansari (2016), while studying e-learning readiness of University faculty in India, conceptualized e-learning readiness as the ability (competency) of the learners in a given context. Therefore, analyzing the e-learning readiness of the university students is important so that they can easily adapt to the teaching approaches and modalities.

Engagement, as a key predictor of academic success, is directly influenced by students' readiness, making this investigation essential for designing inclusive and effective e-learning systems (Dixson, 2015). By examining this relationship, the study offers valuable insights into improving learning experiences and outcomes for online students in Pakistan, where digital transformation in education is still emerging.

It is stated that online learning readiness has the dimensions of technology and student characteristics (Kaymak-Demir & Horzum, 2013), and is an important part of distance education as it is associated with the success of e-learning programs (Kaur & Abas, 2004). It is evident in the literature that computer/internet self-efficacy demonstrate a positive relationship with e-learning readiness and performance of students (Achukwu, et al., 2015; Wu, Tennyson and Hsia, 2010). Also, Komarraju & Nadler (2013) found comparable results in a study examining the relationship between self-efficacy beliefs and academic achievement. However, there are conflicting findings regarding the relationship between CSE and student engagement. In their 2012 study of online students, Sun and Rueda found that although situational interest and self-regulation were found to be significantly correlated with three factors of engagement (behavioral, emotional, and cognitive), CSE did not appear to be associated with any of the engagement constructs (Sun & Rueda, 2012). This research aims to clarify this contradiction.

Beer, Clark, and Jones (2010) argue that although some studies took participation into account while assessing online learning, this assessment does not represent the online learning process of students and does not provide information about the quality of online learning. The researchers maintain that student engagement may help in such an assessment.

Prihastiwi, 2020 has found in her study while evaluating online learning at the psychology faculty of the Muhammadiyah University of Surabaya, that 83.5% of the total 221 students experienced stress which results in low involvement during the course. In another research conducted the following year, Prihastiwi asserted that research sample felt that they did not get detailed explanation of the subject matter so they experienced confusion (88%).

Mixed results have been found in e-learning literature regarding the effects of learner control on learning outcomes (Kraiger & Jerden, 2007). Research suggests that the success of e-learning programs is highly dependent on the learner's reactions to the learning environment. Moreover, if a learner finds components of the e-learning environment frustrating (such as the included learner control features) or perceives the content to be useless, the high degree of control and autonomy available to him or her allows for disengagement from the learning environment rather than enhanced performance (DeRouin, Fritzsche, & Salas, 2005; Park & Tennyson, 1980; Steinberg, 1989). Only a few empirical studies examine the relationship between perceived learner control and student engagement, reporting positive, negative, or non-significant relationships (e.g., Lan & Hew, 2020; Orvis et al., 2009). These inconsistent results present a challenge for teachers on whether and how to implement learner control in blended learning.

This research addresses these gaps by investigating the influence of e-learning readiness on student engagement in online courses. The aim of the present study is to investigate whether computer/internet self-efficacy, motivation for learning, learners control, self-directed learning and online communication self-efficacy are predictors of online student engagement. By examining these dynamics, the study aims to provide insights that can guide institutions in designing more inclusive e-learning systems tailored to the diverse needs of students in Pakistan.

1.4 Research Objective

This research generally aims to investigate the relationship between readiness towards an e-learning environment and students' engagement. Based on the problem statement, we have defined the following research objective for the project:

1.5 Significance of the Study

This study is significant as it explores the relationship between e-learning readiness and online student engagement, a critical area in the rapidly evolving educational landscape.

The findings of this study will contribute to the growing body of knowledge on e-learning adoption and its effectiveness, particularly in the context of developing countries like Pakistan. Furthermore, they will have practical implications for educators, policymakers, and institutions by informing the development of targeted interventions to enhance engagement, ensuring that online education is accessible, equitable, and impactful for all learners.

In order for e-learning programs to be successful, it is essential to evaluate the e-readiness levels of students as well as providing them with the necessary infrastructure and materials. Hong and Gardner (2018) state that low level of readiness has an important effect on the engagement level of students and depth of learning. Parkes, Stein and Reading (2015) argue that unprepared learners cannot actively participate and use critical thinking skills. They investigated the perceptions of university students about online learning readiness using the LMS. The findings indicated that the students were prepared to engage in e-learning technology, whereas they were unprepared for such activities as being clear and concise in responses, reading and writing, synthesizing ideas, planning strategies, having discussions, and working with other students.

Existing research on e-learning readiness and student engagement has primarily focused on developed countries, with limited studies examining their relationship in developing contexts such as Pakistan. Additionally, this research extends social constructivist theories by examining the role of learner autonomy and self-directed learning in digital education.

With the increasing adoption of e-learning in Pakistan, understanding the predictors of online student engagement is crucial for improving the effectiveness of digital learning programs. By identifying key e-learning readiness factors—such as computer/internet self-efficacy, motivation for learning, learner control, self-directed learning, and online communication self-efficacy—this study provides valuable insights for course designers and educators. Institutions can leverage these findings to develop targeted interventions that enhance students' preparedness for online learning, ultimately leading to better engagement and academic success.

This study holds significant policy implications for higher education institutions and government agencies overseeing digital education initiatives. The results can guide the development of national e-learning strategies by emphasizing the importance of readiness assessments before implementing large-scale digital learning programs.

2: LITERATURE REVIEW

2.1 Computer/Internet Self Efficacy

Gürçan (2005) defines computer self-efficacy as an individual's perception of the ability to use computer skills in practice. In other words; it is the judgment of the individual towards the use of computers (Demir, 2015). Internet self-efficacy can be defined as individuals' perceptions and beliefs about internet usage skills that they have for their intended purpose in the internet environment (Tsai and Tsai, 2003). Studies show that internet self-efficacy is an essential

variable on the success of accessing and learning information in online environments (Joo et al., 2000)

This concept, rooted in Bandura's (1977) broader notion of self-efficacy, emphasizes confidence in one's capabilities to use technology effectively. Compeau and Higgins (1995) describe computer self-efficacy as the extent to which individuals believe they can use computer technologies to achieve specific goals. It encompasses not only technical skills but also the confidence to troubleshoot issues, learn new applications, and adapt to evolving technologies (Eastin & LaRose, 2000). The research conducted by Allam (2020) concentrated on online learning during COVID-19 among undergraduate level in Malaysia and the result revealed that computer and internet self-efficiency among undergraduate students was at high level (Allam et al., 2020).

2.2 Learners Control

The essence of web-based learning media is that it gives opportunity to the learner to decide which information to access and how to order the information (Lawless & Brown, 1997), have more flexibility and more personalized means of learning (Lin & Hsieh, 2001). They have more control on their learning. Students' directing their self-learning experience and process is expressed as learner control (Shyu & Brown, 1992). Learner control is a fundamental component of self-regulated learning, where learners take an active role in managing their educational processes (Zimmerman, 2000). It empowers students to tailor their learning experiences according to their individual needs, preferences, and goals, thereby promoting a more personalized and effective learning environment (Kraiger & Jerden, 2007). A broad definition was posed by Wydra (1980) in which learner control was described as, "a mode of instruction in which one or more key instructional decisions are delegated to the learner" (p. 3). By providing learners with control, they may feel an increased sense of competence and ownership over their learning (Skinner, 1996). The Component Display Theory of Merrill (1983) and the Elaboration Theory of Reigeluth and Stein (1983) have indicated that learner control is an important aspect of effective learning.

2.3 Motivation for Learning

Motivation for learning refers to the intrinsic and extrinsic factors that stimulate students' desire to engage in the learning process and achieve academic success. Intrinsic motivation arises from within the learner, driven by personal interest, enjoyment, or the inherent satisfaction of mastering new skills and knowledge (Deci & Ryan, 1985). Extrinsic motivation, on the other hand, involves external factors such as grades, rewards, or recognition (Ryan & Deci, 2000). Both types of motivation play crucial roles in driving students' persistence, effort, and overall engagement in educational activities (Schunk, Pintrich, & Meece, 2008). Motivated learners are more likely to set academic goals, employ effective learning strategies, and maintain a positive attitude towards their studies (Wigfield & Eccles, 2000).

2.4 Self-directed Learning

Self-directed learning – also referred to as academic self-regulation – has been defined as ‘an active, constructive process whereby learners set goals for their learning and then attempt to monitor, regulate, and control their cognition, motivation, and behavior, guided and constrained by their goals and the contextual features of the environment’ (Pintrich 2000, p. 453). SDL refers to a process in which individuals take the initiative, with or without assistance from others, in diagnosing their learning needs, formulating learning goals, identifying resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes (Knowles, 1975). In other words, self-directed learning is the learner's ability to guide and direct his or her own learning (Hartley & Bendixen, 2001). SDL emphasizes autonomy and control over the learning process, enabling learners to tailor their educational experiences to their personal needs and preferences (Garrison, 1997). Online learning lends itself to a SDL experience. To succeed in an online learning context, learners are engaged in self-assessment during and after the online lessons so that they could adjust their plans, goals and strategies accordingly (Schunk & Zimmerman, 1998), monitoring their learning comprehension Jossberger et al. (2020), and making judgments on various aspects in their learning process (Petrides, 2002). Further, learners need to develop strategies to effectively use resources and overcome challenges that are uniquely associated with online learning (e.g., written communication) (Hill, 2002). Last but not least, online learners need to become motivated to overcome the procrastination challenge associated with online learning (see Elvers, Polzella, & Graetz, 2003), and to take advantage of online communication affordances to create meaningful interaction (King, 2002). In the context of online education, SDL is particularly critical as it encourages students to engage proactively with the learning material, seek out additional resources, and manage their time effectively (Candy, 1991).

Numerous researchers have argued that online students, to an even greater extent than traditional learners, require well-developed self-directed learning (SDL) skills to guide their cognition and behaviour in these highly autonomous learning situations (Hill & Hannafin 1997; Hartley & Bendixen 2001; Dillon & Greene 2003; Dabbagh & Kitsantas 2004). For example, Dabbagh and Kitsantas (2004) have contended that ‘in a Web-based learning environment, students must exercise a high degree of self-regulatory competence to accomplish their learning goals

2.5 Online Communication Self Efficacy

Online communication self-efficacy refers to an individual's confidence in their ability to effectively communicate through digital platforms and online environments (Eastin & LaRose, 2000). This construct encompasses various aspects of online communication, including the use of digital tools, understanding and navigating online social cues, and conveying messages clearly and appropriately in virtual settings. High online communication self-efficacy implies that individuals feel capable of engaging in online discussions, collaborating with peers, and expressing their thoughts and ideas effectively (Compeau & Higgins, 1995). At this point, it can be said that the online communication self-efficacy is vital for the individuals participating in the learning process not to have any limitations in the learning process (Engin, 2017; Yurdugül and Sırakaya, 2013). This self-belief is crucial in online learning environments, where effective communication is essential for academic success and meaningful engagement (Bandura, 1997). This can be supported by the research of Topal (2016) explained that having

the ability to communicate and utilize communication tools are the requirement for blended learning. In the study conducted by Stephenson (2001), it was indicated that online interactive environments improve responsibility, critical analysis and reflection, and social structuring of information in students, concluding that online communications are important in online learning process.

2.6 Student's engagement:

Handelsman et al. (2005) identified four factors of student engagement: Emotional engagement, performance, participation and skill engagement.

2.6.1 Emotional Engagement

Emotional engagement in the context of online learning refers to the affective responses that students have toward their learning experiences, such as interest, enthusiasm, boredom, and frustration (Fredricks et al., 2004). Student engagement may be influenced by control students have over their learning activities and positive emotions in the classroom (Deci, Nezlek, & Sheinman, 1981). Different researchers and studies have defined emotional engagement using different variables. This term has been defined variously as:

- A psychological condition in which care, attention, and effort are spent for the task of learning (Marks, 2000).
- The attention paid to the learning environment and the joy taken from this setting (Shernoff et al., 2014).
- The quality of the effort exhibited for learning outputs along with the willingness to engage and participate in learning activities (Kuh, 2009).

Emotional engagement is the collection of emotional reactions displayed by the learner for the learning environment (Skinner & Belmont, 1993). Sensations such as attention, love, excitement, happiness, and joy displayed by the learner for the learning environments are indicators of emotional engagement (Skinner & Belmont, 1993). Emotional engagement is a critical component of overall student engagement, as it influences motivation, effort, and persistence in learning tasks (Subramanian et al., 2020). Positive emotional engagement, characterized by feelings of enjoyment and interest, can enhance learning outcomes by fostering a deeper connection to the material and increasing intrinsic motivation (Pekrun et al., 2002). Conversely, negative emotional engagement, such as anxiety and frustration, can hinder learning and reduce academic performance (Pekrun et al., 2002). Emotionally engaged students are more intrinsically motivated to achieve learning outcomes and participate in class. Students who are emotionally engaged also experience greater psychological well-being in the learning environment thus student's level of engagement is associated with higher academic achievement and mental health (Zhang, 2021). Emotional engagement prompts motivation which is among the most important predictors of success (Ozhan et al., 2020). According to Shernoff et al. (2003) students' concentration, interest, and attention which are considered as positive emotional response appear to be integral parts of optimal engagement in classroom. Emotional engagement can fluctuate based on the flow theory. Flow

experience occurs when challenges are balanced, neither too difficult nor too easy (Shernoff et al., 2003). Hence it can be concluded that emotional engagement refers to the student's feeling, attitude, perception towards learning, and the learning environment.

2.6.2 Performance

Performance, in the context of e-learning, typically refers to the achievement of desired learning outcomes, which can include academic grades, completion rates, and the quality of student work. Performance metrics in educational settings are often measured through assessments, exams, project evaluations, and other academic criteria (Sabry & Baldwin 2003). Performance can also be seen through the lens of student engagement and participation, indicating not just what students learn, but how they apply and demonstrate their knowledge (Fredericks, Blumenfeld, & Paris, 2004). Performance typically refers to the outcomes of students' learning activities, which can be measured through grades, test scores, project completions, and other assessments of academic achievement (Slavin, 2006). Performance is a critical indicator of how well students have understood and internalized the course material and how effectively they can apply their knowledge and skills (Biggs, 1987). High performance is often associated with deep learning, where students not only recall information but also comprehend and utilize it in various contexts (Entwistle & Ramsden, 2015). Performance in the educational context refers to the measurable outcomes of students' learning processes, typically evaluated through grades, test scores, or other forms of assessment. It encompasses a wide range of competencies, including knowledge acquisition, skill development, and the ability to apply learned material in various contexts (Bloom, 1956). High academic performance is often the result of effective learning strategies, consistent effort, and the ability to overcome obstacles (Zimmerman, 2000). Performance is not only a reflection of cognitive abilities but also of motivational and emotional factors that influence students' engagement and effort (Pintrich & De Groot, 1990).

2.6.3 Participation

Engagement, with its cognitive, emotional, and behavioral dimensions, affects academic achievement, interaction with peers, and participation (Carini et al., 2006; Fredricks et al., 2004). The relationship between participation and academic achievement has been studied for decades. Participation in the context of education is defined by Dancer and Kamvounias (2005) whereby participation is as active engagement that consists of five elements: participation, contribution to discussion, group skills, communication skills, and attendance. Participation is a critical component of student engagement and is often associated with better learning outcomes, as it promotes deeper understanding, critical thinking, and the application of knowledge (Fredricks, Blumenfeld, & Paris, 2004). It also encourages self-directed learning and foster an environment where individuals can have multiple opportunities to self-assess and revise their own thinking processes (Van Amburgh, 2007). According to Gourlay (2015), student engagement involves public interaction and forms of observable 'participation'. High levels of participation indicate that students are not merely passive recipients of information but are actively constructing their

knowledge through interaction and collaboration (Vygotsky, 1978). The participation component of engagement is characterized by factors such as school and class attendance, being prepared for class, completing homework, attending lessons, interacting positively and appropriately with teachers and peers, and not disrupting the class, and being involved in extra-curricular sports (Finn, 1989). Attendance is a well-established factor in academic performance (deJung & Duckworth, 1986; Weitzman et al., 1985).

2.6.4 Skill

Skill engagement involves the active involvement of students in learning activities that develop their competencies and abilities (Handelsman et al., 2005). Skill engagement refers to the development and application of specific skills through the learning process. In an online setting, this includes the acquisition of digital literacy skills, critical thinking, problem-solving abilities, and subject-specific competencies. Skill engagement is measured by how effectively students can apply what they have learned to practical scenarios, demonstrating their mastery and confidence in using new skills (Handelsman et al., 2005). This dimension emphasizes the importance of active learning and hands-on activities that reinforce skill acquisition.

High levels of skill engagement are associated with mastery learning, where students achieve a deep understanding and proficiency in their subject areas (Bloom, 1971). In Tuckman's (2007) study, the inclusion of study skills support groups influenced students, particularly those with a high-tendency to procrastinate, to stay on task in their e-learning modules. Skill engagement is critical for long-term retention and transfer of knowledge, as it requires students to actively apply what they have learned in meaningful ways. Skills engagement also includes organization of learning and study time management which is influenced by individual's ability to use the virtual environment. (Bates & Khasawneh, 2007; Pellas, 2014). The cognitive component of engagement emphasizes that individuals should develop willingness to exert effort to master their skills (Fredricks, Blumenfeld, & Paris, 2004). Shernoff et al. (2003) stated that providing opportunities to enhance skills (e.g., providing immediate feedback and incrementally teaching more complex skills that build upon previously learned skills) along with presenting a challenge may be one of the most ideal ways of engaging students. Given the importance of challenge, skill, and relevance of instruction to overall engagement, teachers may be able to enhance engagement by supporting students' sense of competency and autonomy, such as providing tasks that offer choice, are connected to students' personal goals, and offer opportunities for success.

3. HYPOTHESIS DEVELOPMENT

3.1 Computer/Internet Self efficacy and Emotion:

Based on the findings of Ergun (2020), it can be said that students who have high computer/internet self-efficacy, who can set learning goals, and who can manage time and prepare a study plan have higher levels of engagement, and this engagement is reflected in their behaviors such as paying

attention to the subjects related to the course, asking questions, having motivation, making effort to learn and participation of students in academic activities. Pellas (2014) reported that computer self-efficacy, metacognitive self-regulation, and self-esteem in online courses were positively correlated with several aspects of student engagement including cognitive and emotional factors.

H1: There is a significant positive impact of computer/internet self-efficacy (CIS) on Emotion (E)

3.2 Computer/Internet Self efficacy and Performance:

The relationship between computer/Internet self-efficacy and performance has been a focal point of research in educational psychology and e-learning studies. Piccoli, Ahmad, and Ives (2001) claimed that computer self-efficacy is an important aspect to predict learning effectiveness in a technology enhanced course. Higher levels of computer/Internet self-efficacy are generally associated with better academic performance. Internet self-efficacy was able to predict students' performance. Students confident in their computer/Internet skills are better equipped to utilize a variety of online learning resources, such as digBates & Khasawnehital libraries, educational videos, and interactive simulations. This effective utilization of resources enhances their understanding and retention of course material, thereby boosting their performance (Joo, Bong, & Choi, 2000). Computer/Internet self-efficacy supports self-regulated learning behaviors, such as goal setting, self-monitoring, and self-evaluation (Zimmerman, 2000). Students who believe in their technological capabilities are more likely to independently navigate e-learning environments, manage their study schedules, and seek help when needed, all of which contribute to better academic outcomes (Artino, 2008). High self-efficacy in technology use helps students overcome technological barriers that might otherwise impede their learning. Confidence in troubleshooting and resolving technical issues allows students to maintain focus on learning tasks without prolonged interruptions, thereby sustaining their performance levels (Torkzadeh & Van Dyke, 2001).

In the literature it is proven that computer self-efficacy exerts a positive and significant impact on online learning readiness of students (Achukwu, et al., 2015), and a positive influence on performance expectations in blended e-learning system environments. (Wu, Tennyson and Hsia, 2010)

Empirical studies support the positive linkage between computer/Internet self-efficacy and performance. For example, a study by Wang, Shannon, and Ross (2013) found that students with higher computer self-efficacy were more likely to achieve better grades in online courses. Similarly, research by Liaw (2008) indicated that computer self-efficacy significantly predicted students' satisfaction and perceived usefulness of e-learning systems, both of which are closely related to their performance. Similarly Pellas (2014) also proved that higher levels of self-efficacy may lead to better academic performance and self-regulation.

H2: There is a significant positive impact of computer/internet self-efficacy (CIS) on Performance (PF)

3.3 Computer/Internet Self efficacy and Participation:

Participation in the context of e-learning refers to the extent to which students engage in learning activities, including attending online classes, contributing to discussions, completing assignments, and interacting with peers and instructors. Participation is a critical component of the learning process as it enhances understanding, promotes active learning, and fosters a sense of community among learners (Hrastinski, 2008). High levels of participation are often associated with better academic outcomes and a more enriching learning experience (Rovai, 2007)

The relationship between computer/Internet self-efficacy and participation has been extensively explored, if not directly, with findings indicating that higher levels of self-efficacy are associated with increased participation in e-learning environments. It is said that those individuals with a high perception of this kind of self-efficacy are more enthusiastic and have higher levels of expectation in participating in the activities that is carried out via computer (Wolverton et al., 2020).

Students with high computer/Internet self-efficacy are more confident in their ability to navigate online learning platforms and use digital tools. This confidence reduces anxiety related to technology use, making students more willing to participate in online activities (Cassidy & Eachus, 2002). Reduced anxiety facilitates a more positive attitude towards e-learning, thereby encouraging greater involvement in learning tasks (Hodges, 2008).

Chakraborty and Nafukho (2014) found four factors that are important in student's participation online, and one of them is using the right technology to deliver the right content. According to the research conducted by Ergun (2020), students with a high level computer/internet self-efficacy develop more behavioral engagement in learning environments, such as participating in conversations, attending classes, and being motivated to learn. Students who believe in their technological capabilities are more likely to actively participate in discussions, collaborate with peers, and seek help when needed (Tsai & Tsai, 2003). Students with strong computer self-efficacy can efficiently navigate learning management systems, use communication tools, and access digital resources, which enhances their ability to participate in online learning activities (Joo, Bong, & Choi, 2000). This effective use of e-learning tools supports a more interactive and collaborative learning environment (Liaw, 2008). High computer/Internet self-efficacy promotes self-regulated learning behaviors, such as setting goals, managing time, and monitoring progress. These behaviors are critical for sustained participation in online courses (Zimmerman, 2000). Self-regulated learners are more likely to stay motivated, persist in the face of challenges, and actively engage in learning activities (Artino, 2008).

Empirical studies provide robust evidence supporting the positive relationship between computer/Internet self-efficacy and participation. For example, a study by Lim (2001) found that students with higher computer self-efficacy were more likely to participate in online discussions

and collaborative projects. Similarly, research by Johnson, Hornik, and Salas (2008) indicated that computer self-efficacy significantly predicted students' participation and engagement in web-based courses. In the research of Chang and others (2014) conducted on the topic of the effects of internet self-efficacy on student motivation, the results reveal that students who had high internet self-efficacy did better on their examination and they were more comfortable to engage and participate in online courses.

In conclusion, computer/Internet self-efficacy plays a pivotal role in enhancing students' participation in e-learning environments. By fostering confidence in their technological abilities, students are more likely to engage actively in online learning activities, utilize e-learning tools effectively, and exhibit self-regulated learning behaviors. Educational institutions can support this by providing training and resources to boost students' computer/Internet self-efficacy, thereby promoting greater participation and improving overall learning outcomes.

H3: There is a significant positive impact of computer/internet self-efficacy (CIS) on Participation (PT)

3.4 Computer/Internet Self efficacy and Skill:

Individuals with high computer/Internet self-efficacy are more likely to take the initiative to explore and utilize digital tools and resources (Compeau & Higgins, 1995). This confidence encourages them to engage in learning activities that develop their technical skills, such as using new software, participating in online courses, or collaborating on digital platforms. The willingness to explore and experiment with technology is crucial for developing a broad range of skills.

High self-efficacy helps individuals overcome challenges and persist in their efforts to develop skills (Bandura, 1997). When faced with technical difficulties or unfamiliar tasks, those with strong self-efficacy are more likely to persevere, seeking solutions and learning from their experiences. This resilience is essential for skill development, as it involves continuous learning and adaptation.

Individuals with high computer/Internet self-efficacy are adept at identifying and utilizing various digital resources to enhance their skills (Eastin & LaRose, 2000). They are more likely to seek out online tutorials, instructional videos, forums, and other educational materials that support their learning. Access to and effective use of these resources enable learners to acquire new skills and improve existing ones.

High self-efficacy is associated with increased engagement in skill-building activities (Schunk, 1991). Confident individuals are more likely to practice their skills regularly, engage in hands-on learning experiences, and apply their knowledge in practical contexts. This active participation and practice are critical for mastering skills and achieving proficiency.

Individuals with strong computer/Internet self-efficacy are more open to seeking feedback and reflecting on their performance (Bandura, 1997). Constructive feedback helps them identify areas for improvement, while reflection enables them to assess their progress and adjust their learning strategies. This iterative process of feedback and reflection is vital for continuous skill development.

Empirical research supports the positive impact of computer/Internet self-efficacy on skill development. For instance, a study by Torkzadeh, Chang, and Demirhan (2006) found that individuals with higher computer self-efficacy demonstrated better performance in computer-related tasks and greater proficiency in using technology. Similarly, Eastin and LaRose (2000) highlighted that self-efficacy influences the extent to which individuals engage with digital technologies and develop their technical skills.

H4: There is a significant positive impact of computer/internet self-efficacy (CIS) on Skill (S)

3.5 Learner Control and Emotion:

The relationship between learner control and emotional engagement in an online learning environment is well-documented, with research indicating that increased learner control can significantly impact students' emotional responses to their learning experiences. Study by Ergun (2020) revealed that learner control was the most influential variable on students' interest in and positive feelings about the course. When students identify their own needs and organize their learning in this direction, their emotional engagement levels are positively affected. When learners have control over their learning processes, they experience a greater sense of autonomy, which is closely linked to intrinsic motivation (Deci & Ryan, 1985). This autonomy fosters positive emotions such as enjoyment and interest, as students feel more responsible for and invested in their learning outcomes (Reeve et al., 2004). Enhanced intrinsic motivation leads to more emotionally positive learning experiences and greater engagement with the material.

Learner control can help reduce anxiety and stress by allowing students to manage their learning pace and choose strategies that work best for them (Schniederjans & Kim, 2005). When learners can adapt their study methods and schedules to fit their comfort levels, they are less likely to feel overwhelmed, resulting in lower levels of negative emotions such as frustration and anxiety (Artino, 2008).

Greater learner control enables students to personalize their learning experiences according to their individual needs and preferences. This personalization can lead to more meaningful and relevant learning, which in turn promotes positive emotional responses (Kraiger & Jerden, 2007). When learning content and activities align with students' interests and goals, they are more likely to feel satisfied and enthusiastic about their education.

Learner control is associated with higher levels of self-efficacy, or the belief in one's ability to succeed in specific tasks (Bandura, 1977). As students exercise control over their learning and experience success, their confidence grows, which enhances positive emotions and reduces

negative feelings (Pintrich, 2003). High self-efficacy contributes to a more positive emotional climate in the learning environment.

Empirical studies provide strong evidence for the positive relationship between learner control and emotional engagement. There is strong evidence that learner control is associated with positive emotional reactions toward a course and the e-learning system, irrespective of the level and dimensions of control provided. Such impacts on affective outcomes include positive effects on satisfaction (Luo, Y., Xie, M., & Lian, Z., 2019) and attitude (Kettanurak et al., 2001; Schnackenberg & Sullivan, 1998), reduced anxiety (Abdous, 2019), and improved self-efficacy (Wang & Zhan, 2020; Kurt & Tomak, 2022; Cho & Shen, 2013). Similarly, research by Reeve et al. (2004) demonstrated that autonomy-supportive learning environments, which offer greater learner control, are associated with increased enjoyment and interest in learning.

H5: There is a significant positive impact of learner control (LC) on Emotion (E)

3.6 Learner Control and Performance:

The relationship between learner control and performance in online learning environments is well-documented, with research indicating that increased learner control can significantly impact students' academic performance.

Online learners who are better empowered to determine their own learning may exhibit better learning performance (Wang and Newlin, 2002). Chou & Liu (2005) attested in their study that high levels of learner control can improve learners' performance. At higher levels of learner control, learners are engaged in greater levels of interaction. These interactions, especially with others, including their classmates and instructors, can make learners feel more efficacious due to activities they and their classmates have accomplished, as well as the feedback received from peers and instructors, leading to emotional states such as satisfaction and a sense of belonging (Piccoli, Ahmad, & Ives, 2001). These findings are also asserted in the study conducted by Lawless & Brown (1997). According to them, E-learning programs with higher learner control allow individuals to actively explore the instructional environment, utilize multiple e-learning features, and create the display of information in a manner that they prefer. This created greater students' performance.

Learner control enhances students' sense of autonomy, which is closely linked to intrinsic motivation (Deci & Ryan, 1985). When students feel they have control over their learning, they are more likely to be motivated to engage deeply with the material, leading to better performance (Reeve et al., 2004). Increased learner control encourages students to develop self-regulation skills, such as goal setting, strategic planning, and self-monitoring (Zimmerman, 2000). These skills are crucial for academic success as they help students to manage their time effectively, select appropriate learning strategies, and stay focused on their tasks (Pintrich, 2003). Self-regulated learners are more likely to perform well academically because they can adapt their learning strategies to meet the demands of different tasks and overcome challenges.

Greater learner control allows students to tailor their learning experiences to their individual needs, interests, and learning styles (Kraiger & Jerden, 2007). This personalization can lead to higher levels of engagement, as students find the material more relevant and interesting (Chen, Lambert, & Guidry, 2010). Engaged students are more likely to invest effort and time in their studies, resulting in better performance. Similarly Setiani et al. (2020) suggest that if student exercise their control over their learning, they are better equipped to achieve their academic goals and perform well in assessments.

Empirical studies support the positive relationship between learner control and performance. For instance, research by Sitzmann, Kraiger, Stewart, & Wisher (2006) found that students who perceived higher levels of control over their learning reported better academic performance in online courses. Similarly, a meta-analysis by Kraiger and Jerden (2007) demonstrated that learner control positively impacts various educational outcomes, including performance, across different learning contexts. Also, Christian et al. (2011) conclude in their quantitative review that task-level engagement is closely aligned with task-specific motivation and task performance.

H6: There is a significant positive impact of learner control (LC) on Performance (PF)

3.7 Learner Control and Participation:

The relationship between learner control and participation is well-supported by research, indicating that increased learner control can significantly enhance students' participation in learning activities.

Learner control is associated with increased self-efficacy, or the belief in one's ability to succeed in specific tasks (Bandura, 1977). As students gain control over their learning and experience success, their confidence grows, which encourages them to participate more actively (Pintrich, 2003). High self-efficacy reduces the fear of failure and promotes a more proactive approach to learning.

In online learning environments, learner control provides flexibility in how and when students engage with the material (Artino, 2008). This flexibility allows students to participate at times that are most convenient for them, accommodating their schedules and personal commitments. The accessibility of online resources and activities further enhances participation by providing multiple avenues for engagement.

Empirical studies support the positive relationship between learner control and participation. For example, research by Artino (2008) found that students with higher perceived control over their learning reported more active participation in online courses. Similarly, a study by Reeve et al. (2004) demonstrated that autonomy-supportive learning environments, which offer greater learner control, are associated with increased participation in educational activities.

H7: There is a significant positive impact of learner control (LC) on Participation (PT)

3.8 Learner Control and Skill:

The relationship between learner control and skill engagement is well-established, with research indicating that increased learner control can significantly impact students' active involvement in skill development activities.

Learner control enhances students' sense of autonomy, which is closely linked to intrinsic motivation (Deci & Ryan, 1985). When students have control over their learning processes, they are more likely to be motivated to engage deeply with the material and invest effort in skill development (Reeve et al., 2004). Intrinsic motivation drives students to practice and refine their skills, leading to higher levels of skill engagement.

Increased learner control encourages students to develop self-regulation skills, such as goal setting, strategic planning, and self-monitoring (Zimmerman, 2000). These skills are crucial for effective skill engagement as they help students to manage their learning activities, set specific skill-related goals, and monitor their progress towards achieving them (Pintrich, 2003). Self-regulated learners are more likely to engage in deliberate practice, a key component of skill development (Zaky, 2021)

Greater learner control allows students to tailor their learning experiences to their individual needs, interests, and learning styles (Kraiger & Jerden, 2007). This personalization can lead to higher levels of skill engagement, as students find the learning activities more relevant and meaningful (Chen, Lambert, & Guidry, 2010). When students perceive that the skills they are developing align with their personal and professional goals, they are more likely to engage actively in the learning process.

Learner control is associated with increased self-efficacy, or the belief in one's ability to succeed in specific tasks (Bandura, 1977). As students exercise control over their learning and experience success, their confidence grows, which in turn boosts their engagement in skill development activities (Pintrich & De Groot, 1990). High self-efficacy encourages students to take on challenging tasks and persist in practicing their skills, leading to greater skill engagement. Chang and Ho (2010) supported that motive that comes from individuals consists of a perception of control. Students who can control learning environment, they have an ability to utilize their skills to obtain new knowledge from classes.

Empirical studies support the positive relationship between learner control and skill engagement. For instance, research by Artino (2008) found that students who perceived higher levels of control over their learning reported higher levels of engagement in skill development activities in online courses. Similarly, a meta-analysis by Kraiger and Jerden (2007) demonstrated that learner control positively impacts various educational outcomes, including skill engagement, across different learning contexts.

H8: There is a significant positive impact of learner control (LC) on Skill (S)

3.9 Motivation for Learning and Emotion:

The relationship between motivation for learning and emotional engagement is well-supported by educational research. Motivated students are more likely to experience positive emotions related to their learning, which in turn enhances their overall engagement and academic performance

Intrinsic motivation is closely linked to positive emotional engagement (Deci & Ryan, 1985). When students are intrinsically motivated, they engage in learning activities for the sheer joy and satisfaction they derive from them. This leads to feelings of interest, excitement, and enthusiasm, which enhance their emotional engagement (Ryan & Deci, 2000). Intrinsically motivated students are more likely to find learning enjoyable and meaningful, which fosters positive emotional experiences.

Extrinsic motivation can lead to both positive and negative emotional engagement, depending on the nature of the external rewards and the student's perception of them (Ryan & Deci, 2000). While extrinsic rewards like grades or recognition can boost students' motivation and lead to positive emotions such as pride and satisfaction, they can also induce pressure and anxiety, especially if the rewards are perceived as controlling or overly demanding (Deci, Koestner, & Ryan, 1999). The balance of these emotions influences the overall emotional engagement of extrinsically motivated students.

Students' goal orientations—whether they are focused on mastery (learning-oriented) or performance (achievement-oriented)—influence their emotional engagement (Ames, 1992). Mastery-oriented students, who aim to develop competence and understanding, are more likely to experience positive emotions like interest and enjoyment, which enhance their emotional engagement (Linnenbrink & Pintrich, 2002). In contrast, performance-oriented students, who focus on demonstrating their abilities and outperforming others, may experience mixed emotions, including anxiety and frustration, which can impact their emotional engagement.

Motivation for learning is strongly linked to self-efficacy, or the belief in one's ability to succeed in specific tasks (Bandura, 1997). High self-efficacy boosts students' confidence and resilience, leading to positive emotional engagement (Schunk & Pajares, 2009). When students believe they can achieve their learning goals, they are more likely to experience feelings of accomplishment and satisfaction, which enhance their emotional engagement.

In the study conducted by Ergun (2020), motivation to learn is another predictor of affective engagement. It includes behaviors such as being open to new ideas, being motivated to learn, drawing lessons from mistakes, and sharing ideas with others. Students who have a flexible approach in learning, who can discuss their opinions, and who see their mistakes as a new learning experience have higher levels of affective engagement in online courses

Empirical studies support the positive relationship between motivation for learning and emotional engagement. For example, research by Meyer and Turner (2006) found that students with high intrinsic motivation reported higher levels of positive emotional engagement, such as enjoyment and interest, in their learning activities. Similarly, a study by Pekrun et al. (2002) & Li (2021) demonstrated that students' motivation significantly influenced their emotional responses to

academic tasks, with motivated students experiencing more positive emotions and fewer negative emotions. Emotional engagement can be positively predicted by students' learning motivation (Ganotice et al., 2022).

H9: There is a significant positive impact of motivation for learning (MFL) on Emotion (E)

3.10 Motivation for Learning and Performance:

High level of engagement enables students to learn the course content more effectively. It enables students to expand the knowledge obtained by creating new ideas or to critically examine the existing ideas to produce new solutions (Strachan & Liyanage, 2015). According to the social learning theory, engagement of learners is the primary element in the emergence of desired learning outcomes and motivation of students to learn (Bandura, 1977). Motivation influences students' ability to set and pursue academic goals. Intrinsically motivated students are more likely to set mastery-oriented goals focused on understanding and competence (Ames, 1992). These goals drive students to engage deeply with the material, leading to better comprehension and higher performance. Extrinsically motivated students may set performance-oriented goals aimed at obtaining rewards or avoiding negative outcomes, which can also enhance their academic efforts and results (Harackiewicz et al., 2002).

Motivated students employ effective learning strategies such as elaboration, organization, and critical thinking (Pintrich & De Groot, 1990). They are more likely to engage in self-regulated learning, which involves planning, monitoring, and evaluating their learning activities (Zimmerman, 2000). This strategic approach leads to more efficient and effective learning, thereby improving performance. Additionally, motivated students are more persistent and willing to invest the necessary effort to overcome challenges and achieve their academic goals (Schunk, 1991). As with learner-controlled programs, students who are highly motivated are able to explore content in greater depth than they would in classroom-based learning or training with lower degrees of control. (Karim, 2013)

Motivation is closely linked to self-efficacy, or the belief in one's ability to succeed in specific tasks (Bandura, 1997). High self-efficacy boosts students' confidence and encourages them to tackle challenging tasks, leading to higher performance. Students with strong self-efficacy are more likely to persevere in the face of difficulties and employ adaptive strategies to achieve their goals (Pajares, 1996). This confidence and persistence contribute significantly to academic success.

Empirical studies support the positive relationship between motivation for learning and academic performance. For example, a meta-analysis by Robbins et al. (2004) found that motivation significantly predicts college students' academic performance and retention. Similarly, research by Pintrich and De Groot (1990) demonstrated that motivated students who used self-regulated learning strategies achieved higher academic performance in high school settings. A study by Liu & Geng (2005) found that there was a significant positive relationship between learning motivation

and academic performance, and the stronger the motivation to learn, the better the academic performance.

H10: There is a significant positive impact of motivation for learning (MFL) on Performance (PF)

3.11 Motivation for Learning and Participation:

The relationship between motivation for learning and participation is well-supported by educational research. Motivation is likely to be reason that may increase student engagement and participation in online classes (Chootanon, 2022). Motivated students are more likely to engage actively in learning activities, resulting in higher levels of participation. Students' goal orientations influence their participation in learning activities. Mastery-oriented students, who focus on developing competence and understanding, are more likely to engage in deep learning and participate actively in discussions and collaborative projects (Ames, 1992). Performance-oriented students, who aim to demonstrate their abilities and achieve high grades, may also participate actively, but their engagement may be more surface-level and driven by the desire to outperform peers (Elliot & McGregor, 2001).

Motivation for learning is strongly linked to self-efficacy, or the belief in one's ability to succeed in specific tasks (Bandura, 1997). High self-efficacy boosts students' confidence and encourages them to participate actively in learning activities (Zimmerman, 2000). When students believe they can achieve their learning goals, they are more likely to take initiative, contribute to class discussions, and engage in collaborative learning (Pajares, 1996). This active participation enhances their overall engagement and academic success.

Motivated students often exhibit higher levels of interest and curiosity, which drive them to participate actively in learning activities (Hidi & Renninger, 2006). When students find the subject matter engaging and relevant, they are more likely to ask questions, seek clarification, and explore additional resources. This curiosity-driven participation leads to a deeper understanding of the material and a more fulfilling learning experience (Schiefele, 1991).

Empirical studies support the positive relationship between motivation for learning and participation. For instance, a study by Li (2021) found that students with high intrinsic motivation reported higher levels of participation in classroom activities, including asking questions, contributing to discussions, and collaborating with peers. Similarly, research by Pintrich and De Groot (1990) demonstrated that motivated students who used self-regulated learning strategies showed higher levels of participation and academic performance.

H11: There is a significant positive impact of motivation for learning (MFL) on Participation (PT)

3.12 Motivation for Learning and Skill:

The relationship between motivation for learning and skill engagement is well-documented in educational research. Motivated students are more likely to engage actively in skill development activities, leading to higher levels of skill engagement. Motivation fosters a deep interest in the subject matter, which enhances cognitive engagement and the quality of learning (Deci & Ryan, 1985). When students are intrinsically motivated, they are more likely to engage in skill development activities with enthusiasm and persistence. This deep engagement leads to a more thorough understanding and mastery of the skills being learned (Ryan & Deci, 2000). Motivated students also engage in skill-building exercises to achieve external rewards, such as grades, certifications, or career advancement (Ryan & Deci, 2000). While this type of engagement may be more goal-directed, it still contributes to students' overall skill development and proficiency (Eccles & Wigfield, 2002).

When students believe they can achieve their learning goals, they are more likely to take initiative, practice regularly, and seek feedback to improve their skills (Pajares, 1996). This active engagement enhances their overall skill mastery and competence. Motivated students often exhibit higher levels of interest and persistence, which drive them to engage actively in skill development activities (Hidi & Renninger, 2006). When students find the subject matter engaging and relevant, they are more likely to invest time and effort in practicing and refining their skills. This persistence leads to continuous improvement and a deeper understanding of the skills being developed (Schiefele, 1991).

Students' goal orientations influence their engagement in skill development activities. Mastery-oriented students, who focus on developing competence and understanding, are more likely to engage deeply in skill-building exercises (Ames, 1992). They are motivated to achieve a high level of proficiency and are willing to invest the necessary time and effort to master the skills. This mastery orientation leads to higher levels of skill engagement and achievement (Elliot & McGregor, 2001).

Empirical studies support the positive relationship between motivation for learning and skill engagement. For example, a study by (Deci & Ryan, 1985) found that students with high intrinsic motivation reported higher levels of engagement in skill development activities, such as practicing, seeking feedback, and applying skills in real-world contexts. Similarly, research by Zimmerman and Kitsantas (1997) demonstrated that motivated students who used self-regulated learning strategies showed higher levels of skill engagement and performance.

H12: There is a significant positive impact of motivation for learning (MFL) on Skill (S)

3.13 Online Communication self-efficacy and Emotion:

Online communication self-efficacy is the fourth variable predicting affective engagement. Students who are confident in terms of sending online e-mail, chatting, participating in chats, and starting discussions etc. can develop more positive emotions towards the course and pay more

attention to it (Ergun, 2020). Hung et al. (2010) state that in online learning, communication self-efficacy is a necessary dimension to overcome the limitations of online communication. For this reason, learning environments need to include communication tools to facilitate communication between teachers and students. Students need to ask questions and exchange ideas to improve their learning using synchronous tools such as live chat, instant messaging, audio discussions like Skype, and asynchronous tools such as e-mail.

Students with high online communication self-efficacy feel confident in their ability to navigate online platforms and communicate effectively (Eastin & LaRose, 2000). This confidence reduces anxiety and stress, leading to more positive emotional experiences such as enjoyment and satisfaction (Bandura, 1997). When students believe in their communication abilities, they are more likely to engage actively in online discussions, ask questions, and participate in collaborative activities, all of which contribute to a positive emotional climate (Schunk, Pintrich, & Meece, 2008).

One widely known instructional model is the Community of Inquiry (CoI) (Garrison et al., 2000) which suggests that learning occurs through educational experience in which learners and teachers interact through exhibiting three forms of presence—cognitive, social, and teaching—in combination. The paper also proposed a method for assessing the extent to which each form of presence is manifested in text-based online environments.

Drawing on research that identified self-efficacy as a determinant of success in online learning, Getenet et al., (2021) conducted a study with 110 students enrolled in postgraduate online courses at a business school in Australia. They used structural equation modeling to validate a model in which student attitudes and digital literacy contribute to self-efficacy, which then had positive effects on interactions with the online system and instructor and on peer engagement, conceptualized as involving social and academic interaction with other students.

Research from Falloon (2020) and Paetsch and Drechsel (2021) emphasizes the importance of a positive attitude towards digital technology for its effective use in teaching and learning. Students who lack confidence in their online communication skills may feel anxious about making mistakes, being misunderstood, or receiving negative feedback (Bandura, 1997). This anxiety can lead to negative emotions such as fear, frustration, and avoidance behavior. Conversely, students with high self-efficacy are less likely to experience communication anxiety, resulting in more positive emotional experiences (Artino, 2012). Individuals with high social skill and well-being emotional intelligence levels could have more self-confidence in online communication self-efficacy behavior such as using online tools (e-mail, discussion boards) to communicate with others efficiently, expressing themselves in written communications (emotions and jokes), and asking questions in online discussion environment (Engin, 2017)

High online communication self-efficacy enhances students' sense of social presence, or the feeling of being connected and interacting with others in an online environment (Ergun, 2020). When students feel socially present, they are more likely to experience positive emotions such as belonging, interest, and excitement (Garrison et al., 2000). Effective communication skills enable students to build meaningful relationships with peers and instructors, fostering a supportive and emotionally engaging online learning environment (Swan & Shih, 2005).

Students with high online communication self-efficacy are more likely to seek and provide feedback, which plays a crucial role in emotional regulation (Zimmerman & Kitsantas, 1997). Constructive feedback can enhance positive emotions such as pride and satisfaction, while a lack of feedback or negative feedback can lead to emotions such as frustration and disappointment (Hattie & Timperley, 2007). Confident communicators are better equipped to handle feedback and use it to improve their performance, leading to more positive emotional outcomes (Pekrun, 2006).

Empirical studies support the positive relationship between online communication self-efficacy and emotion. For instance, a study by Artino (2012) found that students with high online communication self-efficacy reported higher levels of positive emotions and lower levels of negative emotions in online learning environments. Similarly, research by Eastin and LaRose (2000) demonstrated that online communication self-efficacy significantly predicted students' satisfaction and emotional engagement in online courses.

H13: There is a significant positive impact of online communication self-efficacy (OCS) on Emotion (E)

3.14 Online Communication self-efficacy and Performance:

The relationship between online communication self-efficacy and performance is supported by various studies in educational research. Students with high online communication self-efficacy are generally better equipped to perform well in online learning environments.

High online communication self-efficacy enables students to participate effectively in online discussions and collaborative activities. This active participation leads to a deeper understanding of course content and better performance on assignments and exams (Garrison, Anderson, & Archer, 2000). When students are confident in their communication skills, they are more likely to engage with peers and instructors, seek clarification, and contribute meaningful insights, all of which enhance their learning and performance (Baldwin, Bedell, & Johnson, 1997).

Students with high online communication self-efficacy are more likely to seek out and utilize available resources and support systems (Hodges, 2008). This proactive approach can include asking for help from instructors, participating in study groups, and using online resources effectively. Access to these supports can significantly improve academic performance by providing students with the information and assistance they need to succeed (Tinto, 1997). It enables students to give and receive constructive feedback, which is essential for iterative improvement and academic growth (Hattie & Timperley, 2007). High self-efficacy in online communication means that students can effectively interpret and act on feedback, leading to continuous improvement in their performance. Moreover, they can provide useful feedback to peers, contributing to a collaborative learning environment where everyone benefits.

Online communication self-efficacy is closely linked to self-regulated learning, where students take control of their learning process through goal setting, self-monitoring, and self-reflection (Zimmerman, 2002). Confident communicators are better at articulating their learning goals,

discussing their progress, and seeking feedback, all of which are critical components of self-regulated learning. This autonomy and proactive approach lead to higher academic performance (Pintrich & De Groot, 1990). Empirical research supports the positive impact of online communication self-efficacy on performance. For example, a study by Eastin and LaRose (2000) found that students with higher levels of online communication self-efficacy performed better in online courses compared to those with lower self-efficacy. Similarly, Hodges (2008) demonstrated that online communication self-efficacy was a significant predictor of academic success in virtual learning environments.

H14: There is a significant positive impact of online communication self-efficacy (OCS) on Performance (PF)

3.15 Online Communication self-efficacy and Participation:

Students with high online communication self-efficacy feel confident in their ability to participate effectively in online discussions and activities (Eastin & LaRose, 2000). This confidence translates into a greater willingness to engage in course activities, share ideas, and collaborate with peers. When students believe in their communication skills, they are more likely to take initiative and participate actively in online learning (Artino, 2012).

High online communication self-efficacy reduces communication anxiety, which can be a significant barrier to participation (MacIntyre & Thivierge, 1995). Students who are anxious about their ability to communicate online may avoid participating in discussions or group activities. Conversely, students with high self-efficacy experience less anxiety, making them more likely to engage in online interactions and contribute to the learning community (Bandura, 1997).

Students with high online communication self-efficacy are better equipped to interact and collaborate with their peers and instructors (Garrison, Anderson, & Archer, 2000). Effective communication skills enable them to express their ideas clearly, ask questions, and provide feedback, all of which are essential for meaningful participation. This interaction fosters a sense of community and belonging, encouraging further participation (Palloff & Pratt, 2007). Students with high online communication self-efficacy are better equipped to interact and collaborate with their peers and instructors (Garrison, Anderson, & Archer, 2000). Effective communication skills enable them to express their ideas clearly, ask questions, and provide feedback, all of which are essential for meaningful participation. This interaction fosters a sense of community and belonging, encouraging further participation (Palloff & Pratt, 2007).

Students with high online communication self-efficacy are more likely to seek out and utilize available resources and support systems (Hodges, 2008). This proactive approach to learning includes participating in study groups, accessing online resources, and asking for help when needed. Such engagement with learning resources further supports active participation in the course (Tinto, 1997).

H15: There is a significant positive impact of online communication self-efficacy (OCS) on Participation (PT)

3.16 Online Communication self-efficacy and Skill:

High online communication self-efficacy enables students to confidently engage in learning activities and practice new skills (Zimmerman, 2000). When students believe in their ability to communicate effectively online, they are more likely to participate in skill-building exercises, seek feedback, and refine their abilities (Schunk, 1991). This confidence encourages continuous learning and skill development.

Students with high online communication self-efficacy are more likely to participate in collaborative learning activities, which are essential for skill engagement (Garrison, Anderson, & Archer, 2000). Collaboration with peers allows students to practice and refine their skills in a supportive environment, receive constructive feedback, and learn from others' experiences (Johnson & Johnson, 1989). Effective communication is key to successful collaboration and skill development.

High online communication self-efficacy facilitates the effective use of online resources and tools, which are critical for skill engagement (Hodges, 2008). Students with strong digital communication skills can navigate online platforms, access instructional materials, and utilize interactive tools to enhance their learning and practice new skills. This proactive approach supports continuous skill engagement and development (Pintrich & De Groot, 1990).

Online communication self-efficacy reduces barriers such as anxiety and hesitation that can hinder skill practice (Artino, 2012). Students who are confident in their online communication abilities are less likely to experience anxiety when participating in skill-building activities. This reduction in anxiety allows them to focus more on learning and practicing new skills, leading to better engagement and proficiency (MacIntyre & Thivierge, 1995).

Empirical research supports the positive impact of online communication self-efficacy on skill engagement. For example, a study by Eastin and LaRose (2000) found that students with higher levels of online communication self-efficacy were more likely to engage in skill-building activities and demonstrate improved competencies compared to those with lower self-efficacy. Similarly, research by Hodges (2008) demonstrated that online communication self-efficacy was a significant predictor of students' engagement in skill development activities in virtual learning environments.

H16: There is a significant positive impact of online communication self-efficacy (OCS) on Skill (S)

3.17 Self-Directed Learning and Emotion:

Self-directed learning allows students to take control of their educational journey, which can lead to increased feelings of autonomy and empowerment (Deci & Ryan, 2000). This sense of control over one's learning process is associated with positive emotions such as enjoyment and satisfaction. When students can direct their learning, they are more likely to engage emotionally with the material, as they perceive it as relevant and meaningful (Garrison, 1997). In self-directed learning, learners are active in the process of determining their learning objectives, activities, needs and competence levels, and they take more responsibility for their own learning (Knowles, M. S., 1975).

SDL is often driven by intrinsic motivation, where students engage in learning activities for the inherent satisfaction and interest they derive from the process (Deci & Ryan, 1985). Intrinsically motivated learners experience higher levels of emotional engagement, as they find joy and fulfillment in the act of learning itself. This intrinsic interest can enhance positive emotions and reduce negative ones, contributing to a more enjoyable and engaging learning experience (Csikszentmihalyi, 1990).

Self-directed learners can tailor their learning experiences to their interests and needs, which can lead to greater emotional investment in their studies (Candy, 1991). By pursuing topics that they are passionate about and using methods that suit their learning style, students can enhance their emotional engagement. Personalized learning fosters a deeper connection to the material, leading to increased enthusiasm and commitment (Tough, 1971).

SDL encourages students to set their own goals and develop strategies to achieve them, which can lead to a sense of accomplishment and pride when they overcome challenges (Zimmerman, 2002). This process of setting and achieving personal goals is associated with positive emotions such as confidence and satisfaction. Successfully navigating challenges and achieving milestones can boost students' emotional engagement and motivation (Schunk, 1991).

Students engaged in SDL often develop better resilience and coping strategies, which can help them manage the emotional ups and downs of the learning process (Garrison, 1997). Effective self-directed learners are more likely to view setbacks as opportunities for growth rather than as insurmountable obstacles. This positive outlook can reduce negative emotions such as frustration and anxiety, fostering a more emotionally engaging learning environment (Pekrun, 2006).

Empirical research supports the positive impact of self-directed learning on emotional engagement. For example, a study by Loyens, Magda, and Rikers (2008) found that students who engaged in SDL reported higher levels of intrinsic motivation and positive emotions compared to those who relied on more structured, teacher-directed learning approaches. Similarly, research by Garrison (1997) demonstrated that self-directed learners exhibited greater emotional engagement and persistence in their studies.

H17: There is a significant impact of self-directed learning (SDL) on Emotion (E)

3.18 Self-Directed Learning and Performance:

Self-directed learners are skilled in setting specific, measurable, achievable, relevant, and time-bound (SMART) goals, which are essential for guiding their learning activities (Zimmerman, 2002). By setting clear goals and creating detailed plans, students can focus their efforts on high-priority tasks, leading to more efficient and effective learning. This structured approach helps improve academic performance by ensuring that students stay on track and meet their learning objectives (Locke & Latham, 2002).

SDL encourages students to identify and utilize various learning resources, including textbooks, online materials, peers, and instructors (Candy, 1991). This resourcefulness enhances students' ability to find relevant information, solve problems, and overcome obstacles independently. By developing strong problem-solving skills, self-directed learners can address academic challenges more effectively, leading to higher performance (Garrison, 1997).

Effective time management is a critical component of SDL. Self-directed learners are adept at organizing their study schedules, setting deadlines, and adhering to their plans (Dembo & Seli, 2004). This discipline ensures that they allocate sufficient time to each task, avoid procrastination, and maintain a steady pace of progress. Good time management practices contribute to better performance by allowing students to complete assignments on time and prepare adequately for assessments (Schunk & Zimmerman, 1998).

SDL fosters intrinsic motivation, where students engage in learning activities for the inherent satisfaction and interest they derive from the process (Deci & Ryan, 1985). Intrinsically motivated learners are more likely to be engaged, persistent, and dedicated to their studies. This heightened engagement translates into better academic performance, as students are more willing to invest the effort required to master complex concepts and complete challenging tasks (Ryan & Deci, 2000).

Self-directed learners regularly monitor their progress and reflect on their learning experiences, allowing them to identify strengths and areas for improvement (Schon, 1983). This self-assessment helps students make necessary adjustments to their learning strategies, enhance their understanding, and achieve their academic goals. By continuously evaluating their performance, self-directed learners can ensure that they are on the right track and making meaningful progress (Zimmerman, 2002). Torun (2020) examined the relationship between students' readiness and academic performance in online courses in higher education. The results indicated that self-directed learning and motivation were effective predictors of academic performance.

Empirical research supports the positive impact of self-directed learning on academic performance. For example, a study by Loyens, Magda, and Rikers (2008) found that students who engaged in SDL exhibited higher academic performance compared to those who relied on more traditional, teacher-directed approaches. Similarly, Garrison (1997) demonstrated that self-directed learners achieved better outcomes in terms of knowledge acquisition and skill development, highlighting the effectiveness of SDL in promoting academic success.

H18: There is a significant positive impact of self-directed learning (SDL) on Performance (PF)

3.19 Self-Directed Learning and Participation:

SDL fosters a sense of ownership over the learning process, encouraging students to take responsibility for their education (Deci & Ryan, 2000). When students feel they have control over their learning, they are more likely to participate actively in educational activities. This sense of autonomy motivates learners to engage in discussions, seek out resources, and collaborate with peers, leading to higher levels of participation (Garrison, 1997).

SDL often stems from motivation, where learners are driven by an inherent interest and enjoyment in the subject matter (Deci & Ryan, 1985). Intrinsically motivated students are more likely to participate actively because they find the learning activities fulfilling and engaging. This intrinsic interest encourages them to delve deeper into the material, ask questions, and contribute to discussions, thereby enhancing their participation (Ryan & Deci, 2000). Self-learning enables the learner to actively participate throughout the process, taking individual responsibility, and managing the learning and evaluation process (Nunan and Lamb, 1996)

Self-directed learners are adept at identifying and utilizing various learning resources, both within and outside the classroom (Candy, 1991). This resourcefulness leads to increased participation as students actively seek out information, engage with supplementary materials, and apply their knowledge in practical settings. By taking the initiative to explore additional resources, self-directed learners enhance their participation and deepen their understanding of the subject matter (Tough, 1971).

SDL encourages collaborative learning, where students work together to achieve common goals (Garrison, 1997, Gharti, 2019). Collaborative learning activities, such as group projects and peer discussions, require active participation from all members. Self-directed learners are more likely to engage in these activities as they recognize the value of collaboration in enhancing their learning experience.

SDL involves regular self-monitoring and reflection, enabling students to assess their progress and adjust their learning strategies accordingly (Zimmerman, 2002). This reflective practice encourages students to participate actively in their learning journey, as they continuously evaluate their performance and seek ways to improve. By engaging in self-assessment, self-directed learners identify areas where they need to participate more actively and take steps to enhance their involvement (Schunk, 1991).

Empirical research supports the positive impact of self-directed learning on participation. For instance, a study by Loyens, Magda, and Rikers (2008) found that students who engaged in SDL exhibited higher levels of participation in online discussions and collaborative activities compared to those who relied on traditional, teacher-directed approaches. Similarly, Garrison (1997) demonstrated that self-directed learners were more actively involved in their educational experiences, leading to increased participation and better academic outcomes. Parkes, Stein and Reading (2015) argue that unprepared learners cannot actively participate and use critical thinking skills.

The characteristic of e-learning is that the teacher's role is decreasing so that it requires students to take a more active role in their learning. In particular, students must take responsibility for guiding and directing their learning (Hartley & Bendixen, 2001).

Self-directed learning is a personal characteristic in which individual learners must have the initiative to learn, have a self-concept as a learner, be responsible for their learning, be creative, open to learning opportunities, initiative, autonomous and, love learning (Guglielmino, 1977). Based on these characteristics, it is a requirement to be fully involved and be able to be attentive in learning through e-learning

H19: There is a significant positive impact of self-directed learning (SDL) on Participation (PT)

2.20 Self-Directed Learning and Skill:

SDL encourages learners to set specific, measurable, achievable, relevant, and time-bound (SMART) goals related to skill development (Zimmerman, 2002). By clearly defining their objectives, students can focus their efforts on acquiring particular skills, creating structured plans to achieve these goals. This strategic approach ensures that learners engage in deliberate practice, which is essential for skill development (Locke & Latham, 2002).

Self-directed learners are proactive in identifying and utilizing various resources, such as online tutorials, textbooks, workshops, and expert guidance, to develop their skills (Candy, 1991). By seeking out diverse resources, students gain exposure to different perspectives and techniques, enhancing their understanding and proficiency in specific skills. This resourcefulness allows them to tailor their learning experiences to their unique needs and preferences, leading to more effective skill development (Tough, 1971).

SDL emphasizes the importance of practice and application in skill development. Self-directed learners actively seek opportunities to practice their skills in real-world contexts, applying theoretical knowledge to practical situations (Eneau, 2008). This hands-on experience helps reinforce learning, build competence, and enhance performance. Regular practice and application are critical for mastering skills and achieving a high level of proficiency (Kolb, 1984).

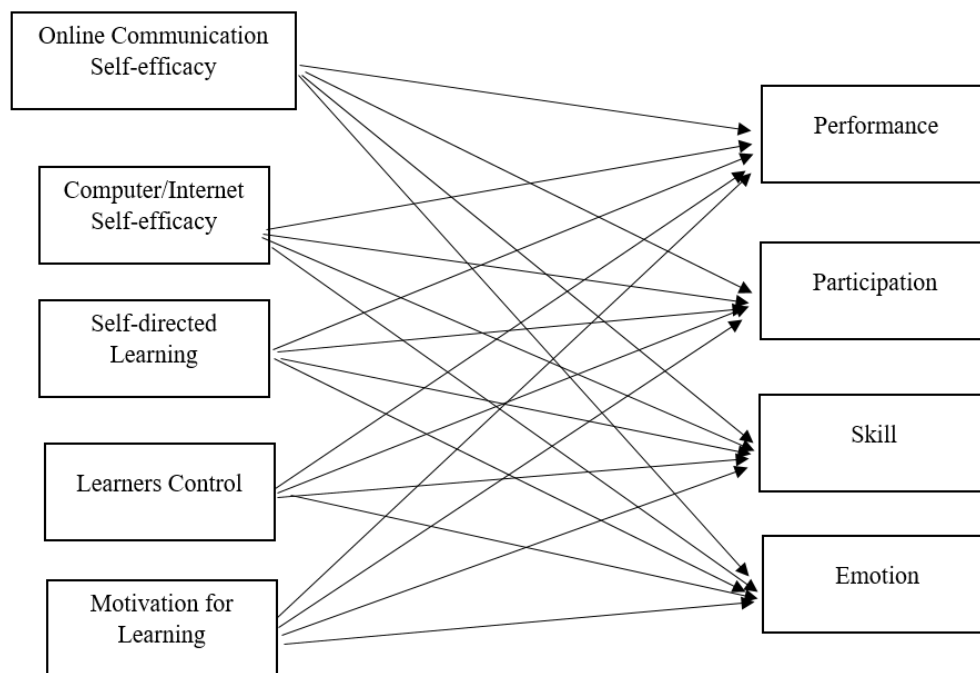
Self-directed learners engage in continuous self-assessment and reflection, seeking feedback from various sources to improve their skills (Schon, 1983). Constructive feedback helps learners identify areas for improvement and refine their techniques. Reflective practice enables students to critically evaluate their performance, understand their strengths and weaknesses, and make informed adjustments to their learning strategies. This iterative process of feedback and reflection is vital for ongoing skill development (Schunk, 1991).

SDL fosters intrinsic motivation, where learners are driven by a genuine interest and passion for developing their skills (Deci & Ryan, 1985). Intrinsically motivated students are more likely to persist in their efforts, even when faced with challenges. This perseverance is crucial for skill development, as it requires sustained practice and continuous improvement. Motivated learners

are also more likely to engage deeply with the material, leading to better skill acquisition and mastery (Ryan & Deci, 2000).

Empirical research supports the positive impact of self-directed learning on skill development. For instance, a study by Loyens, Magda, and Rikers (2008) found that students who engaged in SDL demonstrated higher proficiency in critical thinking and problem-solving skills compared to those who relied on traditional, teacher-directed approaches. Similarly, Garrison (1997) highlighted that self-directed learners showed significant improvements in both cognitive and technical skills, underscoring the effectiveness of SDL in promoting comprehensive skill development.

H20: There is a significant positive impact of self-directed learning (SDL) on Skill (S)



The graphical representation of the research model is presented in figure 2.1

4. THEORETICAL UNDERPINNING:

4.1 Constructivist Theory and Student Engagement

Constructivist theory posits that learners actively construct their own understanding and knowledge of the world through experiences and reflections on those experiences (Piaget, 1954; Vygotsky, 1978). This perspective emphasizes the role of active learning, where students are not passive recipients of information but rather engage in a dynamic process of meaning-making. Constructivism underscores the importance of social interactions and collaboration in learning, suggesting that knowledge is constructed through dialogue and shared experiences (Bruner, 1996).

In the context of e-learning, constructivist principles highlight the importance of active engagement, social interaction, and the ability to apply knowledge in real-world scenarios (Jonassen, 1999).

Student engagement, defined as the degree of attention, curiosity, interest, optimism, and passion that students show when they are learning or being taught, is a critical factor in successful learning outcomes (Fredricks, Blumenfeld, & Paris, 2004). Engagement is multidimensional, encompassing behavioral, emotional, and cognitive aspects. Behavioral engagement includes participation in academic and extracurricular activities; emotional engagement involves positive and negative reactions to teachers, classmates, and school; and cognitive engagement refers to investment in learning and willingness to exert effort in understanding complex ideas.

Constructivist theory supports student engagement by promoting active learning strategies that require students to interact with the content, collaborate with peers, and reflect on their learning processes. According to constructivist principles, learning environments that encourage exploration, discussion, and problem-solving can enhance students' intrinsic motivation and engagement (Loyens & Gijbels, 2008). For instance, project-based learning, collaborative group work, and inquiry-based activities align with constructivist approaches and have been shown to increase student engagement (Prince, 2004).

4.2 Self-Efficacy Theory and E-Learning Readiness

Self-efficacy theory, developed by Albert Bandura, refers to an individual's belief in their capability to execute behaviors necessary to produce specific performance attainments (Bandura, 1977). Self-efficacy influences how people think, feel, motivate themselves, and act. In the context of education, self-efficacy impacts students' motivation, learning, and performance. Higher levels of self-efficacy are associated with greater effort, persistence, and resilience in the face of challenges (Bandura, 1986).

E-learning readiness encompasses the preparedness of learners to engage with and benefit from online learning environments. It includes dimensions such as technological skills, self-directed learning ability, motivation, and attitudes towards e-learning (Aydin & Tasci, 2005). Students with high e-learning readiness are typically more comfortable using digital tools, managing their learning independently, and maintaining motivation in an online setting. E-learning readiness, which encompasses technological self-efficacy, self-regulation, and motivation, aligns with these constructivist ideals by preparing students to take an active role in their online learning environments.

Self-efficacy theory underpins e-learning readiness by highlighting the role of confidence in using technology and managing one's own learning. Students with high computer/Internet self-efficacy are more likely to engage actively with e-learning platforms, navigate digital resources effectively, and troubleshoot technological issues independently (Eastin & LaRose, 2000). Moreover, self-efficacy in self-directed learning, a key component of e-learning readiness, ensures that students

can set learning goals, monitor their progress, and adjust their strategies as needed (Zimmerman, 2002).

Research indicates that self-efficacy is a significant predictor of e-learning readiness and success. For example, students with high self-efficacy are more likely to participate in online courses, complete assignments, and achieve higher academic performance in e-learning environments (Wang & Newlin, 2002). Thus, fostering self-efficacy through targeted interventions, such as training in digital literacy and self-regulated learning strategies, can enhance students' readiness for and engagement in e-learning.

E-learning readiness ensures that students possess the necessary skills and attitudes to navigate and interact with digital learning platforms effectively. This readiness is critical as it enables students to engage deeply with learning materials, participate in collaborative activities, and manage their learning processes autonomously (Hung et al., 2010). For instance, students with high technological self-efficacy are more confident in using e-learning tools, which facilitates their active participation and engagement in online courses. Similarly, self-regulation skills, which are central to constructivist theory, allow students to set goals, monitor their progress, and reflect on their learning, thereby enhancing their engagement and overall learning outcomes (Zimmerman, 2002). Motivation, another crucial component of e-learning readiness, drives students to persist in their learning tasks and seek out meaningful interactions and resources.

The variables in this study—e-learning readiness and student engagement—are deeply interconnected through the lens of constructivist theory. E-learning readiness provides the foundation for students to engage constructively with online learning environments, fostering a cycle of continuous learning and development. This readiness supports the active, collaborative, and reflective learning processes advocated by constructivist theory, ultimately leading to higher levels of student engagement. Thus, the constructivist framework not only explains the importance of e-learning readiness but also elucidates how it facilitates and enhances student engagement in online educational settings (Dabbagh & Kitsantas, 2012).

As a consequence, constructivism will be utilized to support the research's main thesis: learning is an active, creative process. The goal of this study was to fill in the gaps in the literature by examining how e-learning readiness effects the online student's engagement. The constructivism theory was used to create the research model. As a consequence, constructivism was chosen in this research since it claims that engaging with classmates and lecturers leads to active collaborative learning. Prior work has paved the way for the creation and refinement of a research model to investigate the influence of social media use in collaborative learning on academic achievement among research students

5: METHODOLOGY

The context of higher education in Pakistan is diverse, encompassing a mix of public and private institutions that cater to a wide range of students across the country. As reported in the Pakistan Education Statistics (PES) 2021-22, there are 220 universities operating in Pakistan, reflecting the

growing demand for higher education. These institutions vary in terms of infrastructure, resources, and student demographics.

This study was conducted within this diverse landscape, drawing data from both public and private educational settings to ensure a comprehensive understanding of e-learning engagement. A significant portion of the research was carried out at the University of Karachi, one of the largest public universities in Pakistan, known for its diverse student body and wide range of academic programs. The inclusion of this public university provided valuable insights into how e-learning readiness and engagement manifest in a resource-constrained yet highly populated environment.

In addition to the public university sample, half of the participants were postgraduate certification (PGCert) students enrolled in a private training institute. These students, often engaged in professional development programs, represent a unique subset of learners with distinct educational needs and engagement patterns. By incorporating this group, the study captured the nuances of how e-learning readiness and engagement may differ between traditional public university students and those enrolled in private, specialized programs.

This dual focus on public and private institutions offers a well-rounded perspective on the state of e-learning in Pakistan, shedding light on the challenges and opportunities faced by diverse educational stakeholders in adopting and implementing online learning systems.

5.1 Sampling Design

5.1.1 Target Population

The target population in this study is aged between 21 and above. These samples then further narrowed down to audiences who have gained an online learning experience in their life. The respondents of this study are divided in two groups, traditional and non-traditional. Traditional students are representing sample from University of Karachi and non-traditional students are representing sample size form ICE PGCert online course.

5.1.2 Sampling Technique

This study employs a random sampling technique, distributing 200 survey questionnaires to students at the University of Karachi, representing traditional students, and 200 survey questionnaires to participants in the ICE PGCert online course, representing non-traditional students. Random sampling is chosen to ensure that every member of the target population has an equal chance of being included in the sample, which enhances the representativeness and generalizability of the findings (Creswell, 2014). This technique reduces selection bias, allowing for a more accurate and unbiased estimation of the population parameters (Fowler, 2014)

5.1.3 Sampling Size

According to Roscoe (1975), sampling size of 30 to 500 is considered as most suitable for majority studies. According to GreatBrook (n.d), 200 responses will give fairly good survey accuracy in a survey project. Data will be collected from a sample of 200 postgraduate students enrolled in an online postgraduate certification course in education at IQualify UK for non-traditional and 200 postgraduate students from University of Karachi for traditional students.

5.2 Data Collection Method

The data collection for this study will be conducted using structured survey questionnaires administered to both traditional and non-traditional students. A total of 400 questionnaires will be distributed, with 200 targeting students at the University of Karachi and another 200 directed towards participants in the ICE PGCert online course. Moreover, a survey link was shared with a survey link (through WhatsApp group) with students of ICE. This method is chosen due to its efficiency in gathering a large amount of data in a relatively short period, ensuring a broad representation of the target population (Fowler, 2014). The survey will include validated scales to measure e-learning readiness, student engagement, cultural dimensions, and personality traits. Utilizing online survey tools will facilitate ease of distribution and collection, ensuring higher response rates and data accuracy (Bryman, 2016). The structured nature of the questionnaire ensures consistency in responses, allowing for reliable and comparable data necessary for robust statistical analysis (Creswell, 2014).

5.3 Research Instrument

Given the nature of the study, a structured questionnaire consisting primarily of close ended questions was designed. The research instrument contains five sections and the items were adapted by referring to extant literature. A five-point Likert scale (1 = strongly agree, 2= agree, 3 = neither agree nor disagree, 4 = disagree and 5 = strong disagree) was used to determine the respondents' level of agreement and disagreement to each statement for dimensions of big five personality i.e. neuroticism (N), extraversion (EXT), openness (OP), conscientiousness (CON), dimensions of culture i.e. uncertainty avoidance (UA), power distance (PD), individualism/collectivism (IC), lower order constructs of e-learning readiness i.e. internet/computer self-efficacy, online communication self-efficacy, self-directed learning and learner control, lower order constructs for online student engagement i.e. skill, emotion, participation and performance. Out of the 400 questionnaires distributed, 320 were retained for further analysis indicating a response rate of 78%.

The first section of the questionnaire will be used to collect the personal data of the respondents. It determine age, gender, education level and the cohort group. Filter question are included to ask whether the students have experienced an e-learning environment in their studies to confirm that the respondent matches for this research purpose.

E-learning readiness scale was developed by Hung et al (2010) to measure learner readiness in online learning settings. The students were asked to describe themselves in reference to a 5-point Likert-type scale, with anchors ranging from 1 (strongly agree) to 5 (strongly disagree). The scale was divided into five dimensions: self-directed learning, learner control, motivation for learning, computer/Internet self-efficacy and online communication self-efficacy (see Appendix 1 for statements in each dimension). In the first part, “self-directed learning” centered on learners’ taking responsibility for the learning context to reach their learning objectives described by Garrison (1997). A total of 5 items represented this dimension (SDL1, SDL2, SDL3, SDL4 and SDL5) The concept of “learner control” centered on online learners’ control over their learning (control that manifested itself as repeating or skipping some content) and on efforts by online learners to direct their own learning with maximum freedom. A total of 3 items represented this dimension (LC1, LC2 and LC3). The concept of “motivation for learning” centers on online learners’ learning attitudes (MFL1, MFL2, MFL3 and MFL4), and the concept of “computer/Internet self-efficacy” is about online learners’ ability to demonstrate proper computer and Internet skills (CIS1, CIS2 and CIS3). The final concept is “online communication self-efficacy,” which would describe learners’ adaptability to the online setting through questioning, responding, commenting, and discussing (OCS1, OCS2 and OCS3).

Students’ perceived level of engagement were measured using Marcia Dixon’s (2010) peer-reviewed OSES (see Appendix E). Students self-reported their perceived levels of engagement by responding to a 17-item Likert-style questionnaire, resulting in individual scores ranging from 1 (very characteristic of me) to 5 (not at all characteristic of me). The OSES comprises four subcategories: skills engagement, emotional engagement, participation engagement, and performance engagement (Dixon, 2010). Skills engagement pertains to ways students interact with the course content by studying regularly and keeping up with the readings. A total of 5 items represented this dimension (E1, E2, E3, E4, and E5). Emotional engagement pertains to ways students make the course content relevant, interesting, and useful by applying course material to their everyday lives. A total of 5 items represented this dimension (S1, S2, S3, S4, and S5). Participation engagement pertains to ways students interact with others by participating online, posting questions on discussion forums, and helping other students. A total of 5 items represented this dimension (PT1, PT2, PT3, PT4, and PT5). Performance engagement pertains to ways students want to do well in the course by getting good grades and doing well on exams. A total of 2 items represented this dimension (PF1 and PF5).

6: DATA ANALYSIS

Data analysis is conducted after all usable data is collected. The process of evaluating, recoding, decoding data will be applied to statistical or logical techniques. This process is to test the difference between reality and expectation of data. It then analyzes whether the data characteristics and quality met each other. This study utilized Smart PLS 3 software for model assessment. Quantitative data is analyzed through the partial least square structural equation modeling (PLS-SEM). PLS-SEM, an embryonic data analysis tool, is imperative to be utilized in business and social sciences research to knob over sample size and non-normal data efficiently (Sarstedt et al, 2014; Hair et al, 2011). PLS-SEM goes through two stage analysis i.e. Measurement model

specification and structural model assessment (Wong 2013). Measurement model specification pledges to carry forward for further analysis the construct with good indicator loading, convergent validity, composite reliability (CR), and discriminant validity. Structural model assessment weighs path coefficient and tests their significance. Moreover, PLS-SEM is redundantly applied for data analysis in the empirical studies in the knowledge management literature (Fauzi, 2022). The output generated will be presented in statistical diagrams and tables.

Moreover, the SPSS vs.30 which is the Statistical Package for Social Sciences were utilized to classify and also analyze the demographic information

6.1 Testing the normality assumption

According to Hair, Black, Babin, Anderson, and Tatham (2010), testing the presence of normality is essential in multivariate analysis. In other words, if the data is not normally distributed, then it may affect the validity and reliability of the results. In the current study, we employed the Jarque-Bera (skewness-kurtosis) test to check whether the data are normally distributed or not. The skewness value indicates the symmetry of the distribution (Pallant, 2005). A negative skew indicates that the distribution is shifted to the right, whereas positive skew indicates a shift to the left. Kurtosis provides information about the height of the distribution (Pallant, 2005). The positive kurtosis value indicates a peaked distribution, whereas a negative value indicates a flatter distribution. According to Tabachnick and Fidell (2007), the normal range for skewness-kurtosis value is ± 2.58 . Following this recommendation, all the items in the dataset were found to be normally distributed (i.e. $< \pm 2.58$). More specifically, the skewness and kurtosis value in each case was in the range of ± 1 which is considered negligible.

The skewness and kurtosis of openness to experience are -0.323 and 0.305 while conscientiousness is 0.072 and -0.284. For agreeableness is 0.012 on skewness and 0.358 on kurtosis. While the skewness for self-directed learning is -0.357 and kurtosis is -0.428. Any value that falls between -1.96 to +1.96 will be considered reliable.

6.2 Demographic Details of the Participants

The demographic information of the survey participants is described in this section. The frequency distribution in terms of gender, age and cohort student are depicted in the tables in the following subsections.

The frequency table was generated to describe the distribution of gender in the sample. As shown in Table 1, the majority of the participants were female ($n = 157$, 49.1%) while 155 participants (48.4%) were male. The results for gender wise distribution of the respondents are presented in table 4.1.

Table 4.1

Frequency table of gender distribution of sample

	N	%	Valid Percentage	Cumulative Percentage
Female	157	49.1	49.1	51.3
Male	155	48.4	48.4	100.0
Total	320	100.0	100.0	

Descriptive statistics were calculated to summarize the distribution of age group in the sample. As shown in table 2, the largest age group was 18-24 years (n = 105, 32.8%) followed by 33-40 years (n = 87, 27.2%) and 25-32 years (n = 82, 25.6%). The smallest age group was greater than 40 years (n = 40, 12.5%). The result of age wise distribution of respondents are presented in table 4.2.

Table 4.2

Descriptive statistics of age group in the sample

	N	%	Valid Percentage	Cumulative Percentage
18-24	105	32.8	32.8	34.7
25-32	82	25.6	25.6	60.3
33-40	87	27.2	27.2	87.5
greater than 40	40	12.5	12.5	100.0
Total	320	100.0	100.0	

This study comprises “cohort student” variable as demographic variable considering the traditional and non-traditional nature of students. Non-traditional learners are defined in literature as learners with sparse age gaps, different background, family commitment, full-time employed, discontinued education, single parent (Devlin, 2017). On the other hand, traditional learners are typically young adults who are childfree, locally based, from a middle class family, are recent school leavers and have parents that can financially support them during their study (Devlin, 2017). To classify students into traditional (T) and non-traditional categories (NT), we used three key questions in our demographic survey: (1) “Do you have responsibility for any dependent, such as a spouse, children, or elderly family members?” and (2) “Are you currently engaged in any part-time or full-time work while enrolled in the degree program?” (3) “Are you financially dependent on someone?” If a participant responded “yes” to any of the questions, they were categorized as a non-traditional student (NT). This classification reflects the unique challenges that non-traditional students may face in balancing academic and personal responsibilities, which may influence their engagement in online learning environments.

The frequency table was generated to describe the distribution of traditional/non-traditional students in the sample. As shown in Table 1, the majority of the participants were traditional students (n = 168, 59.4%) while 146 participants (38.8%) were non-traditional. The results for student’s cohort distribution of the respondents are presented in table 4.3.

Table 4.3

Frequency table of traditional/non-traditional students in the sample

	N	%	Valid Percentage	Cumulative Percentage
NT	146	38.8	38.8	40.6
T	168	59.4	59.4	100.0
Total	320	100.0	100.0	

6.3 The Measurement Model

The first step of PLS-SEM analysis is the assessment of the measurement model. Subsequently, our research model consists of reflectively measured lower order constructs. The quality of the construct in the study is assessed by the measurement model. The assessment of the quality criteria starts with evaluation of the factor loadings which is followed by establishing the construct reliability and construct validity.

6.3.1 Factor loadings

In the measurement model, examining the indicator reliability is considered the first step. Indicators' variance is measured by indicator reliability that is explained by relevant constructs (Chin, 1998). Moreover these values are indicated by outer loadings or factor loadings (Wong, 2013). Factor loadings refer to "the extent to which each of the items in the correlation matrix correlates with the given principal component. Factor loadings can range from -1.0 to +1.0, with higher absolute values indicating a higher correlation of the items with the underlying factor" (Pett et al, 2003, p. 299). Items in the model should have a value greater than 0.50. Although factor loading over 0.7 is desirable (Vinzi, Chin, Henseler & Wang, 2010), researchers frequently obtain weaker outer loadings (<0.70) in social science studies. Rather than automatically eliminating indicators, the effect of the removal of the item on composite reliability, content, and convergent validity shall be examined. Generally items with outer loadings from 0.40 to 0.70 shall be considered for removal only if deletion results in an increase of composite reliability or average variance extracted (AVE) over the recommended value (Hair et al., 2016). In the current study, as indicated in Table 4, a total of two items (SDL2, factor loading =0.294 and PT5, factor loading =0.114) were deleted due to low factor loading (<0.500). Factor loadings are present in table 4.8.

Factors		Descriptive Stats		Confirmatory Factor Analysis		
		Mean	Standard deviation	Outer loadings	T statistics	P values
CIS1	I feel confident in performing the basic functions of Microsoft Office programs (MS Word, MS Excel, and MS PowerPoint).	0.904	0.018	0.904	49.492	0.000
CIS2	I feel confident in my knowledge and skills of how to manage software for online learning.	0.893	0.012	0.892	74.564	0.000
CIS3	I feel confident in using the Internet (Google, Yahoo) to find or gather information for online learning.	0.754	0.031	0.753	24.092	0.000
LC1	I can direct my own learning progress.	0.932	0.025	0.930	37.141	0.000
LC2	I am not distracted by other online activities when learning online (instant messages, Internet surfing).	0.642	0.036	0.640	17.58	0.000
LC3	I repeated the online instructional materials on the basis of my needs	0.575	0.048	0.575	11.897	0.000
MFL1	I am open to new ideas.	0.837	0.036	0.834	23.453	0.000
MFL2	I have motivation to learn.	0.795	0.048	0.799	16.81	0.000
MFL3	I improve from my mistakes.	0.625	0.057	0.628	11.014	0.000
MFL4	I like to share my ideas with others.	0.631	0.060	0.638	10.555	0.000
OCS1	I feel confident in using online tools (email, discussion) to effectively communicate with others.	0.942	0.014	0.943	68.948	0.000
OCS2	I feel confident in expressing myself (emotions and humor) through text.	0.911	0.014	0.910	63.752	0.000

OCS3	I feel confident in posting questions in online discussions	0.728	0.035	0.728	20.634	0.000
SDL1	I carry out my own study plan	0.794	0.023	0.792	34.782	0.000
SDL2	I seek assistance when facing learning problems.	0.106	0.069	0.294	1.621	0.106
SDL3	I manage time well.	0.868	0.015	0.868	58.504	0.000
SDL4	I set up my learning goals	0.910	0.011	0.909	81.965	0.000
SDL5	I have higher expectations for my learning performance	0.800	0.030	0.799	26.622	0.000
E1	Putting forth effort	0.593	0.036	0.593	16.297	0.000
E2	Applying course material to my life	0.914	0.013	0.915	68.657	0.000
E3	Finding ways to make the course material relevant to my life	0.875	0.014	0.877	60.750	0.000
E4	Finding ways to make the course interesting to me	0.919	0.009	0.919	102.777	0.000
E5	Really desiring to learn the material	0.851	0.015	0.852	55.350	0.000
PF1	Getting a good grade	0.913	0.032	0.865	28.633	0.000
PF2	Doing well on the tests/quizzes	0.788	0.032	0.792	24.687	0.000
PT1	Having fun in online chats, discussions or via email with the instructor or other students	0.963	0.017	0.962	56.577	0.000
PT2	Participating actively in small-group discussion forums	0.930	0.017	0.931	54.635	0.000
PT3	Helping fellow students	0.464	0.044	0.465	10.489	0.000
PT4	Posting in the discussion forum regularly	0.825	0.040	0.829	20.793	0.000
PT5	Getting to know other students in the class	0.114	0.071	0.114	1.534	0.126
S1	Making sure to study on a regular basis	0.640	0.048	0.639	13.214	0.000
S2	Looking over class notes between getting online to make sure I understand the material	0.623	0.078	0.621	7.998	0.000
S3	Being organized	0.832	0.025	0.836	33.221	0.000
S4	Taking good notes over readings, PowerPoints, or video lectures	0.803	0.029	0.800	28.004	0.000
S5	Listening/reading carefully	0.758	0.029	0.760	26.658	0.000

Table 4.8
Factor Loading

6.3.2 Indicator Multicollinearity

Variance inflation factor (VIF) statistic is utilized to assess multicollinearity in the indicator (Fornell & Bookstein, 1982). According to Hair et al (2016) multicollinearity is not a serious issue if the value of VIF is below 5. Table 4.9 presents the VIF value for each of the indicators as below the recommended threshold.

Table 4.9
Multicollinearity statistics (VIF) for indicators

	VIF
CIS1	1.868
CIS2	1.811
CIS3	1.490
E1	1.767
E2	2.449
E3	2.630
E4	2.078
E5	1.610
LC1	1.252
LC2	1.152

LC3	1.152
MFL1	1.886
MFL2	1.700
MFL3	1.751
MFL4	1.234
OCS1	1.287
OCS2	1.294
OCS3	1.221
PF1	2.594
PF2	2.594
PT1	1.888
PT2	1.724
PT3	1.830
PT4	1.483
PT5	1.806
S1	1.620
S2	1.892
S3	2.050
S4	1.774
S5	1.876
SDL1	1.376
SDL2	1.207
SDL3	1.355
SDL4	1.775
SDL5	1.486

6.3.3 Reliability analysis

According to Mark (1996) “Reliability is defined as the extent to which a measuring instrument is stable and consistent. The essence of reliability is repeatability. If the instrument is administered over and over again, will it yield the same results” (p. 285). The two most commonly used methods for establishing reliability include Cronbach Alpha and Composite Reliability (CR). The results of both Cronbach Alpha and Composite Reliability are presented in Table 4.10. The Cronbach’s Alpha ranged from .772 to .910 whereas Composite Reliability statistics ranged from .849 to .934. Both indicators of reliability have reliability statistics over the required threshold of .70 (Hair et al, 2011). Hence, construct reliability is established.

Table 4.10
Construct Reliability Analysis (Cronbach’s Alpha and Composite Reliability)

	Cronbach's alpha	Composite reliability (rho_c)
CIS	0.890	0.930
E	0.910	0.934
LC	0.820	0.892
MFL	0.877	0.914
OCS	0.890	0.931
PF	0.772	0.895
PT	0.809	0.849
S	0.909	0.932
SDL	0.822	0.890

6.3.4 Construct Validity

Statistically using PLS, construct validity is established when there is convergent validity and discriminant validity.

Convergent validity test is a subset of construct validity and it refers to the level to the relativity of two measures of constructs (Trochim & Donnelly, 2006). Convergent validity test consists of three measuring scale such as Composite Reliability (CR), loading value (Outer Loading) and Average Variance Extracted (AVE). Outer loading is functioned as to evaluate and assess the collected data's consistency of variables and indicator reliability (Memon & Abdul Rahman, 2014; Kwong & Wong, 2013). According to Hair, Ringle, & Sarstedt (2011), any outer loading values higher than 0.708 should be kept; values between 0.40 and 0.70 should be removed. Composite Reliability (CR) is to measure the proposed construct's overall internal consistency reliability (Kwong & Wong, 2013). Memon & Abdul Rahman (2014), suggested that 0.7 and higher value for CR is good enough. Average Variance Extracted (AVE) is used to define the amount of variance captured by latent variables from its relative manifest variables due to measurement errors; the AVE value should be at 0.5 and above (Memon & Abdul Rahman, 2014).

“Convergent validity is the degree to which multiple attempts to measure the same concept are in agreement. The idea is that two or more measures of the same thing should co-vary highly if they are valid measures of the concept” (Bagozzi et al, 1991, p. 425). When the AVE value is greater than or equal to the recommended value of 0.50, items converge to measure the underlying construct and hence convergent validity is established (Fornell & Bookstein, 1982). Convergent validity results based on the AVE statistics in the current study show that all the constructs have AVE value above 0.7 except for PT which is slightly lower (0.574) but within the threshold value. Hence, convergent validity is not an issue. Table 4.11 shows the AVE value for each of the constructs.

Table 4.11
Construct Convergent validity (AVE)

	Average variance extracted (AVE)
CIS	0.816
E	0.741
LC	0.733
MFL	0.728
OCS	0.819
PF	0.810
PT	0.574
S	0.732
SDL	0.638

6.3.5 Discriminant validity

Discriminant validity is the degree of different measures for different constructs (Afthanorhan, 2014). It calculates and investigates the combinations among the measures of overlapping variables possibility. According to Fornell & Larcker (1981), the correlation values have to archive a higher value than the square roots of AVE with the purpose of achieve the validity of measurement model

“Discriminant validity is the degree to which measures of different constructs are distinct. The notion is that if two or more concepts are unique, then valid measures of each should not correlate too highly” (Bagozzi et al, 1991, p. 425). Discriminant validity is assessed through Formell and Larcker Criterion, Cross loadings and Heterotrait-Monotrait Ratio (HTMT).

6.3.5.1 Formell and Larcker Criterion

According to Formell and Larcker (1981) criterion, discriminant validity is established when the square root of AVE for a construct is greater than its correlation with all other constructs. In this study, the square root of AVE (in Bold and Italics) for a construct was found greater than its correlation with other constructs (Table 4.12). Hence, providing strong support for establishment of discriminant validity.

Table 4.12
Discriminant Validity – Formell and Larcker

	CIS	E	LC	MFL	OCS	PF	PT	S	SDL
CIS	0.831								
E	-0.098	0.812							
LC	0.328	-0.11	0.824						
MFL	0.436	-0.21	0.581	0.757					
OCS	0.493	-0.14	0.449	0.514	0.755				
PF	-0.111	0.468	-0.069	-0.119	-0.003	0.944			
PT	-0.125	0.602	-0.028	-0.183	-0.121	0.478	0.754		
S	-0.031	0.702	-0.153	-0.188	-0.107	0.459	0.568	0.789	
SDL	-0.236	0.181	-0.187	-0.172	-0.174	0.285	0.278	0.245	0.453

Note: Bold and Italics represent the square root of AVE

6.3.5.2 Cross loadings

Cross loadings help assess if an item belonging to a particular construct loads strongly onto its own parent construct instead of other constructs in the study. The result (Table 4.13) shows that factor loading of all the items is stronger on the underlying construct except for the item LC1 and LC2 which were loading more on SDL than their own latent construct. Their value was recorded as 0.950 which was greater than the threshold value. To resolve the issue with the discriminant value the cross loading values were examined. LC1 and LC2 were deleted from the model and the value was restored within the threshold level (0.390). Hence, based on the evaluation of cross loadings, discriminant validity is attained.

Table 4.13
Discriminant Validity – Cross Loadings

	CIS	E	LC	MFL	OCS	PF	PT	S	SDL
CIS1	0.823	-0.062	0.182	0.371	0.287	-0.15	-0.163	-0.021	0.322
CIS2	0.718	-0.016	0.181	0.188	0.363	-0.001	-0.107	0.028	0.326
CIS3	0.878	-0.227	0.231	0.387	0.45	-0.042	-0.111	-0.106	0.35
E1	-0.152	0.749	-0.241	-0.194	-0.142	0.389	0.518	0.616	-0.168

E2	-0.169	0.823	-0.169	-0.155	-0.208	0.463	0.503	0.637	-0.091
E3	-0.125	0.873	-0.309	-0.3	-0.276	0.374	0.481	0.614	-0.188
E4	-0.157	0.849	-0.319	-0.374	-0.175	0.473	0.484	0.624	-0.144
E5	-0.07	0.761	-0.223	-0.258	-0.116	0.406	0.489	0.595	-0.153
LC1	0.297	-0.115	0.595	0.474	0.385	-0.027	-0.136	-0.123	0.599
LC2	0.156	0.057	0.083	0.079	0.258	0.233	0.049	-0.025	0.305
LC3	0.195	-0.321	0.941	0.421	0.297	-0.085	-0.062	-0.302	0.36
MFL1	0.345	-0.282	0.428	0.835	0.351	-0.092	-0.288	-0.188	0.43
MFL2	0.263	-0.204	0.369	0.747	0.355	-0.123	-0.169	-0.187	0.445
MFL3	0.391	-0.34	0.484	0.844	0.417	-0.205	-0.212	-0.294	0.446
MFL4	0.24	-0.075	0.152	0.499	0.331	-0.122	-0.087	-0.084	0.16
OCS1	0.548	-0.171	0.381	0.462	0.723	-0.067	-0.122	-0.101	0.383
OCS2	0.275	-0.172	0.229	0.377	0.734	-0.025	-0.083	-0.103	0.3
OCS3	0.209	-0.174	0.18	0.26	0.788	-0.016	-0.187	-0.13	0.23
PF1	-0.068	0.44	-0.077	-0.127	-0.023	0.903	0.522	0.459	-0.056
PF2	-0.099	0.51	-0.143	-0.201	-0.057	0.961	0.529	0.509	-0.051
PT1	-0.142	0.513	-0.056	-0.163	-0.179	0.441	0.775	0.554	-0.232
PT2	-0.127	0.337	0.106	-0.047	-0.086	0.303	0.669	0.398	-0.087
PT3	-0.151	0.534	-0.155	-0.317	-0.165	0.514	0.891	0.51	-0.159
PT4	0.061	0.292	-0.141	-0.108	-0.022	0.322	0.535	0.267	-0.117
S1	-0.042	0.586	-0.211	-0.168	-0.046	0.446	0.415	0.732	-0.108
S2	0.017	0.626	-0.322	-0.271	-0.123	0.39	0.479	0.851	-0.185
S3	-0.068	0.514	-0.145	-0.19	-0.121	0.349	0.458	0.769	-0.187
S4	-0.122	0.502	-0.185	-0.168	-0.065	0.49	0.497	0.727	-0.155
S5	-0.098	0.668	-0.222	-0.229	-0.209	0.391	0.532	0.786	-0.129
SDL1	0.258	0.025	0.244	0.112	0.248	0.047	-0.013	-0.016	0.44
SDL3	0.162	-0.196	0.455	0.373	0.381	0.014	-0.128	-0.191	0.795
SDL4	0.325	-0.08	0.243	0.367	0.145	-0.077	-0.15	-0.131	0.763
SDL5	0.506	-0.148	0.343	0.506	0.36	-0.104	-0.236	-0.129	0.754

6.3.5.3 Heterotrait-Monotrait Ratio (HTMT)

HTMT is based on the estimation of the correlation between the constructs. Discriminant validity is established based on the HTMT ratio. However, the threshold for HTMT has been debated in existing literature, Kline (2023) suggested a threshold of 0.85 or less, while Gold at al (2001) recommended a liberal threshold of .90 or less. The HTMT results show (Table 4.14) that HTMT ratio for all the constructs are less than the required threshold of .90

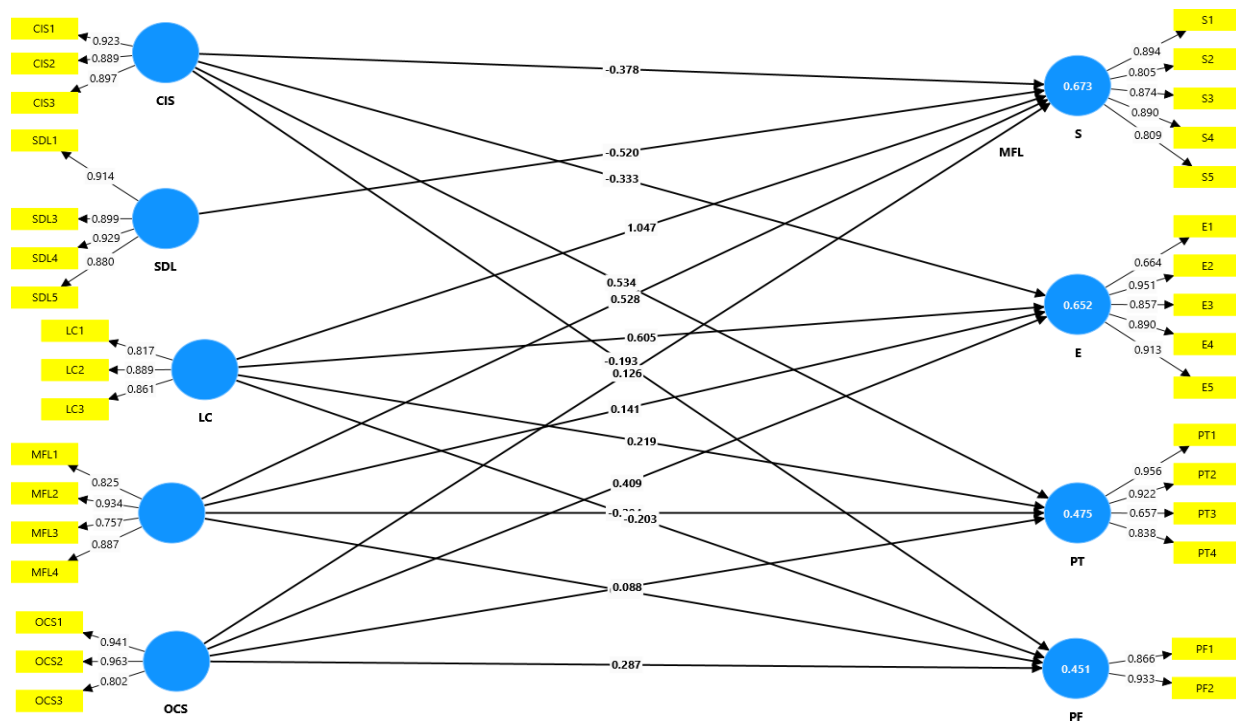
Table 4.14 Discriminant Validity - HTMT

	CIS	E	LC	MFL	OCS	PF	PT	S	SDL
CIS									
E	0.164								
LC	0.209	0.334							
MFL	0.497	0.358	0.465						
OCS	0.660	0.308	0.389	0.742					
PF	0.125	0.591	0.085	0.219	0.065				
PT	0.207	0.723	0.142	0.303	0.284	0.684			
S	0.116	0.880	0.309	0.315	0.206	0.625	0.762		
SDL	0.591	0.211	0.390	0.636	0.614	0.115	0.270	0.225	

6.4 The Structural Model

The structural model reflects the paths hypothesized in the research framework. A structural model is assessed based on the R^2 , Q^2 , and significance of paths.

The R^2 value shows the amount of variance in the DV that is described by the IVs. The higher the R^2 values, the higher predictive ability of the structural model, the better is the result (Chin, 2010). According to Hair et al (2011), an R^2 value 0.75 is considered as substantial however 0.25 is weak. Besides, the T-statistics and relationship strength of DV and IVs are examined by bootstrapping. According to Wong (2013), the value of T-statistics needs to be at least 1.96 to indicate as significant. Hair et al. (2011) suggested that 1.65 (significance level = 10 percent), 1.96 (significance level = 5 percent), and 2.58 (significance level = 1 percent) are the acceptable values for a two-tailed test. According to Hair et al. (2011), the path coefficient values need to be at least 0.1. In addition Hair et al. (2011) also stated that Variance Inflation Factor (VIF) checks the multicollinearity and each indicator's VIF should be less than 5.



6.4.1 Goodness of Fit (Model's predictive capabilities)

In order to ascertain the goodness of fit, the co-efficient of determination R^2 , effect size and the predictive relevance measure Q^2 were assessed in the current paper.

R Square statistics explains the variance in the endogenous variable explained by the exogenous variable(s). Simply, it means how much change in the dependent variable can be accounted for by one or more variable(s). The R square represents the variance explained in each of the endogenous constructs and is a measure of the model's explanatory power (Shmueli & Koppius, 2011), also referred to as in-sample predictive power (Rigdon, 2012). The R square ranges from 0 to 1, with

higher values indicating a greater explanatory power. As a general guideline Cohen (1988) suggested R square values for endogenous latent variables are assessed as follows: 0.26 (substantial), 0.13 (moderate), 0.02 (weak). But acceptable R square values are based on the research context, and in some disciplines, an R square value as low as 0.10 is considered satisfactory, as for example, in predicting stock returns. The results (table 4.16), show that R square for all endogenous constructs is over 0.26, this shows that the model explanatory power is substantial. (Cohen, 1988).

The results of the analysis reveal R^2 value of 0.665 for E. This shows a 66.5% variance in E to be attributed to exogenous variables (CIS, OCS, LC, SDL, MFL). R^2 value of 0.507 for PF was recorded. This shows that 50.7% variance in PF can be attributed to exogenous variables (CIS, OCS, LC, SDL, MFL). R^2 value of 0.442 for PT was recorded. This shows 44.2% variance in PT to be attributed to exogenous variables (CIS, OCS, LC, SDL, MFL). Similarly, R^2 value of 0.665 for S was recorded. This shows that 66.5% variance in E to be attributed to exogenous variables (CIS, OCS, LC, SDL, MFL). Based on the recommended 0.10 cutoff value (Falk and Miller, 1992), results indicated that our model R^2 statistics for all the endogenous variables E, PT, PF and E was substantial. The results are summarized in table 11.

To better estimate the explanatory value of each exogenous variable in the model, the change in R square is estimated if a given exogenous construct is omitted from the model. This measure is referred to as effect size (F square). The effect size is the measure of influence of each independent variable on the dependent variable. In the PLS path model, when an independent variable is excluded from the model, it measures the variation in squared correlation values and ascertains whether the excluded independent variable has a strong effect on the value of the dependent variable. The impact of the predictor variable is high at the structural level if f-sq is 0.35 and it is medium if f-sq is 0.15 and small if f-sq is 0.02 (Cohen, 1988). The model's f-square effect size shows how much an exogenous latent variable contributes to an endogenous latent variable's R square value. In simple terms, effect size assesses the magnitude or strength of relationship between latent variables. The results (table 4.15) revealed that f square effect size ranged from 0.001 (negligible) for PF on CIS to 0.040 (high) for PT on MFL.

The effect size and its significance are present in table 4.15.

Table 4.15
Effect size for Independent Variable

	CIS	E	LC	MFL	OCS	PF	PT	S	SDL
CIS		0000				0.001	0.001	0.005	
E									
LC		0.033				0.002	0.002	0.031	
MFL		0.028				0.019	0.040	0.020	
OCS		0.003				0.004	0.003	0000	
PF									
PT									
S									
SDL								0.001	

Further Q^2 established the predictive relevance of the endogenous construct. A Q^2 above 0 shows that the model has predictive relevance. If Q^2 is 0.35 the predictive relevance is strong and it is

medium if Q^2 is 0.15 and small if Q^2 is 0.02 (Hair et al, 2013). The results show that Q^2 for predictive relevance for all the endogenous constructs is over 0.35 (see table 4.16). This shows that strong predictive relevance of the model is established (Hair et al, 2016)

Table 4.16
R square and Q square

Predictor (s)	Outcome (s)	R-square	Q ² predict
CIS OCS LC SDL MFL	E	0.665	0.654
CIS OCS LC SDL MFL	PF	0.507	0.489
CIS OCS LC SDL MFL	PT	0.442	0.411
CIS OCS LC SDL MFL	S	0.665	0.680

6.4.2 Inferential Analysis

SmartPLS established by Ringle, Wende & Will (2005), is one of the projecting software applications for Partial Least Squares Structural. SmartPLS is used and accepted by many articles and journals (Henseler, Ringle & Sinkovics, 2009; Shackman, 2013). In this section, the researcher details the statistical techniques used to test the hypotheses of this study. Given the nature of these research questions, a two-tailed test was employed to assess the relationships between variables. The choice of a two-tailed test allows for the detection of both positive and negative effects, providing a comprehensive analysis of the potential relationships.

Hypotheses were tested using structural equation modeling (SEM) to account for the complex relationships between e-learning readiness, student engagement, cultural dimensions, and personality traits. The significance level (α) was set at 0.05, meaning that we accepted a 5% risk of concluding that an effect exists when there is no actual effect. This criterion is consistent with standard practices in social science research (Cohen, 1988).

After assessment of goodness of fit, hypotheses were tested to ascertain the significance of the relationship. To test the proposed hypothesis and the structure model, path coefficients between latent variables are assessed. A path coefficient value should be at least 0.1 to account for a certain impact within the model (Hair et al., 2011). Of these path coefficients in this model (see table

4.17), eight of the hypotheses are significant at the level of 0.05, have signs in the expected directions, and pose a path coefficient value (β) ranging from 0.04 to 1.03.

As shown in the table 4.17 computer/internet self-efficacy negatively relates to emotion ($\beta = -0.305$, $p < 0.001$), stated otherwise in the hypothesis thus rejecting H1. Similarly, computer/internet self-efficacy negatively relates to student's performance ($\beta = -0.160$, $p < 0.001$), rejecting H2. In support of H3, computer/internet self-efficacy is positively related to participation ($\beta = 0.514$, $p < 0.001$). Furthermore computer/internet self-efficacy negatively impact skills acquisition ($\beta = -0.370$, $p < 0.001$), which was opposed to what was stated in the hypothesis, thus rejecting H4. In terms of learner control, it was hypothesized to positively impact emotion, which was supported by the results ($\beta = 0.990$, $p < 0.001$), thus accepting H5. Although performance and participation shows a positive path coefficient with learner control, H6 and H7 were rejected as their p value was insignificant. ($\beta = 0.200$, $p > 0.001$; $\beta = 0.077$, $p > 0.001$). Moreover, learner control positively relates to skill acquisition ($\beta = 1.034$, $p < 0.001$), accepting H8. Motivation for learning shows positive relation with emotion and performance ($\beta = 0.176$, $p < 0.001$; $\beta = 0.729$, $p < 0.001$), hence accepting H9 and H10. Whereas motivation for learning relates negatively to participation ($\beta = 0.221$, $p < 0.001$), which contradicts to what is stated in the hypothesis, thus rejecting H11. Motivation for learning shows positive relation with skill acquisition ($\beta = 0.524$, $p < 0.001$), accepting H12. Online communication self-efficacy was found to have positively impacting emotion and performance ($\beta = 0.558$, $p < 0.001$; $\beta = 0.434$, $p < 0.001$), thus accepting H13 and H14. Furthermore, H15 and H16 were rejected as online communication self-efficacy has no significant relation with student participation and skill acquisition ($\beta = 0.043$, $p > 0.001$; $\beta = 0.117$, $p > 0.001$). H17, H18 and H19 were also rejected as emotion and performance show negative path coefficient with self-directed learning ($\beta = -0.600$, $p < 0.001$; $\beta = -0.615$, $p < 0.001$) and self-directed learning has no significant relation with participation ($\beta = 0.225$, $p > 0.001$). Lastly, H20 was also rejected as the path coefficient shows a negative relation of self-directed learning with skill ($\beta = -0.502$, $p < 0.001$) as contrary to what was stated in the hypothesis. The results are summarized in table 15 and the structural model (Figure 3)

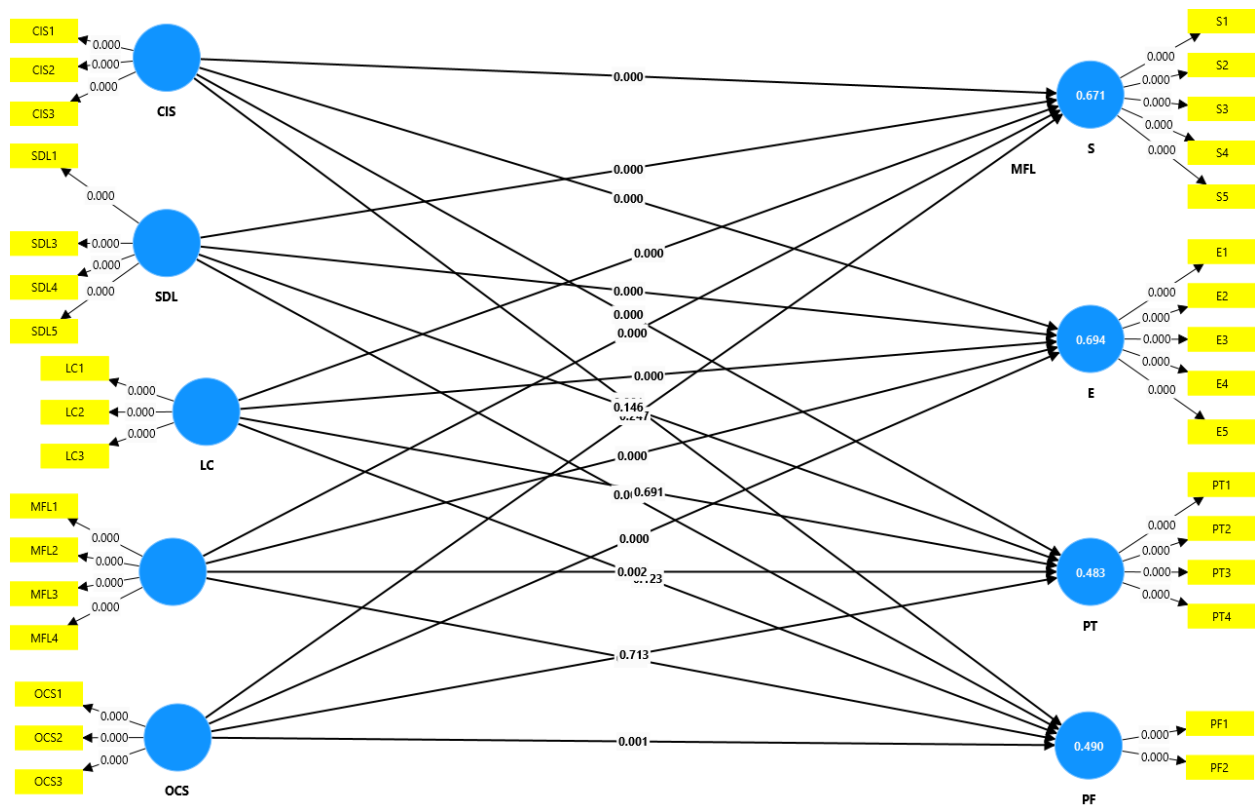


Figure 3: Structural Model

Table 4.17
Direct Relationship

Hypothesis	β coefficient	T statistics	P values	Results
H1: CIS -> E	-0.305	7.138	0.000	Rejected
H2: CIS -> PF	-0.160	3.432	0.001	Rejected
H3: CIS -> PT	0.514	6.103	0.000	Supported
H4: CIS -> S	-0.370	6.884	0.000	Rejected
H5: LC -> E	0.990	10.373	0.000	Supported
H6: LC -> PF	0.200	1.544	0.123	Rejected
H7: LC -> PT	0.077	0.397	0.691	Rejected
H8: LC -> S	1.034	9.094	0.000	Supported
H9: MFL -> E	0.176	5.440	0.000	Supported
H10: MFL -> PF	0.729	16.223	0.000	Supported
H11: MFL -> PT	-0.221	3.145	0.002	Rejected
H12: MFL -> S	0.524	15.869	0.000	Supported
H13: OCS -> E	0.558	5.585	0.000	Supported
H14: OCS -> PF	0.434	3.297	0.001	Supported
H15: OCS -> PT	0.043	0.368	0.713	Rejected
H16: OCS -> S	0.117	1.157	0.247	Rejected
H17: SDL -> E	-0.600	6.370	0.000	Rejected
H18: SDL -> PF	-0.615	7.463	0.000	Rejected
H19: SDL -> PT	0.225	1.455	0.146	Rejected
H20: SDL -> S	-0.502	4.338	0.000	Rejected

*Note: CIS: Computer/Internet self-efficacy, LC: Learners Control, MFL: Motivation for learning, OCS: Online Communication self-efficacy, SDL: Self-Directed Learning, E: Emotion, PF: Performance, PT: Participation, S: Skill *** $p < 0.005$*

7. DISCUSSION

E-learning readiness provides learners with the necessary skills, attitudes, and resources to effectively engage in and benefit from online learning environments. However, although the adoption of online learning programs has been significant in recent years, the capabilities and efficacy of such programs have yet to be fully investigated. Based on the identified factors from the literature, a framework that conceptualizes e-learning readiness impact on the online student engagement was derived. This framework builds on and extends previous models (Ergun, 2020). Previous characterizations of e-learning readiness (Hung et al., 2010) were employed to develop five different dimensions of e-learning readiness. Subsequently, these dimensions were used to investigate the effect of e-learning readiness on online student engagement in detail. This study's findings show that conflicting results from earlier literature analysis (Beer, Clark, and Jones, 2010; Prihastiwi, 2020; Kraiger & Jerden, 2007) may be explained by looking at different e-learning readiness and online student engagement dimensions in detail.

The respondents are generally post graduate students, and the majority of them are traditional students studying in University of Karachi. This is a quantitative study that employs structural equation modeling (SEM) to analyze the results. Based on the results of the analysis, a few conclusions can be drawn.

7.1.1 Computer/internet self-efficacy:

Firstly, the result of this study reveals a positive and significant relationship between computer/internet self-efficacy and participation. This finding is in line with Bandura's self-efficacy theory, which suggests that individuals who have confidence in their abilities are more likely to approach difficult tasks with greater effort and determination. In the context of online learning, students with robust online learning self-efficacy may perceive themselves as more adept at navigating virtual platforms and handling the intricacies of online coursework. Consequently, they are more likely to demonstrate higher levels of engagement and participation (Wu, 2023).

Secondly, contrary to the previous research, finding suggests negative influence of computer/internet self-efficacy on emotional engagement. There may be several reasons explaining this result. As mentioned by Compeau & Higgins (1995) in their study, students who feel confident in their ability to use technology may perceive less need for support from instructors or peers, leading to lower levels of interaction and emotional connection. Meanwhile grounded in the self-efficacy theory, social support is an important resource that enhances students' self-beliefs in computer/internet and online communication (Bandura, 1997). This implies that interactions with instructors and peers are crucial for fostering emotional engagement in online learning.

environments. A high sense of self-efficacy may reduce these interactions, thereby lowering emotional engagement. Further research is required to clarify these contradictions.

Thirdly, this study reveals surprising results that computer/internet self-efficacy has a negative impact on student's performance and skill while positively influencing student's participation. From a theoretical perspective, it seemed logical to hypothesize that students high in computer/Internet skills will utilize more digital tools and this effective utilization of resources enhances their understanding and retention of course material, thereby boosting their performance. They are more open to seeking feedback and reflecting on their performance (Bandura, 1997) which helps them identify areas for improvement and they are engaging in skill building activities. Contrary to this justification, the reasons behind the current results could be manifold.

1. High levels of computer/internet self-efficacy can lead to overconfidence, where students may feel they are already proficient with the technology and, as a result, may not feel challenged or emotionally engaged. Bandura (1997) suggests that self-efficacy influences the level of effort and perseverance an individual exerts. When students are overly confident in their technical skills, they might not invest emotionally in the learning process, believing that they do not need to put in additional effort. This phenomenon is sometimes referred to as the "illusion of competence," where students believe they have mastered content or skills more than they actually have. This notion is supported by Moores et al. (2009) in his study which revealed that overconfidence leads to a significant negative relationship between self-efficacy and subsequent performance.
2. The specificity of self-efficacy matters. While students may have high self-efficacy regarding general computer/internet use, they may lack specific self-efficacy in using particular educational technologies or learning management systems required for their courses. As Compeau and Higgins (1995) emphasize, self-efficacy beliefs are task-specific, and high general self-efficacy does not necessarily translate to high performance in specific contexts.
3. Students confident in their computer/internet skills may spend excessive time exploring additional technological tools or engaging in non-academic online activities, detracting from their study time and negatively impacting their performance. The work of Widyanto and McMurran (2004) on internet addiction highlights how excessive engagement with technology can interfere with academic responsibilities.
4. Students with high self-efficacy might assume they already possess the necessary skills, leading them to bypass or underestimate the importance of further skill development opportunities. This assumption can result in a lack of participation in training sessions, workshops, or exercises designed to enhance specific skills (Compeau & Higgins, 1995).
5. There can be a misalignment between perceived self-efficacy and actual skill levels. Students might overestimate their competence, leading them to engage less with activities aimed at skill enhancement, resulting in a weaker development of actual skills (Dunning et al., 2003). This overestimation can prevent them from recognizing areas where they need improvement, thus hindering their engagement in skill-building activities as highlighted by Talsma et al. (2018) that over-efficacious students may experience negative impacts on academic self-regulation and performance. A study conducted by Sun and Rueda (2012) also suggest in his study that antecedent

variables such as instructor support and acquired skills may be important factors in increasing distance education student engagement.

6. High self-efficacy can sometimes lead students to avoid using resources or seeking help, as they may believe they do not need it. This can result in missed opportunities for skill development and lower engagement with educational tools designed to enhance skills.

7.1.2 Learners Control:

The results for relationship between learners control and online student engagement dimensions were in conformity with the previous research. This study suggests a positive and significant impact of learners' control on emotion and skill. Learner control enhances students' sense of autonomy, which is closely linked to intrinsic motivation. When students feel they have control over their learning process, they are more likely to experience positive emotions such as interest and enjoyment (Deci & Ryan, 1985). This positive emotional engagement is critical in sustaining effort and persistence in online learning environments. This echoes in Karim et al. (2013), who posits that students with greater control over their learning can tailor their learning experiences to their specific needs, preferences, and skill levels. This customization allows for targeted skill development, as students can choose to focus on areas where they need improvement or are particularly interested (Karim et al., 2013). The ability to self-directed learning activities enables students to engage more deeply with the material, leading to the development of new skills. Moreover, the findings indicate that Learner Control (LC) does not have a significant impact on performance and participation. This suggests that having control over one's learning experience in an online environment does not necessarily enhance student performance or participation. A possible explanation is that while learner control provides autonomy, its effectiveness may depend on other factors such as self-regulation, motivation, or prior experience with online learning. For example Cho, & Heron, (2015) revealed in their study that in a self-paced online mathematics course students may feel less motivated, more isolated, and alone and may use inappropriate learning strategies. Additionally, Pekrun et al. (2010) found that student boredom is negatively related to motivation (e.g., intrinsic motivation), learning strategies (e.g., effort, elaboration, and self-regulation), and academic performance. Moreover, students who lack strong time management skills or intrinsic motivation may not fully utilize the flexibility offered by learner control, leading to minimal improvements in performance or engagement. These results align with previous studies suggesting that learner autonomy alone is insufficient to drive active participation and academic success without adequate instructional support and engagement strategies (Eneau, 2008). Future research should explore how factors like self-efficacy, instructional design, and peer interaction moderate the relationship between learner control, participation, and performance in online learning environments.

7.1.3 Motivation for Learning:

The results for the relationship between motivation for learning and emotional engagement, skill and performance dimensions of online student engagement were in conformity with the previous research. Our research findings add empirical evidence to the body of MFL research (Özhan et al., 2020; Meyer and Turner (2006); Pekrun et al. (2002); Li (2021); Robbins et al. (2004); Liu & Geng (2005); Pintrich and De Groot (1990); Wolters and Daugherty (2007); Zimmerman and Kitsantas (1997). The results are also supported by several theories i.e self-determination theory (SDT), Expectancy-value theory and Flow theory. Self-Determination theory (SDT) posits that when students experience autonomy, competence, and relatedness, their intrinsic motivation is enhanced, leading to positive emotional engagement. When students are intrinsically motivated, they find the learning process inherently enjoyable and satisfying, resulting in positive emotional reactions such as interest and enthusiasm (Ryan & Deci, 2000). According to the Expectancy-Value Theory, students' motivation is influenced by their expectations of success and the value they place on the task. When students believe they can succeed (high expectancy) and value the learning activity (high value), they are more likely to experience positive emotions like excitement and enjoyment while engaged in the task (Wigfield & Eccles, 2000). Flow Theory, developed by Csikszentmihalyi, describes a state of deep immersion and engagement in an activity. When students are highly motivated, they are more likely to experience flow, characterized by intense focus, a sense of control, and enjoyment. This state of flow is associated with high levels of emotional engagement (Csikszentmihalyi, 1990).

This study reveals a surprising, and somewhat puzzling result that motivation for learning is negatively and insignificantly related to participation. The reason for negative participation could be explained in several reasons:

1. The classroom environment and teaching style significantly impact student participation. Even highly motivated students might not participate actively if the classroom environment is not conducive to participation. Factors such as a lack of psychological safety, fear of negative evaluation, and a teacher-centered approach can hinder participation (Fassinger, 1995).
2. Individual differences in personality, self-efficacy, and prior experiences can mediate the relationship between motivation and participation. For instance, highly motivated students who are introverted might still participate less in class discussions despite their high motivation (Komarraju, Karau, & Schmeck, 2009).
3. According to self-determination theory, motivation quality matters more than quantity. High-quality motivation (autonomous motivation) is associated with engagement and participation, while low-quality motivation (controlled motivation) may lead to superficial engagement. If students feel controlled or pressured, even if they are motivated to learn, their participation might not reflect deep engagement (Deci & Ryan, 1985)
4. Motivation can be broadly classified into intrinsic and extrinsic motivation. Intrinsic motivation refers to engaging in an activity for its inherent satisfaction, while extrinsic motivation refers to engaging in an activity for external rewards or to avoid punishment. If students are primarily extrinsically motivated, they might participate less in class discussions or activities

because their focus is on achieving grades or other rewards rather than the learning process itself (Ryan & Deci, 2000)

5. The way motivation and participation are measured can also influence the observed relationship. Self-reported measures of motivation might not capture the nuances of students' actual motivations, and observational measures of participation might miss the quality of engagement. This mismatch can lead to an insignificant relationship between the two variables (Linnenbrink & Pintrich, 2002)

7.1.4 Online Communication self-efficacy:

In this study online communication self-efficacy is the fourth variable predicting the outcome variables. Consistent with many other studies that supported online student engagement in e-learning, the results of this study also show online communication self-efficacy is positively related to performance and emotional engagement. This finding aligns with previous research in the field of general education (e.g., Molinillo et al., 2018; Doo and Bonk, 2020; Miao et al., 2022; Eastin and LaRose, 2000). For example the observations made by Doo and Bonk (2020), who emphasized that learners endowed with a heightened sense of social presence are better equipped to forge meaningful relationships and engage in effective communication within the online environment, thereby experiencing increased levels of engagement. Moore (1993) explained that instructors can decrease students' sense of distance, thus increasing their feeling of emotional connection, by “manipulating the communications media” (p. 25). For this reason, learning environments need to include communication tools to facilitate communication between teachers and students. Students need to ask questions and exchange ideas to improve their learning using synchronous tools such as live chat, instant messaging, audio discussions like Skype, and asynchronous tools such as e-mail.

This study reveals an unexpected result that online communication self efficacy has insignificant relationship with participation and skill engagement. The reason for insignificant participation could be explained in several reasons:

1. Limited access to reliable technology and internet connectivity can overshadow the effects of online communication self-efficacy. Even highly self-efficacious individuals may find it challenging to participate or engage in skill development if they face significant technological barriers (Rababah, 2022).
2. If individuals perceive the online communication tasks as irrelevant or unimportant, their self-efficacy may not translate into actual participation or skill engagement. The relevance of tasks plays a crucial role in motivating individuals to apply their self-efficacy in meaningful ways (Eccles & Wigfield, 2002).
3. Research indicates that self-efficacy beliefs are task-specific, meaning that individuals may have varying levels of confidence and engagement across different online communication tasks. (For example, someone may feel confident in participating in text-based discussions but less

confident in using video conferencing tools. Higher online communication self-efficacy in specific tasks correlates with increased engagement and proficiency in those tasks (Borup, 2012).

4. Individuals who are naturally extroverted or prefer face-to-face interactions may not participate or engage deeply in online communication activities, despite having high self-efficacy. Personality traits can influence the extent to which self-efficacy impacts online engagement (Sachitra, 2024).

5. Self-efficacy is often measured through self-report questionnaires, which can be subject to biases such as social desirability or overestimation of one's abilities. These biases can result in inflated self-efficacy scores that do not accurately predict actual participation or skill engagement (Pajares, 1996).

6. Different studies may use varying scales and methods to measure online communication self-efficacy, leading to inconsistencies in findings. Measurement inconsistencies can contribute to the observed insignificant relationships in some studies (Schunk & Pajares, 2005)

7.1.5 Self-directed Learning:

This study reveals a surprising, and somewhat puzzling result that self-directed learning is negatively related to emotional engagement, performance and skill engagement. It also shows insignificant relation with participation. The reason for negative skill engagement could be explained from the absence of direct instructor guidance which can lead to a lack of structured skill development. Students may struggle to identify the most effective learning strategies or resources due to instructors direct and on time feedback. As explained by the study of Petrides (2002), it is challenging to evaluate one's learning in an online context because instructors have time pressures associated with providing feedback to every student resulting in fragmented or inconsistent skill acquisition. This issue is particularly pronounced in students with lower prior knowledge or less experience with self-directed learning (Song et al., 2007).

Also, students who are self-directed may sometimes overestimate their skills or abilities, leading them to skip foundational material or engage with content at a superficial level. This overconfidence can result in insufficient depth of skill engagement, as students might not fully develop the necessary competencies or fail to engage deeply with new or challenging skills

SDL requires students to take on responsibilities typically managed by instructors, such as planning and organizing learning activities. Shohoudi et al. (2015) said that self directed learners are highly possessing self-efficacy traits in order to meet new challenges. In the same context, Garrison (1997) documented that in SDL, learners take the control over cognitive faculties in order to construct new learning outcomes. This additional cognitive load can be overwhelming for some students, detracting from their ability to focus on content mastery and thus negatively impacting performance. Moreover, the autonomy inherent in SDL can sometimes lead to feelings of isolation or stress, especially in online learning environments where peer and instructor interactions are limited. From previous e-learning studies, the interactive learning environment is a crucial factor

for enhancing learners' positive attitudes such as perceived satisfaction, (Liaw & Huang, 2007; Sharma et al., 2007). These negative emotions can reduce emotional engagement, as students may feel disconnected or unsupported in their learning journey.

Sharma et al. (2007) state that perceived self-efficacy is an essential factor to increase learners' self-regulation in e-learning environments. If students have low self-efficacy, the demands of SDL can be intimidating. These students may doubt their ability to successfully navigate their learning process, leading to anxiety or frustration, which can diminish emotional engagement.

While SDL encourages autonomy, not all students possess the same level of self-regulation skills. Students who struggle with time management, goal setting, or self-monitoring may experience reduced academic performance (Pintrich, 2004). Without adequate support, these students may find it challenging to keep up with course requirements, leading to lower grades and performance outcomes.

The relationship between SDL and participation in online courses can be complex. Ahmad et al, (2019) suggested in his study that SDL has no positive relationship with student achievement. He claimed that cultural influences could be a contributing factor to this. Various studies have shown that culture may influence self-directed learning readiness of learners (Ahmad & Majid, 2010; Prekumar et al., 2010)

While SDL promotes autonomy, it does not necessarily encourage participation in collaborative or interactive activities, which are often facilitated by structured guidance or external motivation. As a result, students who are highly self-directed may not see the value in participating in group discussions or peer activities, leading to an insignificant correlation between SDL and participation (Song & Hill, 2007).

8. CONCLUSION

This study explored the impact of e-learning readiness dimensions—computer/internet self-efficacy, learner control, motivation for learning, and self-directed learning—on various aspects of online student engagement, including skill, emotional engagement, performance, and participation. The findings reveal several unexpected results, such as the negative relationship between computer/internet self-efficacy and engagement, the inconsistent role of learner control, and the surprising negative impact of self-directed learning on skill and emotional engagement. These results suggest that the effectiveness of e-learning readiness factors is influenced by contextual elements such as course design, social support, and instructional guidance. By addressing gaps in the literature, this study provides new insights into the complex relationship between e-learning readiness and engagement, particularly in the context of Pakistan. Previous research primarily examined these factors in isolation, whereas this study considers their interplay and contradictions, highlighting the need for further research. Additionally, the findings challenge conventional assumptions by demonstrating that high self-efficacy and self-direction do not always translate to higher engagement.

The study's significance lies in its contribution to both theory and practice. Theoretically, it extends the application of self-efficacy theory and self-directed learning concepts in online education, emphasizing the role of external support mechanisms. Practically, the findings have implications for educators and policymakers in designing more effective e-learning environments. Institutions should focus on structured skill development, fostering social support, and creating psychologically safe learning spaces to enhance student engagement. Future research should explore these dynamics further to develop a more comprehensive understanding of how e-learning readiness influences engagement across different learning contexts.

8.1 Recommendations:

The first recommendation is to offer training programs to improve students' digital confidence and competence. Universities have not fully considered the digital competencies of students in relation to academic success in university e-learning environments (Parkes et al., 2015). Thus, a university should focus on supporting learning assistance and community building to ensure that students have enriched experiences of using e-learning systems for their learning (Islam, 2013). Workshops or orientation sessions focusing on navigating e-learning platforms, using online tools, and troubleshooting common issues can empower students to participate more actively in online learning activities.

The second recommendation is to integrate emotional support mechanisms, such as counseling, peer mentoring, and mindfulness sessions, to help students cope with stressors in e-learning environments. For example, universities can support the use of students' electronic portfolios for academic courses with a university assistant as a learning mentor, as well as allow internal and external e-learning contents (e.g., MOOCs as large learning communities) to earn academic course credits toward degrees (Kim et al., 2019). The findings of this study suggest the need to provide opportunities for students to learn and adapt e-learning resources and infrastructure as a way of deepening their academic experiences and avoid confusions.

The third recommendation is to providing clear guidelines and resources which can help students feel more in control of their learning experience. Institutions can incorporate strategies to develop SDL skills among university students, potentially through assignments or projects that require independent learning and time management. For online learners, who already demonstrate higher SDL, institutions could further support this by providing resources that enhance their ability to set and achieve academic goals autonomously. For instance, universities could implement structured yet flexible online orientations on time management, self-assessment, and goal-setting.

The fourth recommendation is for course designers to create engaging group activities that align with students' intrinsic goals, fostering collaboration while maintaining individual motivation.

The fifth recommendation is to encourage the use of discussion boards, group chats, and virtual classrooms to improve students' online communication abilities. According to Chakraborty et al. (2014) one of the important findings regarding student engagement in online courses noted that interactions help students with the course work and timely completion of course assignments and

projects. Therefore, video conferencing can be successfully incorporated in online courses to enhance interaction. In addition, more dynamic learning management systems like eCampus now have features like collaborate which enable learners to interact with each other, with the course content, with the instructors and with the technology. Thus, online learning has now become more humane, personalized and real, as the learners can now be fully engaged in the learning process.

The sixth recommendation is for institutions to provide scaffolding to support self-directed learning, such as goal-setting tools, progress trackers, and regular check-ins with instructors. By balancing autonomy with structured guidance, students can gradually develop effective self-directed learning habits.

One key takeaway is the essential role of digital tool familiarity and technological proficiency in driving successful engagement in online courses.

8.2 Implications

Due to the correlational nature of this investigation, obvious implications for online learning are difficult to extract. Nevertheless, the results reported here provide institutions, course developers, educators and policy makers with some insights into the relations between e-learning readiness, student's engagement, their personality traits and cultural interactions

8.2.1 For institutions and course designers

The findings suggest that e-learning systems need to balance autonomy with support. Institutions should design e-learning environments that enhance learner control and digital competence while addressing emotional and collaborative challenges. Additionally, creating engaging group activities and fostering online communication can improve participation and emotional engagement, ensuring a more holistic learning experience. This could include, for example, ensuring that (a) the course provides students with opportunities to become cognitively engaged with the information presented (i.e., opportunities to select, organize, and integrate new information into their existing knowledge structures; Barlow et al., 2020), which should increase students' sense of control and value beliefs; (b) the technology is reliable, accessible, and usable; (c) instructions for accessing course management systems are clear and explicit; (d) the course structure provides users with sufficient control and ease-of-navigation (e) the course explicitly addresses the importance, use, and value of instructional activities and (f) the online environment and course policies encourage learning and understanding, as opposed to performance and competition.

8.2.2 For Educators

Educators should recognize that highly motivated students may struggle with participation in collaborative activities. By integrating interactive elements such as group projects, peer discussions, and gamified assessments, instructors can encourage participation without compromising students' intrinsic motivation. Furthermore, they should provide regular feedback and emotional support to students facing challenges in skill and performance engagement.

8.2.3 For Policy Makers

Policymakers should emphasize the integration of digital literacy programs in the curriculum to ensure that students are adequately prepared for e-learning environments. They should also allocate resources for the development of robust online support systems, including mental health resources and personalized learning tools, to address emotional and performance-related challenges in online learning.

8.3 Limitation

Several limitations can be found in this study. Lucas (2003) identified generalizability as a threat to external validity because the results of the study reflect a generalized agreement with the entire population. A large sample size is commonly utilized to ensure the sample population represents the consensus of the whole population. While there was a 77.5% return on responses from the surveys sent, the sample size was relatively small. A larger cohort or university would be necessary to gain a broader correlation between the two student population groups. The limitations that are threats to internal validity will be addressed. First, the participants' non-accordance with answering the questions without following the appropriate survey instructions, failing to read the questions, or giving proper responses could threaten internal validity. To mitigate this limitation, instructions were stated clearly within the online survey, at the beginning of each section, and page breaks and instructions were given to the student's instructors.

The study adopts a cross-sectional design, capturing data at a single point in time. This approach limits the ability to understand how e-learning readiness and student engagement evolve over time or in response to changes in educational or personal circumstances.

In addition, though care was taken to distribute the survey in channels used by all students, the voluntary response of students chosen from these channels does not constitute a simple random sample of traditional and non-traditional students group. For example, our survey over-represents traditional students, who constituted 59.4% of the survey sample. The channels chosen could also bias certain results; for example, it is possible that online surveys released on WhatsApp group excluded those who are less tech-savvy individuals. Traditional students completed offline questionnaires, while non-traditional students responded via WhatsApp. This variation in data collection methods could have influenced the results, as participants completing questionnaires

online may have been more accustomed to digital tools, potentially skewing responses related to e-learning readiness. Results from the small survey might be skewed slightly because differences in response behavior due to the mode of administration can bias the results, making it difficult to compare responses directly between the two groups.

While this study employs a robust quantitative approach, there are several limitations to consider. First, the reliance on self-reported data from survey questionnaires may introduce response biases, such as social desirability bias, which can affect the accuracy of the data (Podsakoff et al., 2003). Additionally, the cross-sectional design of the study limits the ability to establish causality between e-learning readiness and student engagement, as it captures data at a single point in time (Bryman, 2016). The sample is restricted to students from the University of Karachi and the ICE PGCert online course, which may limit the generalizability of the findings to other populations and educational contexts (Creswell, 2014). Finally, while random sampling is used to enhance representativeness, it cannot entirely eliminate sampling error or ensure that all relevant subgroups are adequately represented.

8.4 Future research

Future studies should investigate the reasons behind the negative relationships observed in this study, such as why self-directed learning negatively influences engagement dimensions and why motivation for learning reduces participation. These insights can help refine existing e-learning models and create more targeted interventions

While the aim of this study was twofold; to reconcile previous results and to open up new directions for future research, the findings provide a starting point for several areas. A first research opportunity relates to the combined moderating effect of personality and culture. So far, no study we are aware of has attempted to examine how individual personalities and culture together moderates the relationship between e-learning readiness and online student engagement. However, future research can also examine the role of students' learning styles alongside their personality traits. Learning styles—whether visual, auditory, or kinesthetic—play a crucial role in shaping how students interact with e-learning platforms and content. Understanding these preferences could provide deeper insights into why certain students engage more effectively than others in an online learning environment.

For example, individual high in self-directed learning may find online environments less stimulating and engaging. A possible path for future research is therefore to investigate if the relationship between e-learning readiness and learning outcomes follows an inverted U-shape, with neither very low nor very high levels of e-learning readiness being desirable. A nonlinear relationship between e-learning readiness and learning outcomes would also help explain earlier studies' non-consistent findings concerning the desirability and effectiveness of e-learning readiness. Moreover, it is essential to investigate how different e-learning interfaces (e.g., text-based platforms, multimedia-rich tools, or interactive simulations) interact with these learning styles to influence engagement. For instance, visual learners may exhibit higher engagement when

exposed to multimedia-rich interfaces, whereas auditory learners might perform better with podcast-like materials.

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