



## Online Collaborative Environment for quality enhancement and sustainability in Higher Education Institutions: A quantitative study on measurement of perceived learning effectiveness with reference to dimensions of student engagement

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**ABSTRACT:** In this study, the main focus is how the student academic engagement level enhances learning effectiveness and the three dimensions of students engagement components influence academic engagement. It is essential to evaluate and study the engagement of students in online learning to help teachers understand the students in order to facilitate timely intervention to assist students to reflect their own learning and motivate their engagement in the learning process. Student engagement is a quantitative variable including the quantification of student's behavior, the quantification of cognitive presence and the quantification of emotions. This research has focused on study of the student engagement in the construction of theoretical models, including behavior, emotions and cognitive presence of engagement components on creation of academic engagement and thereby perceiving learning effectiveness due to lack of precise measurement of student engagement. Therefore the paper introduced a credible and measurable model of student engagement and analyzes the students behavior engagement mode, cognitive engagement mode and emotional engagement mode. This research paper is mainly focused on the following aspects: at first a Students' Engagement Model in online learning taking into account the idea of existing model was constructed. Then as per the study of literature



excessive attention was given to student performance, their behavior, the lack of cognitive and emotional considerations introduced 3 dimension with 5 variables student engagement model. The model combined the characteristics of student engagement in online learning, and then proposed the "three dimensional seven path" analysis framework of students' engagement model. Model test proved that emotional engagement plays a dominant role compared to other 2 dimensions as emotions are first required to have positive behavior and cognitive presence in online learning. The importance of student academic engagement on their perceived learning effectiveness is strongly correlated as a mediator and significantly supported as previous studies. Again the significance of cognitive components for achieving active learning is also strongly supported. Study of a single dimension to academic engagement is non-significant instead combining all together to establish academic engagement for effective learning is strongly proved by the test result.

**Keywords:** student academic engagement, dimensions of students' engagement, cognitive engagement, emotional engagement, e-learning effectiveness, academic achievement.

DOI Number: 10.48047/nq.2022.20.19.NQ99157

NeuroQuantology2022; 20(19): 1769-1808

## INTRODUCTION

Online learning has been on the rise within the last 20 years. In Western countries, although teaching enrolment has declined, on-line learning enrolment in publicly establishments has continuing to extend (Allen & Seaman, 2017). Recently technology driven learning experiences in higher education have followed the changing educational paradigm from being instructor-led to becoming learner centered learning strategies (Olelewe & Agomuo. 2016).

Virtual classrooms made learning easy, everywhere and anytime. There is a need for an online instructional learning where a student is engaged by practicing, experiencing sharing things and gaining knowledge in a collaborative environment. Student is very important in any learning context, therefore the paper focuses on student academic engagement in technology-mediated learning

experiences. Engagement is also an important construct for predicting the gradual process by which students drop out from school (Appleton et al., 2008; Appleton, Christenson, Kim, & Reschly, 2006).

Learning effectiveness is quite an active process, and can be understood both in formal or informal ways. Learning effectiveness includes the entire process through which students involve in a high quality learning activity. The recent trend becomes a challenge to educator to support knowledge construction of providing learning context that nurtures advancing technology enabled platforms, teaching and learning practices as a significant educational innovation and level of student engagement to e-learning. To achieve a high rate of student academic success and enhance the quality of learning experiences and outcomes studying student engagement is crucial.

Spanjers, D. M. (2007) stated that factors related to students' engagement are good indicators for assessing the quality and learning effectiveness of online programs.

The evidence for role of engagement in influencing students' academic have been provided by several previous studies. In reviewing student engagement instructors are able to more effectively evaluate student perceptions of their engagement and learning effectiveness that support and sustain learning activities (Mandernach et al, 2011).

Engagement: According to Fredricks and colleagues (2004), student engagement is often conceptualized along three dimensions behavioural, cognitive and emotional. In the present study, key aspects of each dimension were translated into indices that could be measured in the students perceived learning experiences. Despite the benefits of student engagement found in the literature, its relationship with effective learning has not been firmly established. Accordingly, the current study examined the effect of student engagement on academic performance. In the current study, student engagement included behavioural components, emotional components and cognitive components. It was also tested whether emotional components play a dominant role to establish behavioural presence and cognitive presence in academic engagement.

The behavioural aspect of student engagement refers to student attendance,

involvement in a course, effort and persistence in activities including extracurricular and academic. It is mostly concerned with getting involved in activities, completing given tasks and attending regularly (Fredricks et al. 2004).

Emotional engagement refers to emotional reactions (positive/negative) demonstrated in learning, such as showing interest, rejection, boredom, frustration or anxiety towards their learning settings and feel like they belong in the school. The sense of belonging is considered significant to student's willingness to complete schoolwork (Fredricks et al. 2016, Harris. 2008).

Cognitive engagement: According to Fredricks and (2004) and Pintrich (2003), cognitive engagement is investment in one's activities. This engagement presence can be checked when students perceive the value of what they are learning, understanding a topic and demonstrate a desire to learn and master skills. The cognitive type of engagement is linked to self-regulated learning, intellectual capacity questions, focusing on tasks.

These dimensions are interrelated and contribute to student's engagement. Although each of the three aspects of engagement can be considered distinct, the previous studies observed that there is considerable overlap. For example Filsecker and Kerres (2014) stated that the behavioural part of the engagement that includes putting effort and attention could be regarded as cognitive engagement.

Combination of three dimensions can provide a more in-depth description of learner and about their engagement (Fredricks et al., 2004). Therefore, it is important to measure all the dimensions when measuring student academic engagement because focusing on only one dimension can limit the understanding of student engagement as all dimensions of engagement interrelate in a volatile manner among individual students (Fredricks et al., 2004). For example students' being interested in class does not necessarily achieve better learning outcomes. Further, although research has claimed cognitive engagement to be the most significant type of engagement, emotional and behavioural components are seen as dimensions that may be required to establish cognitive engagement (Harris, 2008). For example, students need to be involved in the learning activity based on how they feel, then decide to engage cognitively which specifies starting with emotional aspect then creating positive behavior and finally showing cognitive presence.

This goes further in understanding the significant relationship between these three dimensions of engagement. Interestingly, these types of dynamic adoption of e-learning systems showed mixed results for students' academic success such as increased satisfaction with the learning experience (Lyons & Evans 2013), a positive result in reducing dropout rates (Lopez Pérez et al. 2011), increased academic performance (Lopez - Perez et al. 2011: Roffe (2002), and critical

thinking. By contrast, few studies also proved that there was no relationship or a negative relationship between satisfaction with e-learning courses and performances (Levy, 2007) or technology use and student GPA (Moreira, Cunha, & Inman, (2020) among students who fully or partially access campus e-learning environments. The reason for the mixed results may be differences in student level of engagement and other characteristics using university e-learning technology for academic activities (Roffe, 2002).

The aim of this paper is to investigate the relationships between students reported different dimensions of engagement and perceived learning effectiveness in an online module. The relationship of emotion, cognitive and behavioural aspects of learning will be reviewed, as there is evidence that supports the effect of emotion, cognition, behaviour on student academic engagement and higher order thinking in online learning. On the basis of this findings, several emotional, cognitive and behavioural strategies will be discussed with the aim of assisting teachers with improving student engagement in the online classroom.

## LITERATURE REVIEW

The thought of e- learning has witnessed a rise within the teaching sector, as enrolment rates in on-line courses have considerably increased in recent years. In keeping with the literature, an important element of quality in on-line education is to confirm student engagement. In short, the necessity to effectively test learner

engagement is imperative to work out the performances and also the self-made achievements of learners. Kuh (2003) developed the National Survey of Student Engagement (NSSE) model to measure students' engagement through their skills, emotion, interaction and performance, applicable in e-learning. Analysis has proved that activities that inspired on-line and social presence increased and designed learner confidence and improved performances are key factors in engagement. With this regard, some students have explored the problem of cognitive engagement within the context of technology use in e-learning like whether or not students have browse, understood, and replied to the messages in discussion forums (Richardson and Swan, 2003).

Additionally, as e-learning has become popular, researchers have begun to analyze the information generated by students so as to explore the way to create e-learning simpler and to assist to encourage students to attain their full potential in e-learning. This highlighted that students acquire in-depth data by being concerned in discussions, whereas enquiring, analyzing, and elaborating ends up in additional active and engaged learning among students (Bangert, 2004).

Robertson et al. (2005) have proved positive results for on-line learning effectiveness when examining the perceived quality of learners learning expertise in comparative studies associated with the effectiveness of on-line versus on-campus face-to-face

courses. The study (Omar, Hassan Atan, 2012) aims to spot learner's attitudes toward e-mentoring. Survey analyses of 205 participants were conducted and a factor analysis and multiple correlation/regression technique were disbursed. Correlational analysis result indicated there are 2 teams of learner's perspective that's learner autonomy and teacher as assisted tutors. Finding shows that learner's attitudes play a task in predicting e-mentoring. To determine the self-made of e-mentoring program, this analysis give proof learner's perspective are important factors to confirm students would keep involve with their mentor. Recent studies examining the distribution and deepening of sustainability in higher education need wider and a lot of systematic approaches in student engagement (Wals, 2014). Various predictions of e-learning for instructional functions are illustrated in (Samir et al. 2014) and this study aims to indicate the way to keep students intended in e-learning. The analysis of student motivations for on-line learning will be difficult due to the shortage of face-to-face contact between learners and academics. The study suggests 5 analysis hypotheses to be inspected to spot that hypothesis ought to accept and that shouldn't.

Online Student Engagement (OSE) scale model (Dixson, 2015) developed by author for measure students' engagement through their learning experiences, skills, participation, performance and feeling in an e-learning context. He valid the OSE

idea of activity engagement that is comprised of what was earlier represented as empiric and application learning behaviours. Study reported a big correlation between application learning behaviours and OSE scale and a non-significant correlation between observation learning behaviours and OSE. According to Wang et al. (2015), emotional engagement is said to students' interest in and feelings regarding the course whereas activity engagement is regarding their commitment to following the foundations set by the instructors delivering the course. Meanwhile, cognitive engagement is bestowed by students after they create a mental effort to have interaction with the training resources within the course. These dimensions play completely different roles in e-learning. Researcher (PengWang, 2016) have planned broader ideas like the actual fact that student engagement is outlined as a critical method of on-line and offline. Author studied the connection between student performance and engagement in 2 on-line environments to perceive the connection between the 2 on-line environments, so as to develop within the on-line education setting to improve student learning process. The results show that the standard of students' engagement is absolutely related to with the results of the end term examination. The students' performance collaborating within the study is absolutely associated with the excellent academic performance. Although e-learning will enhance the standard of education there's argument regarding

creating e-learning materials access that ends up in rising learning outcomes just for specific styles of collective analysis. Moreover, it cannot support domains that need field or practical studies. The most disadvantage of use of e-learning is that the absence of crucial personal interactions, not solely between students and academics however additionally among fellow students (Somayeh et al. 2016). From the findings of the analysis (Yousra Banoor Rajabalee, 2019) it was established that students' engagement levels within the on-line course throughout may offer a sign of whether or not they can act in self-based learning activity. The module was designed with the help of the activity based learning approach that is additional inclined towards constructive learning instead of the behaviourist model of learning. This will facilitate to foster an atmosphere where student engagement if properly modeled can facilitate to enhance learning outcomes through higher performances. Finally, the study reveals a direct correlation between engagement and continuous learning activities as compared to the weak positive correlation between engagements and also the final learning activity mark suggests that engagement in constructive learning environments may be higher predictors of success than engagement. Generally student engagement is classified into 3 dimensions emotional (the means they feel), psychological or cognitive feature (the means they think), and behavioural (the means they act) (Moreira, Cunha, & Inman, 2020).



As technology developments increase several universities have adopted e-learning to enhance their teaching and learning processes. This state of affairs has made the emergence of learning analytics that is growing with the aim of optimising students learning experiences through assembling the knowledge and analysing the information with completely different analytical ways to ascertain the students learning behaviours. It's conjointly accustomed discover the hidden data concerning students and predict the educational outcomes (Lee Cheung & Kwok, 2020). The study (Kew S. N & Tasir Z, 2021) aims to research students' psychological engagement in e-learning through content analysis of forum posts. A complete of 267 forum posts created by students throughout one semester was collected for analysis. Inferential statistics were applied to explore the connection between students' psychological engagement and also their gender and the range of posts in forums. The results disclosed that concerning 1/2 the learners gave their posts with none explanations, which mirrored a reduced level of psychological engagement. In the paper (Maatuk A.M, Elberkawi, 2021) the descriptive-analytical methodology was used for the study and also the five-point likert scale was calculated. The study targets the society that has students and teaching employees within the data Technology (IT) School at the University of City Benghazi. The descriptive-analytical approach was applied and also the results were analyzed by applied statistical ways. 2 varieties of questionnaires were

designed and distributed, i.e., the learner form and also the educator form. Four dimensions are highlighted to succeed in the expected results, i.e. the extent of usage of e-learning throughout the COVID pandemic, benefits, disadvantages and obstacles of implementing e-learning within the IT school. By analyzing the results, author achieved encouraging results that focus on a number of problems, challenges and benefits of improving e-learning systems in higher education and during pandemic periods.

**Engagement:** Engagement is a complex term that focus on students' various patterns in emotion, cognition, and behaviour (Appleton et al., 2008; Fredricks et al., 2004; Phan & Ngu, 2014a;). Many researchers have tested the construct and the literature generally focus on variations in its terms, definitions, and scope (Appleton et al., 2008; Fredricks et al., 2004; Upadyaya & Salmela-Aro, 2013). Despite their differences, some similar meanings have been noted between the definitions across the researchers. The definitions by Newmann et al. (1992) and Wehlage et al. (1989) drew a link between engagement and students' psychological investment in learning which is taken into consideration in this research.

**Dimensions of Engagement:** Engagement is relatively diverse in its definitions and coverage. Researchers have reached a consensus that the construct is multidimensional and provide different aspects (e.g., behavioural, cognitive, and emotional), operating together to reflect students' positive approach to learning

(Appleton et al., 2008; Fredricks et al., 2004; Phan, 2014b). Engagement is typically conceptualized as having two, three, or four dimensions. Fredricks et al. (2004) and Jimerson et al. (2003) have proposed a tripartite model that includes a cognitive dimension as well as the emotional and behavioural subtypes. The model of Fredricks et al. (2004) has been proved significant in understanding the multidimensional nature of the engagement construct. The importance of these engagement construct addresses central and related facets of individual development (i.e., emotion, cognition, and behaviour), unlike other models that lack, for instance, the focus on one of these dimension (i.e., cognition) (Phan & Ngu, 2014a).

When students engage in learning on their own initiative, they take initiative in and/or concentrate on acquiring and applying new skills or knowledge, solve problems using underlying approaches (Deater Deckard et al, 2013). The creation of models and measures that motivate student learning engagement is crucial to the development of the field of education. Despite the modest variations described earlier in the terms and definitions there is clear and consistent evidence for the positive short-term and/or long-term influences on students' academic achievement. Positively, this assumption supports the argument by Appleton et al. (2008) that, even though having various conceptualizations of engagement, there is strong empirical support for the impact of the different constructs on students'

learning effectiveness. The results of the longitudinal studies (e.g., Wang & Eccles, 2012a) described that the engagement construct is changeable according to different factors. Educationally, based on this credence, it is important for researchers and educators to consider factors that might foster students' engagement in academics which, eventually, enhance students' performance outcomes. Of the three components the most basic to success is cognitive presence (Garrison, Anderson, & Archer, 1999,). The paper suggest high levels of cognitive presence with accompanying high degrees of commitment and participation are required for the development of higher-order thinking skills and collaborative work. Mandinach elucidated self-regulated learning as the highest form of cognitive engagement in which learners carry out specific cognitive academic activities (e.g., deliberate planning and monitoring). It is through technology, or Computer Mediated Communication, that a unique method of reflective, intellectual, and collaborative learning has developed.

The findings of above all literature reviews align favours that student engagement is a vital issue that contributes to the success of learners in on-line courses. Thus there's a desire to look at student engagement, like behavioural, cognitive, and emotional which might be perceive the standard of learning activities and atmosphere. With the help of supported inputs from literature reviews there's scope for



subsequent studies and consolidate the additional interpretations and patterns within the knowledge. There's scope for perceive the feedback of students with regard to their satisfaction levels to examine if there's any inference that would be made up from the affective side to come up with new observations.

## Theoretical Framework

### **Perceived Learning Effectiveness:**

Learning effectiveness refers to the entire process through which students participate in a high-quality learning experience. Specific features such as cognitive, emotional and behavioural representation in the e-learning network have been used to assess learning effectiveness. Here learning effectiveness includes the contents like academic performance, academic achievement and active learning. The current study requested the students to respond the perceptions of their e-learning experiences. Because there is an increasing number of university program, moving to help adult learners to achieve necessary skills and credentials at a quicker pace, so it is an important task to ask our students to determine their level of learning in e-learning process (Trekles, 2013).

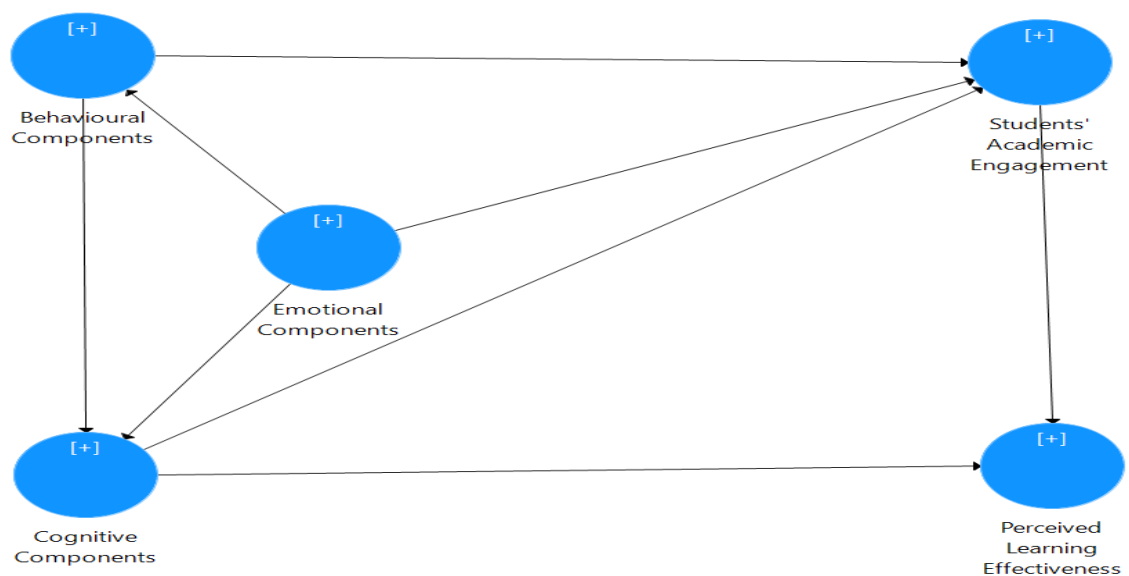
**Student Academic Engagement:** Richards (2011) stressed that meaningful learning occurs when learner actively engaged. This study focuses on the levels of engagement and its associated formations rather than what it is. Three levels of engagement components [Behavioural,

Emotional and Cognitive] are discussed in relationship to their roles in promoting understanding of knowledge by learners. Most of the previous studies have discussed the importance of e-learning (Wang and Wang, 2011), but there have been few studies on the impact of the learning environmental stimuli perceived by students' in e-learning on student engagement. Previous psychologists put forward the S-R theory for the study of student academic engagement (Hazeltine and Schumacher. 2016). As humans generate psychological elements of feelings, emotions, or attitudes in response to stimuli, the stimulus-organism-response (S-O-R) model is extended (Khan et al., 2017; Zhai et al. 2020). To explore the psychological feelings and learning responses of students stimulated by the changes in learning environment here in this paper introduced a model that connect learning engagement in 3 dimensions to know the perceived learning effectiveness. Although previous studies have used this model to test the effect of the e-learning human computer interface (HMI) on student behavior (Zhang et al. 2014, 2015), this study emphasizes the attitude or psychological factors of e-learning, rather than the technical factors, demonstrating the applicability of using the S-O-R model when considering learning engagement in the context of e-learning. The goal of this study was to examine student perceptions of e-learning from their experiences, as well as the roles of academic engagement and learning effectiveness within the university context of an e-learning

environment. **Figure 1** in this section depicts this paper “three-dimensional analysis framework of student

engagement research model, which argues for the rationale of the proposed hypotheses.

Figure 1:



### Structural Construct Model

The framework for the study was developed from an extensive review of existing evidence about students’ engagement, dimensions components and effective learning. The review began with search for relevant empirical research through ERIC, Google scholar, Scopus and Sage, using keywords students’ engagement, effective learning, behavioural engagement, emotional engagement, cognitive engagement, academic achievement, academic performance and active learning. Figure 1. Summarizing the framework resulting from review, proposes a set of relationships among five constructs , behavioural component, emotional component, cognitive component as independent variables influence student engagement as a mediator and effective learning as an outcome (both are considered as dependent variables).

### Student Academic engagement Criteria

Table 1

<b>Student Engagement Criteria</b>			
<b>Components</b>	<b>Codes</b>	<b>Items/ Indicators</b>	<b>Description</b>
Behavioural	BC1	Attendance	Attend classes on a regular basis
	BC2	Participation	Participate in academic activities actively
	BC3	Interaction	Communicate with other learners and instructors
	BC4	Attention/Concentration	Follow and work on teachers' instruction
Emotional	EC1	Co-ordination	Co-operate in class for unity
	EC2	Sense of belonging	Feeling of belongingness
	EC3	Interest	Eager to join the class
	EC4	Commitment	Shared effort in completing task
Cognitive	CC1	Self-regulation/self-efficacy	Ability to manage oneself in learning process
	CC2	Deep learning	In depth study of course contents
	CC3	Critical thinking/ Problem-solving skill	Capacity to think rationally/ Creative skill to prepare pupils for future

(1) Behavioral engagement analysis: Although the behavior of students in the online learning environment has a certain degree of inaccuracy and deceptive, but the frequency, breadth and depth of behavior engagement can still reflect student engagement. This paper takes the positive components of behavior as the basis for the analysis of students' behavior engagement.

(2) Emotional engagement analysis: Emotional engagement refers to the emotional response of students in the learning process; students will show a different emotional experience during participation in the completion of specific tasks. This paper will be from the perspective of student positive emotional experience in e learning process.

(3) Cognitive Engagement Analysis: It means psychological investment in learning activities. 3 indicators of this are

focused here to measure how it is correlated with student academic engagement.

### **Students' Academic engagement and e-learning**

In higher education, student academic engagement is a strong predictor of learning effectiveness (Carini et al. 2006). Academic engagement can be improved by using technology to connect students, staff and the course contents to facilitate academic success (Mehdinezhad. 2011). In this study, student academic engagement considered as playing the role of mediator for college students to support the adoption of e-learning in their academic work.

### **The Present Study and Problem Statement**

Based on the assumption that students' performance measures would be positively correlated with the engagement



exhibited by both students and instructors (Booliger & Wasilik, 2009 and Carni et al 2006), the paper predicted that student perceived learning effectiveness is positively correlated with student academic engagement. Of course the possibility that each dimension of student engagement might contribute to performance differently was examined although existing evidence did not permit specific predictions regarding the relative contribution of cognitive, emotional and behavioral engagement to students' performance (Appleton, Rotgans, J. I., & Schmidt, H. G. (2011). This paper makes a significant contribution to the literature by testing proposed model of student academic engagement along with perceived learning effectiveness and replicating a study using higher education students as population. Although a previous study of cognitive engagement (Richardson & Newby, 2006) offered a technology context and its results did not offer a model or framework. Therefore, it is important to study the significance of cognitive engagement on students who represent the majority of learners. Although research on cognitive engagement performed back several decades, the online environment or context is a contemporary area of research.

Furthermore, based on available literature, cognitive engagement is expected to be a strong predictor of academic performance, that is, the students who have high cognitive engagement are likely to perform well on the tasks (Pintrich & De Groot, 1990).

Therefore, the investigation of the students' cognitive engagement level, other 2 dimensions of engagement and its contribution to academic achievement can reveal students' current status concerning these variables and their relations with each other leading to some valuable practical suggestions to the teachers and curriculum makers to improve learning effectiveness.

### **Variables:**

Perceived learning effectiveness and student academic engagement are dependent variables

Behavioural components, emotional components and cognitive components are considered as independent variables.

### **Research Objectives**

1. To understand the mediating role of student academic engagement in enhancing learning effectiveness in e-learning process.
2. To identify the relationship between three dimensions of engagement components for developing academic engagement of the students in e-learning.
3. To investigate the relevance of cognitive presence in e-learning for the result of effective learning.

### **Research Questions:**

RQ 1: Is there any significant statistical relationship between perceived student learning effectiveness and student academic engagement in e-learning experiences?

H1: Student academic engagement level increases student learning effectiveness.

RQ 2: Are three components of student engagement interrelated to enhance the academic engagement level of students?

H2: Behavioural indicators positively related to academic engagement level of students.

H3: Emotional indicators positively related to academic engagement level of students.

H4: Cognitive indicators positively related to academic engagement level of students.

H5: Emotional indicators are positively related to behavioural components of engagement.

H6: Behavioural indicators are positively related to cognitive components of engagement.

H7: Emotional indicators are positively related to cognitive components of engagement.

RQ3: Do cognitive components presence have direct influence on perceived learning effectiveness of students in e-learning?

H8: Cognitive components presence increases learning effectiveness of students in e-learning.

## METHODOLOGY

**Sample & Participants:** It is planned to collect data from graduate students of higher education institutions who have experience of online learning and perusing

online learning courses. To explore student experiences with e-learning students were asked to confirm their level of experience through a series of statements assessed on a Likert scale. The total number of respondents in this research was 241 students of the 3 campuses 63.07% were females (n =152) while 36.93% were males (n = 89). With regard to the form of online questionnaire it was possible to submit it only if all items had been estimated, so there were no incomplete questionnaires. Additional control did not identify any extreme values (extreme outliers), but some deviations were found (outliers) by examining each respondent's data which exhibited deviations it was determined that the data corresponded to the context of other answers, and could therefore not be considered deviations. That is why all 241 respondents were included in data processing.

**Instruments/ Scales:** To test the research model, a survey questionnaire was developed with each construct measured using multiple items. Most items were adapted from the related literature. All items were tested based on five point Likert scale. Questionnaire consists of several questions for each components of the students' engagement [cognitive aspect-3 items, emotional aspect-4 items and behavioural aspect-4 items] along with the aspects of impact of engagement on learning effectiveness (no1 up to 6-). These items measures respondents attitude pertaining to online learning that is self-paced learning. In this study, all

measurement construct extended used a five-point Likert Scale from strongly disagree to strongly agree with the scale from 1 to 5 (Strongly Disagree:1, Disagree:2, Neutral:3, Agree:4, Strongly Agree:5).

**Data Collection and Statistical Analysis:** In this research survey questionnaire was reviewed to determine the information needed, decided on a question topic, and developed question content. The questionnaire's criterion was that the survey population must understand the question's objective. The respondents filled out the questionnaire voluntarily. Online questionnaire consisted of individually grouped items which encompassed the evaluation of student engagement and learning effectiveness. Apart from that data on gender, academic field of study, name of the college studying were collected.

The data were collected as part of a larger study on the quality of undergraduate educational experiences at the university level, particularly students' digital learning experiences. The survey was conducted through a self-administered online questionnaire using Google Form which remained open to accept participations for a total of 15 days (2<sup>nd</sup> April 2022 to 16<sup>th</sup> April 2022).

The students of 3 campuses were sent a message in which they were asked to click on an attached internet address that linked to the target survey. E-learning attitude was measured as the positive perception of students of the use of e-learning technology. It was measured using the items described by Chu and Chen (2016). Sample items included, "Studying using e learning tool is a good idea" and "All things considered, with the help of e-learning system is beneficial to me". The Statistical Product software package SPSS 26 was employed to calculate the statistics concerning data processing. Again to validate the hypothesis, PLS-SEM 3.0 technique was used.

**Data Analysis:** To analyze the data, there were several steps, first, the data got from the questionnaire were turned into scores based on the Likert-scale. Missing values were filled with the mean value of the item. Then the computed score was calculated in the mean score for each variable. Finally, those scores were interpreted using descriptive statistics and bivariate correlation of variables in the study. At the end of the questionnaire 3 open ended questions are included to understand the perceptions of students for strategizing e – learning process effectively in the future.

Gender: Table 2 indicates summarized data of the participants.

Table 2

		Frequency	Percent
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Valid	Female	152	63.07
	Male	89	36.93
	Total	241	100

Normality Test: At first to check whether the data obtained are normally distributed or not using SPSS 26 software normality test were conducted. The result showed the variables data are not normally distributed as the significance value found is less than 0.05.

Table 3

### Tests of Normality

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
BC	.184	241	.000	.884	241	.000
EC	.213	241	.000	.855	241	.000
CC	.242	241	.000	.845	241	.000
SAE	.227	241	.000	.903	241	.000
PLE	.186	241	.000	.911	241	.000

### Descriptive Statistics

The initial step in data analysis was to compile descriptive statistics for the variables in this research. According to the descriptive statistics for data sample with varying means and standard deviations student academic engagement, perceived learning effectiveness, behavioural components, emotional components and cognitive components ranged from 1.00 to 5.00 .The five point Likert Scale is considered an interval scale. The mean is very significant. From 1 to 1.80, it is strongly disagree. From 1.81 to 2.60, it means disagree. From 2.61 to 3.40, it means neutral; from 3.41 to 4.20, it means agree; from 4.21 to 5, it means strongly agree.

Table 4

### Descriptive Statistics

	N	Mini	Max	Mean	S.D
1. Behavioural engagement has been much effective in online learning to improve your academic performance and achievement	241	1.00	5.00	2.98	1.24



2. Emotional engagement has been much effective in online learning to improve your academic performance and achievement	241	1.00	5.00	2.88	1.36
3. Cognitive engagement has been much effective in online learning to improve your academic performance and achievement	241	1.00	5.00	2.88	1.29
Valid N (listwise)	241				

The majority of participants agreed item 1 which shows in online class behavioural components are essentially required to higher level of understanding for effective learning [mean=2.98; SD= 1.24] with 60% of students agreeing that indicates combination of all dimensions of engagement together is needed for effective learning. Regarding three dimensions of engagement majority of the students are neutral [mean values are range between 2.60 to 3.40] that they are not able to decide whether engagement was effectively contributed to their academic performance. Comparatively behavioural components are stronger than emotional and cognitive engagement in online learning. Among three dimensions it is proved that emotional engagement components are less effective and need to be focused more [mean=2.88, SD=1.30].

Table 5

### Descriptive Statistics

	N	Mini	Max	Mean	S.D
4. Student behavioural engagement in online class prompted a change in pedagogy to increase student learning effectiveness in class through active learning	241	1.00	5.00	3.20	1.27
5. Student emotional engagement in online class prompted a change in pedagogy to increase student learning effectiveness in class through active learning	241	1.00	5.00	3.24	1.24
6. Student cognitive engagement in online class prompted a change in pedagogy to increase student learning effectiveness in class through active learning	241	1.00	5.00	3.21	1.29
Valid N (listwise)	241				

With regard to perceived learning effectiveness, majority of the students are given neutral opinion in item 4, 5 and 6 in which over 65% of students [mean=3.24, SD=1.24] agreed that student accepted that emotional engagement in online class prompted a change in pedagogy to increase student learning effectiveness in class through active learning. This opinion is consistent with previous studies result which indicate that emotional engagement is very important to create other dimensions of engagement.

Table 6

### Descriptive Statistics

	N	Mini	Max	Mean	S.D
7. Attending regular online classes will help you to share effort in completing task	241	1.00	5.00	3.90	1.04
8. Participation in online class improved my concentration levels in lectures.	241	1.00	5.00	4.05	.84
9. In online class students interaction will improve co-operative nature in class for unity	241	1.00	5.00	4.16	1.01
10. Student concentration level to follow and work on teachers' instruction in online class was easy	241	1.00	5.00	3.61	1.19
Valid N (listwise)	241				

The above table indicates items of behavioural components in which items of 7, 8, 9 and 10 are agreed by majority of the students which shows relatively same result with minimum changes in mean value [range 3.40 to 4.20]. Among all items, 9<sup>th</sup> item is agreed by majority of the students which states that in online class students interaction will improve co-operative nature in class for unity [mean= 4.16, SD=1.01]. Item number 10 having comparatively low mean value [mean= 3.61, SD= 1.19] means they considered their concentration level in online class is much less as per their experience due to lot of distraction during class time.

Table 7

### Descriptive Statistics

	N	Mini	Max	Mean	S.D
11. In online class co-ordination from other learners and instructors will make the students to inculcate problem solving skill.	241	1.00	5.00	3.89	.85
12. Students feel a sense of autonomy and belonging in online class which motivates towards self-regulation	241	1.00	5.00	3.95	.86
13. In online classes students find it easy to have deep learning as they are interested to join the class	241	1.00	5.00	3.72	.87
14. Students commitment towards e-learning identifies the learning goals	241	1.00	5.00	3.89	.88
Valid N (listwise)	241				

The above table indicates items of emotional components. All the 4 items were agreed by majority of the students ( mean value range between 3.41 to 4.20). The item 12 shows the highest mean value [3.95, SD=0.86] which proves students sense of belonging is very significant to motivate self-regulation in online learning. The item 13 is having lowest mean value by perceiving that due to lack of interest in online class students were unable to find

easy to have deep learning. The remaining items 12, 15 and 16 are agreed by majority of the students.

Table 8

**Descriptive Statistics**

	N	Mini	Max	Mean	S.D
15. The emphasis on the students' self-regulation or self-efficacy in online class needed to learn course content effectively.	241	1.00	5.00	4.09	.97
16. I feel confident in understanding of the course concepts in depth as I feel following the lesson on time is easy in online class.	241	1.00	5.00	3.68	.97
17. E-learning participation in both academic and non-academic activities actively developed critical thinking ability	241	1.00	5.00	3.93	1.04
Valid N (listwise)	241				

The above table indicates items of cognitive components. The item 19 is having highest mean value [mean=4.09, SD=0.97] to specify students were perceived self-efficacy or self-regulation in online class make students to learn course contents effectively for active learning. Remaining items were agreed by students. The analysis proves that the confidence level and understanding level of the students in online class were found weak as mean value is comparatively less [3.67, S.D=0.96].

Table 9: Bivariate Correlation

**Correlations**

			BC	EC	CC	SAE	PLE
Spearman's rho	BC	Correlation Coefficient	1.000	.436**	.585**	.040	.123
		Sig. (2-tailed)	.	.000	.000	.536	.057
		N	241	241	241	241	241
	EC	Correlation Coefficient	.436**	1.000	.560**	.017	.025
		Sig. (2-tailed)	.000	.	.000	.789	.699
		N	241	241	241	241	241
	CC	Correlation Coefficient	.585**	.560**	1.000	.008	.102
		Sig. (2-tailed)	.000	.000	.	.906	.115
		N	241	241	241	241	241
SAE	Correlation Coefficient	.040	.017	.008	1.000	.687**	



	Sig. (2-tailed)	.536	.789	.906	.	.000
	N	241	241	241	241	241
PLE	Correlation Coefficient	.123	.025	.102	.687**	1.000
	Sig. (2-tailed)	.057	.699	.115	.000	.
	N	241	241	241	241	241

\*\* . Correlation is significant at the 0.01 level of result (2-tailed).

The investigation of the relationships of the dependent variable and independent variables of the study using bivariate correlational analysis can be seen in Table 8. In this Spearman rank correlation test is used as the data were not normally distributed. All independent variables of the constructed model were significantly and positively correlated with each other. The individual dimensional components are correlated but found insignificant relationship with outcome variables student engagement and perceived learning effectiveness.

The two outcome variables, student academic engagement and perceived learning effectiveness share the strongest relationship of this study ( $r= 0.687, P<0.01$ ). Another strong and significant correlation exists in dimensions of student engagement that is between behavioural components and cognitive components ( $r=0.585, P<0.01$ ), between emotional component and cognitive component ( $r=0.560, P<0.01$ ) and between emotional component and behavioural component ( $r= 0.436, P<0.01$ ) are also found statistically significant and highly correlated. These correlation indicated that emotional component plays a dominant role in engagement and creation of cognitive engagement is very significant to predict positive learning effectiveness. All other correlations were significant and moderately strong (See Table 9).

## DATA ANALYSIS AND RESULTS

To analyze the collected data, descriptive statistics were used to calculate the mean, standard deviation, correlations using IBM SPSS 26 software as stated above. Again Partial least squares-structural equation modeling (PLS-SEM) was adopted to test the research model by empirically assessing a structural model together with a measurement model (Fornell & Larcker, 1981). To explore and develop a theoretical model, the research model assessed using the Smart PLS 3.0 software by the two step approach of first evaluating the measurement model and after that structural model (Anderson & Gerbing, 1988). The primary advantages of PLS-SEM include the relaxation of normal distributional assumptions required by the maximum likelihood method used to estimate models using PLS-SEM's ability to easily estimate much more complex models (Hair et al. 2019; Khan et al 2019). The above reasons support the use of PLS SEM method for this study. PLS-SEM was used to explore a hypothetical research model by analyzing latent variables with multiple observed

variables using regression-based methods (Chin, 1998a, 1998b). Also, PLS SEM is a more exploratory means of understanding the specific path coefficients and how the dependent variable explained by the independent variables in the research model, rather than examining the goodness of fit. The initial analysis of the research model was done using the standardized root mean square residual (SRMR) to see good fit of the estimated model. The model showed the value of 0.06, which was below the recommended value of 0.08; this suggests that the research model is a good fit to the data. Moreover, the fit index of the saturated model showed a value of 0.06 and confirms a good value of model fit (Hair et al. 2017).

Evaluation of the Measurement Model: Prior to evaluating the research model, here conducted several analyses to ensure that the latent constructs exhibited factorial validity and reliability. Evaluation of the measurement model for the reliability, discriminant validity, and convergent validity of the constructs at first examined reliability using Cronbach's alpha and composite reliability in Table 10. The recommended cutoff value of both is 0.7 as extensive evidence of reliability and 0.8 or higher as exemplary evidence of adequate reliability. In Table 3, all the constructs in the measurement model show a Cronbach's alpha of 0.7 or higher and composite reliability of 0.8 or higher. All average variable extracted (AVE) values, ranging from 0.571 to 0.898, exceeded the recommended level of 0.5 (Fornell & Larcker, 1981), which means that 50% or more variance of the items is exhibited by the construct (Chin, 1998a, 1998b). Hence, the convergent validity and reliability show satisfactory levels for the measurement model.

Table 10

	<b>Cronbach's Alpha</b>	<b>rho_A</b>	<b>Composite Reliability</b>	<b>Average Variance Extracted</b>
<b>BC</b>	<b>0.748</b>	<b>0.773</b>	<b>0.840</b>	<b>0.571</b>
<b>CC</b>	<b>0.767</b>	<b>0.768</b>	<b>0.865</b>	<b>0.682</b>
<b>EC</b>	<b>0.815</b>	<b>0.827</b>	<b>0.878</b>	<b>0.643</b>
<b>PLE</b>	<b>0.923</b>	<b>0.923</b>	<b>0.951</b>	<b>0.867</b>
<b>SAE</b>	<b>0.943</b>	<b>0.944</b>	<b>0.963</b>	<b>0.898</b>

Second, discriminant validity is confirmed in the results of Table 11. At first, loadings of every item on its own construct and its cross-loadings on all alternative constructs were tested. Each item should have a higher loading with the construct than its cross-loadings with alternative constructs. In Table 11, there are two different criteria for another test on discriminant validity the Fornell-Larcker criterion (1981) and the heterotrait monotrait ratio of correlations (HTMT Hair et al. 2017). The square root of AVE in the F-L is shown to be higher than all other cross-correlations between constructs (Fornell & Larcker, 1981). In





addition to this, all the constructs in the HTMT criterion below 0.85, thereby suggesting satisfactory discriminant validity.

Table 11

Latent Dimensions	Fornell-Larcker Criterion					Heterotrait-Monotrait Ratio (HTMT)				
	BC	CC	EC	PLE	SAE	BC	CC	EC	PLE	SAE
BC	0.756									
CC	0.661	0.826				0.855				
EC	0.634	0.761	0.802			0.787	0.951			
PLE	0.206	0.203	0.162	0.931		0.244	0.241	0.190		
SAE	0.061	0.075	0.094	0.711	0.948	0.084	0.086	0.105	0.761	

### Testing Structural Model Fit

Before continuing to look at the structural model, at first tend to test the model fit. Henseler et al. (2015) planned 3 model fitting parameters the SRMR, the normed fit index (NFI), and therefore the precise model match. Consistent with Henseler et al (2015), the analysis standards for convergent validity measure (1) NFI ought to be larger than 0.9. (2) SRMR ought to lesser than .08, and (3) the precise model match, that tests the applied math (bootstrap-based) analysis discrepancy between the empirical variance matrix and therefore the variance matrix understood by the composite issue model. Henseler et al. (2015) indicated that dULS and dG were the 95% bootstrapped quantile (HI 95% of dULS and HI 95% of dG). In this study the SRMR value was 0.06 (<0.08), the NFI was 0.934 (>0.90), the dULS was the bootstrapped HI 95% of dULS, and dG was the bootstrapped HI 95% of dG, indicating the data fits the model well.

### Structural Model Analysis

The analysis used the SRMS criterion to gauge the model's goodness of model fit. During this analysis the SRMS is .06, indicating a satisfactory model fit. Once the evaluation of measurement model found satisfactory, next step was assessing the structural model. The hypotheses were examined by the share of variance explained and therefore the significance of the structural ways. PLS-SEM 3.0 was performed to calculate standardized path coefficients, path significance, and therefore related coefficient determination.

Table 12



Paths	$\beta$	T Statistics	P Values	Hypothesis
BC -> CC	0.298	4.198	0.000	H6: Supported
BC -> SAE	0.000	0.000	1.000	H2: Not Supported
CC -> PLE	0.151	3.172	0.002	H7: Supported
CC -> SAE	0.008	0.073	0.942	H4: Not Supported
EC -> BC	0.634	11.258	0.000	H5: Supported
EC -> CC	0.572	9.455	0.000	H8: Supported
EC -> SAE	0.088	0.809	0.419	H3: Not Supported
SAE -> PLE	0.699	17.582	0.000	H1: Supported

Table 12 reports on the PLS-SEM test results, including the path coefficients and their t values corresponding to each path in the structural model. Bootstrapping technique with 5000 samples shows significance testing of path coefficients. To decide the significance of the paths in the model the T-value for each path is 1.96 at the 0.05 significance level and 2.58 at the 0.01 significance level as per previous research evidence.

Figure 2

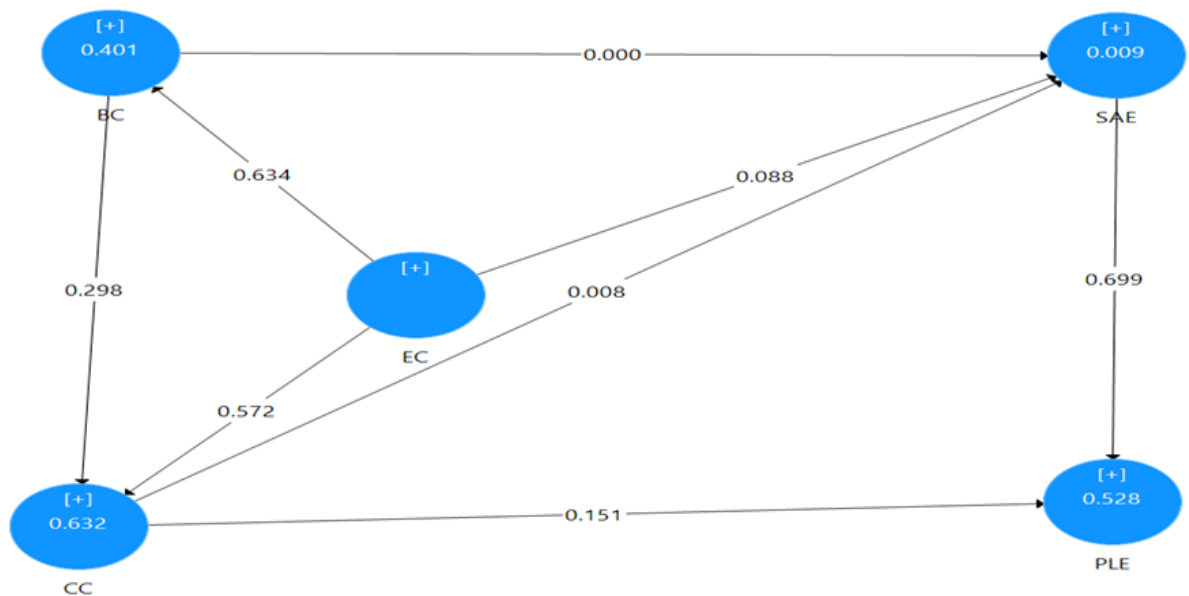


Figure 2 shows the standardized path coefficients and significance levels for each hypothesis set in the beginning, indicating that the hypotheses were supported at  $p < 0.05$ . The results show that students' academic engagement ( $\beta=0.699$ ,  $p<0.01$ , supporting H1) had significant influence on academic learning with very strong indication of correlation, whereas behavioural components ( $B = 0.000$ ,  $p > 0.05$  not supporting H2), did not predict

academic engagement and no significant relationship with students' academic engagement as no correlation found. Other dimensions includes emotional components ( $\beta=0.088$ ,  $p > 0.05$  not supporting H3) and cognitive components ( $\beta=0.008$ ,  $p > 0.05$  not supporting H4) are correlated but moderately predict academic engagement as no significant relationship exists. For emotional indicators ( $\beta = 0.634$ ,  $p < 0.01$  supporting H5) had positive and significant effects on students' behavioural engagement, emotional indicators showing a moderate level of positive coefficient ( $\beta=0.298$ ,  $p < 0.01$ , supporting H6) and emotional indicators ( $\beta=0.572$ ,  $p < 0.01$ , supporting H6) shows a significant effect on students' cognitive engagement.

Table 13

	R Square	R Square Adjusted
BC	0.401	0.399
CC	0.632	0.629
PLE	0.528	0.524
SAE	0.009	-0.004

The R square indicates the variance explained of the endogenous variable by the exogenous variable. Hair et al (2011; Henseler et, al., 2009) proposed that values of 0.75, 0.50 Or 0.25 can be considered as substantial, moderate and weak. In this study result showed that predictor variables of behavioural components are explaining 39.9% (moderate), cognitive components 62.9% substantial variance of outcome variable. Whereas student academic engagement is found insignificant of explanatory variables and showed negative R square value which may be improved with the increase in sample size.

To examine how students perceived digital learning effectiveness experience to affect academic achievement, active learning and academic performance assessing the mediating effects of academic engagement is significant, shown in Table 14. To do this adopted the bootstrapping method to perform the mediation analysis in the PLS-SEM (Nitzl, Roldan, & Cepeda, 2016) with bias-corrected confidence estimates and a 95% confidence interval of the indirect effects.

## DISCUSSION

Table 14: Mediation Effects- Specific Indirect Coefficient

Paths	T Statistics	P Values	Decision
EC -> BC -> SAE	0.000	1.000	Not Significant
EC -> BC -> CC -> SAE -> PLE	0.068	0.946	Not Significant
BC -> SAE -> PLE	0.000	1.000	Not Significant
EC -> BC -> SAE -> PLE	0.000	1.000	Not Significant

EC -> CC -> SAE	0.073	<b>0.942</b>	<b>Not Significant</b>
BC -> CC -> PLE	2.262	<b>0.024</b>	<b>Significant</b>
BC -> CC -> SAE -> PLE	0.069	<b>0.945</b>	<b>Not Significant</b>
EC -> CC -> SAE -> PLE	0.073	<b>0.942</b>	<b>Not Significant</b>
EC -> BC -> CC -> PLE	2.102	<b>0.036</b>	<b>Significant</b>
EC -> BC -> CC	3.722	<b>0.000</b>	<b>Significant</b>
CC -> SAE -> PLE	0.073	<b>0.942</b>	<b>Not Significant</b>
EC -> CC -> PLE	3.136	<b>0.002</b>	<b>Significant</b>
BC -> CC -> SAE	0.069	<b>0.945</b>	<b>Not Significant</b>
EC -> SAE -> PLE	0.814	<b>0.416</b>	<b>Not Significant</b>
EC -> BC -> CC -> SAE	0.068	<b>0.946</b>	<b>Not Significant</b>

The results of this study indicate that a harmonious relationship among all three dimensions and together they contribute a lot to learning effectiveness. Three paths were found significant. One is emotional engagement will contribute to behavioural engagement and thereby making cognitive presence in learning process. Another is emotional presence to cognitive presence and finally contributing to perceived learning effectiveness. The third one is behavioural engagement to cognitive engagement and achieving perceived learning effectiveness. With this research college students' as the research sample, an empirical study was carried out to explore the dependence relationship between dimensions of students' academic engagement using with perceived learning effectiveness using proposed S-O-R model. This study fills the theoretical gap in terms of research on student academic engagement in the e-learning environment.

Based on research findings, this study aims to make the following contributions.

First, few studies have confirmed the influence of stimulating factors in e-learning environment on students' academic engagement. This study discussed learning engagement among college students in the long-term e-learning process, and attempted to provide practical inspiration for colleges to carry out more e-learning practices in the future. Second, most of the previous studies on the S-O-R model focused on the importance of psychological stimuli, but few studies have analyzed the role of specific factors in e-learning especially cognitive presence. This study aimed to fill this gap. The research findings will provide more insights and suggestions for e-learning management.

The results of this study show that all three dimensions of engagement are positively correlated with student academic engagement. This signifies that, in the e-learning context, students' participation and control of the teaching process, their high closeness with teachers, and their mutual recognition and behavioral referents with peers will

make students feel engaged and thus produce learning-related well-being. The interaction, commitment and self-regulation are important factors affecting the psychological status of students, which is consistent with the results of previous research (Richmond et al., 2015; Rogers, 2015). Students' perceive academic achievement when students' cognitive components are strong in learning process. In addition, behavioral attitude components are also an external influencing factor that has a positive effect on students' internal engagement and learning.

This study also found that self-efficacy as a cognitive indicator is positively correlated with learning engagement and effective learning. This is as per prior findings; for instance, Bandura and Wood (1989) stress the significance of self-efficacy for changing and using capabilities, which is one of the influencing factors for improving academic performance. The results of this study are consistent with the view of self-learning theory indicating that learners with self-regulation characteristics have more positive and active learning attitude, who can set practical learning targets according to their own learning, identify available resources, select proper learning strategies, and can, analyse their own learning achievements.

However, result also found that the relationship between three dimensional components of engagement and student academic engagement was not supported. Previous studies have concluded that this

strong and close relationship is one of the most significant element that influence course outcomes (Richmond et al. 2015; Rogers, 2015). The influence of this type is not necessarily positive in all possible conditions. In e-learning, modification of learning environmental conditions and a long stay at home for learning inevitably cause course learning difficulties. Thus teachers will unable to recognize the learning difficulties which ultimately negatively affects their engagement and active learning. Hence collaboration of all dimension is very important rather than focusing on one dimension to establish student engagement.

Further, the research model examined to reveal the relationship between university students' experience in e-learning and academic achievement to enhance the explanatory power of the research model using additional factors. Mixed results regarding the effects of e-learning environments promoted a scholarly interest in the design of the research model. Thus, the present study examined the mediating roles of engagement dimensions in e-learning for academic achievement within the university setting to strengthen this relationship.

This study attempts to contribute to the relative influence of student academic engagement in learning process for university e-learning environments. The findings show that the factors of students' behavioural component and emotional component did not directly predict academic achievement. Instead all dimensions together will be very

significant in achieving effective learning. This result is consistent with previous studies on students' involvement in e-learning in university settings, which did not show a significant impact on their level of performance (Davies & Graff, 2005). There are reasonable explanations for the unexpected finding as students high-effort experience required for academic activities. According to Kuh (2001), students' quality of effort for academic activities can contribute to academic outcomes. The lack of a significant relationship may be related to a student's commitment to academic engagement-toward achieving good academic result (Rodgers, 2008). In other words, students' cognitive components and its presence directly predict their achievement and its plays a mediator role in achieving learning effectiveness along with behavioural and emotional components in academic activities. According to the self-determination theory (Deci, Vallerand, Pelletier, & Ryan, 1991), individuals are more willing to do unenthusiastic activities when they are valued by people to whom they feel connected. Students are likely to make an effort and persevere in learning when they feel they belong to their institution and that learning is a valued activity. In other words, behavioral engagement is likely to be influenced by emotional indicators. Teachers may be familiar with the student who is a hard worker but still seems unable to learn course contents effectively. This student also may be behaviorally engaged but lacks cognitive engagement. In other words, just because

students working hard does not mean they are learning. It is vital to note that the effort is involved in both behavioral and cognitive definitions of engagement. The inclusion of cognitive presence makes a significant difference between students' efforts to simply do the work and effort for understanding and mastering skills (Fredricks et al., 2004). Students who are cognitively and behaviourally engaged will do the task properly and simultaneously manage their learning.

The research model revealed that student e-learning effectiveness and attitudes in the university context are mediated by students 'academic engagement. To make students toward better learning outcomes using university e-learning environments, it is necessary to enhance their meaningful academic engagement in achieving better academic outcomes (Axelson & Flick, 2010). One of the most important aim of higher education institutions using e-learning environments is to get students to be more active in the learning process through dynamic engagement that fosters cognitive and non-cognitive skills for long term academic success (Ituma. 2011: Saadé. Morin, & Thomas, 2012). Particularly, the actual experiences of students in adopting e-learning can contribute to study of academic engagement. Additionally, university students who are cognitively engaged encounter more possibilities for academic achievement in university e-learning environments; that is, positive perceptions or experiences of university e-learning environments. A single dimension



of engagement is not enough to significantly demonstrate strong academic achievement for academic success. The findings of the this study also specifies that students who actively adopt e-learning and have confident attitudes still need to be committed and make the effort to learn the use of digital technology along with a pedagogy for academic success in a university e-learning environment (Davies & Graff, 2005). In given that academic engagement mediates the relationship between all three components of engagement and academic achievement, e-learning environments should be designed to deepen students' level of engagement in academic activities. Thus, a university should focus on supporting learning needs to ensure that students have enriched experiences of using e-learning methods for their learning (Islam, 2013).

### **PRACTICAL IMPLICATIONS**

According to analysis findings, this study has vital sensible significance for learning engagement among undergraduate students within the e-learning context. An in depth relationship between academics and students, students' autonomous management and mutual support are influencing factors for learning effectiveness. External environmental stimuli have a control on psychological standing and facilitate students gain additional positive inner feelings, accordingly they will be considered an important condition for betterment of student learning engagement. Academics ought to target motivating students to

have interaction in learning on their own initiative whereas asking them to realize goals. So to build the subsequent suggestions for long run study reception, at first academics ought to be inspired to grant students additional management over their learning, give an additional active on-line teaching atmosphere, add relevant applied technologies, and enhance students' sense of participation and management in learning process.

Some studies have indicated that instructors play an awfully vital role in advising students to manage their learning (Zimmerman et al. 1996). Thus, institution ought to give academics with temporary coaching courses on the way to promote these techniques in e-learning. Second, academics ought to support communication among students within the e-learning setting. Academics ought to increase opportunities for communication among students, making a learning and social setting that's contributory to relationship maintenance and strengthens interaction. Moreover, open ended answers provided additional interfaces and functions for interaction and communication among students can also be introduced e-learning platform.

The findings of this analysis not solely will enrich the analysis on student engagement in e-learning however can also facilitate academics and platforms that give on-line courses in the future circumstances. Instructors need to pay attention and observe the mental and learning states of learners while teaching. The practical implications of this study give instruction establishments with

suggestions for an integrated approach involving each e-learning and offline environments. The findings of this study recommend the necessity to supply opportunities for college students to find out and adapt e-learning as how to deepen their educational experiences. Universities ought to give coaching, direction, and support consistent with students' profiles, from regular examination of their experiences and level of e-learning adoption for educational engagement and accomplishment.

E-learning environments should be arranged in such a manner to support students' efforts in their educational work. Though members of the young generation considered digital natives, they have to organize for the combination of digital ability with educational connected tasks. Further, integrated e-learning ought to be organized by instructors' along-side students' experiences of following educational engagement to reinforce the educational success. Above all technology-driven teaching methods or materials has tried to be a good approach for enhancing student learning effectiveness (López-Pérez et al., 2011, Lyons & Evans, 2013). Instructors ought to think about the way to integrate and organize field e-learning strategies in teaching and student learning method. Effective implementation of university e-learning setting that gives a victorious educational expertise powerfully depends on the instructor's help and teaching approaches within the e-learning setting.

## RESEARCH LIMITATIONS

The analysis findings can enrich the literature on learning engagement, the S-O-R model, and e-learning environments. With these some limitations exist and represent additional analysis directions. First, though the S-O-R model has achieved a motivating position within the field of science solely, some studies have targeted on the link between stimulating factors within the e-learning atmosphere and learning engagement among faculty students. This study also builds the constructive mechanism for learning engagement within the e-learning atmosphere supported the S-O-R model. The study includes limited number of institutions which may be considered as a constraint because studying student engagement mainly prefers individual differences and psychological stimulus for generalizing findings. So the selection of population and institutions are major limitation. Gender is also one of the vital factor in study behaviour and engagement as psychologists claimed that the perceptions and attitudes of males and females are considered to be different and in this study majority of the participants are females which may also can be considered as a limitation.

## FUTURE ANALYSIS

Future analysis ought to check the model in totally different situations, like e-learning as a supplement to face-to-face instruction. Second, the information utilized in this study came from courses of undergraduate level and most of the students were females. Thus, it remains to be seen whether or not student

management over courses, harmonious teacher-student relationships, and in depth peer referents in e-learning study for a large population across various institutions will bring similar conclusions. Third, the sample during this study might not accurately represent all student groups because of the restrictions of time and area. Thus, future analysis ought to embrace and compare totally different strategy to produce extra opinions on e-learning, additionally to increase the sample size for analysis representativeness. For future studies, few considerations include: (1) the analysis model must be extended to boost the findings of the roles of digital readiness and educational engagement as mediators. (2) the analysis model of this study will be applied to look at students in different establishments or totally different countries to generalize the model; and (3) additional studies might examine the link between university directors and college members and staffs perceptions of e-learning adoption in campus-based and on-line courses and compare these with student engagement and performance.

## CONCLUSION

In summary, this paper has provided a review of the conception of engagement. The paper made the examination of the literature in short targeted on the similarities and variations between the varied terms, definitions, and dimensions offered by researchers for the construct. The literature examined during this review suggests that totally different models

planned will provide understanding students' educational performance, supporting the arguments by researchers (e.g., Appleton et al., 2008; Klem & Connel, 2004) that, at the core of the many models, the conception of engagement captures students' quality learning. Further, the present analysis studies represented during this review have provided support for the event of the model, proposing a direction for intervention. Hence, fostering students' dependencies of all three dimensions and psychological feature presence of cognitive engagement is one pathway to heighten and enhance students' proactive engagement and learning effectiveness in academic-related activities.

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