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Effect of Students Engagement and Moderating Effect of Class & Web-based Tools on Students Performance

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Abstract: This study aims to bring out the engagement level of university students during this pandemic. The research is to study the levels of engagement such as affective, behavioural, and cognitive engagement on the dependent variable of students' performances. As in this pandemic, most classes are online, and students need different classes and web-based tools to interact in the classroom. The biggest challenge to the educational sector is the transformation, and by 2030 there could be a change in the educational sector. For this purpose, the primary data are collected from 979 students of the Kingdom of Bahrain. PLS-SEM was utilised to analyse the measurement and structural models through SmartPLS 3.3.2 software to prove the construct's hypothesis. Therefore, the study utilised the combinative PLS method that fulfils the characteristics of the model. The study results show that affective engagement, behavioural engagement, and cognitive engagement positively affect the students' performance. The moderating effect of class & web-based tools between behavioural engagements and student performance negatively reflects the SEM Model. The education sector is at the centre of revolution from the traditional learning system to more technological-based learning.

Keywords: affective engagement, behavioural engagement, cognitive engagement, class & web-based tools, student performance.

1. INTRODUCTION

Educational institutions are one of many sectors that are affected by COVID-19. Education plays a vital role in developing countries, institutions, and individuals. The quality of education will be determined based on the countries' educational system, which has a relationship between institutions and various countries. Schools and universities converted their teaching process online. Faculties have adopted different measures to share the information, shape students' attitudes, and create an enjoyable learning environment. Universities have been well equipped to train their staff to teach online. To equip the students to face the competitive world, it is mandatory for both developed and developing countries to ensure the quality of education. The role of educational institutions is not only to carry out teaching and learning; there are other pioneer activities like creativity, innovation, and research. Therefore, educational institutions must develop innovative ideas that support the changing environment.

A complete phase of education got disturbed due to COVID-19. The global pandemic has made it difficult for the students, teachers, and administrators to achieve the objectives of individuals and institutions [1]. The situation emerged the need for alternative teaching methods in classes, assignments, assessments, and feedback. Some popular virtual classroom applications like Google Classroom, Zoom, Blackboard, and Moodle play a vital role in converting traditional face-to-face classroom teaching to online virtual systems [6]. The entire education system got impacted by the COVID-19 pandemic; significantly, higher education universities need to move towards a new phase of education . An E-learning system used to overcome the drawbacks of the COVID-19; an electronically supported platform for online classes and portals for the allied activities outside the traditional classroom environment. Students, teachers, and academicians must incorporate internet technology with gadgets to smooth teaching and learn through e-learning.

Student engagement is the involvement of the student in the learning environment. Student engagement received importance from policymakers, practitioners, and researchers [48]. Student engagement will improve the students' performance, and the same can be reflected in the grades due

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to effective teaching strategies. Determining the effect of teaching practices on student engagement positively reflects the thinking and problem-solving skills [7]. Teachers use different strategies to engage the students; some tools will support both students and teachers in carrying out the activities [18]. Some of the essential factors that influence the students' engagement in successful learning experiences include course design, teachers, confidence, peer community, and psychology [8]. In addition, teaching behaviour plays a vital role in enthusiasm, motivation, and engagement [9].

Educational tools like games strongly influence the students' learning, and minimising the distraction will improve the quality of learning and students' attitude [25]. Web-based tools influence motivation and classroom engagement and enrich the learning experience without affecting academic performance [2]. The digital platform includes the teaching pedagogy with increased participation, attention, and enhanced learning experience [19]. Moodle instructional technical design platform could conduct online learning for effectiveness on creativity [42]. However, adopting the technology in the regular teaching class is difficult without adding the framework to the course [26]. Successful blended learning tools are considered a learning framework necessary for innovative teaching and learning strategies [20].

The study aimed to determine the effect of students' engagement on students' attitudes with moderating effect of class and web-based tools from the perspective of bachelor students during the COVID-19 pandemic. Further, the study revealed students' cognitive, affective, and behavioural engagement attitudes. Moreover, the study is limited to the students of the Kingdom of Bahrain. Studies are related to the student's engagement, attitude, and teaching strategies. However, studies on the moderating effect of class and web-based tools from the Kingdom of Bahrain bachelor students during the COVID-19 pandemic are rare. So, the study addresses the existing research gap. The motivation of the study is to review the variables of student engagement, existing literature and utilising the variables in establishing the quality of education. The study results will support the researchers, students, teachers, government, policymakers, and university decision-makers in student engagement, student attitude, and class & web-based tools.

2. LITERATURE REVIEW & HYPOTHESIS DEVELOPMENT

The psychological investment of students in the learning of self-regulatory strategies with deep understanding is cognitive engagement. Increasing student engagement is a critical challenge in higher education today. The faculties are an ever-important factor that is needed to increase student engagement. The problem stays in class more than low achievers if disengaged. Students' perceptions of their social and instructional interactions with their teachers play a crucial role in students' engagement [21]. To a certain level, the quality of interactions that can influence students' engagement in school is considered a factor in improving students' engagement. The findings of particular research indicated that teaching quality is essential but does not influence students' school engagement [30]. Therefore, it is thinkable concepts on how best to guide students in exploratory learning activities to develop transferable knowledge.

Emotional reactions connected to task investment are affective engagement; a positive attitude, affect, and value will increase affective engagement. Teaching and learning strategies improve the affective engagement of the students by increasing the positive emotional experience, reducing negative emotional experience, and enhancing the student's skills to handle the demands of academics and society [10]. Student engagement can be improvised through virtual and live lecture classes with stimuli, video, and pictures [35]. Affective engagement with connectivity, enthusiasm, and meaningfulness discussed the concept of connectivity, such as connecting students to learning and connecting teachers to support students and the teacher [36]. In higher education, digital technology plays a vital role in all the aspects of the student experience linked with student engagement. Knowledge, text-based, sharing, and multimodal tools need to enhance affective engagement in higher educational institutions [17]. Also, excessive technology usage might lead to students' disengagement [11]. Therefore it is hypothesised that:

H_1: There is a significant effect of affective engagement on student performance in the bachelor's program

Behavioural engagement expresses the learning involvement and performance in the academic tasks related to the student characteristics. Positive and supportive relationship supports the students learning for academic achievements [37]. Behavioural engagement provides an idea about selecting appropriate teaching, learning, and assessment strategies in the flipped learning environment in higher educational institutions. It represents a positive effect of behavioural engagement on students' academic performance [3]. Moreover, behavioural engagement in teaching practice, including reading achievement, misbehaviour, participation, and compliance, is more strongly related to students' psychological performance in higher educational institutions [27]. The

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flexibility of course content and time positively affects academic performances and behavioural engagement in the e-learning environment of higher educational institutions. Surprisingly, teacher contact does not significantly affect behavioural engagement [22]. Accordingly, it is hypothesised that:

H_2: There is a significant effect of behavioural engagement on student performance in the bachelor's program

An investigative study to explore cognitive engagement between teachers and students resulted in active talk. The teachers were able to provide constructive, passive, and active prompts. In general, though there was a robust relationship between the teacher talk and students' ability to transfer, the study presented no significant difference between student talk and transfer [23]. Strategies like discussion, reading, and idea-sharing will support positive classroom discipline and enhance cognitive engagement [38]. The learning dashboard influences the student's cognitive engagement as it is the interaction techniques between the teacher and the students to understand the respective tasks. The teacher could use a mixed-method approach to analyse the individual works, group video recording, and focused discussion. The study resulted in the teacher and the students understanding the learning dashboard's respective tasks and interaction techniques that have highly influenced the students' cognitive engagement [12]. Therefore, it is hypothesised that:

H_3: There is a significant effect of cognitive engagement on student performance in the bachelor's program

Web-based tools (Kahoot) positively affect the skills and knowledge of higher education students. Also, a web-based tool (Kahoot) can be an effective method for formative evaluation in web-based education [4]. Furthermore, web general, web communication, web-pedagogical knowledge, web-pedagogical self-efficacy, and web-based instruction positively influence teachers' attitudes and performance [13]. Teaching strategies have a significant influence on the student's outcome. The teaching strategies focused on the factors such as web-based assessment and classroom tools such as Kahoot, videos, crossword puzzles, and many more [14]. The combined class approaches, such as video lectures, and learning activities, have provided an effective method for the learners to understand the learning materials [28]. The teacher exposing the students to the situation and concepts could encourage the students to engage in decision-making. The interactive approach allows students to actively participate in classroom discussions [31]. Accordingly, it is hypothesised that:

H_4: There is a significant effect of class & web-based tools on student performance in the bachelor programme

Several studies proved a strong relation between affective engagement and student performance. Also, there is connectivity between the use of technology by the students with their performance. [44] There is a relationship between learning achievement and technology in higher education. Further, there is a considerable increase in the students' performance when technology is being used in the teaching and learning process. A study based on the higher educational institutions' business students expressed that productivity increases through technological devices during classroom teaching. The technological support in the class includes laptops, LCD projectors, printing devices, smart boards, and animated PowerPoint presentations [39]. Technology-based teaching will improve writing skills and visual memory capacity. Moreover, bachelor-level students in higher educational institutions will get higher visual memory through technology-based teaching tools to increase the student's performance [45]. Therefore, it is hypothesised that;

H_5: There is a significant moderating effect of class & web-based tools between affective engagements and student performance in the bachelor programme

Based on the previous studies, behavioural engagement is one of the roles of the teachers in higher educational institutions; behavioural engagement influences the students' learning and performance. [43]. Therefore, higher education institutions need to create awareness in the minds of teachers on behavioural engagement with engagement knowledge, teacher's knowledge, and method of engagement. Also, relevant policies need to be accompanied by the awareness of teachers' role in students' behavioural engagement in students' performance [15]. Furthermore, web-based tools supported by technological devices play a vital role in students' performance and engagement with English as a Foreign Language (EFL) students of higher educational institutions [29]. Online tools on the engagement will enhance the student's performance on literature, beliefs, behaviours, and attitudes [5]. Accordingly, it is hypothesised that;

H_6: There is a significant moderating effect of class & web-based tools between behavioural engagements and student performance in the bachelor programme

Teachers need to adopt a technologically supported learning environment and redesign the class and web-based tool in cognitive engagement and students' environment. Also, teachers must consider technical, social, and pedagogical tools

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[16]. Students' engagement and educational technology are inevitable in a higher educational environment. Further, cognitive engagement significantly affects the student's performance [40]. A web-based tool on cognitive engagement focuses on students' level, discussion questions, student characteristics, teacher facilitation, and learning community; it influences students' performance in higher educational institutions [32]. Moreover, there is a direct relation between computer-based technology (web-conferencing software, social networking sites, wikis, blogs, and digital games) and student engagement. Class and web-based tools will enhance students' performance and cognitive engagement in higher educational institutions [41]. Therefore, it is hypothesised that;

H_7: There is a significant moderating effect of class & web-based tools between cognitive engagements and student performance in the bachelor programme

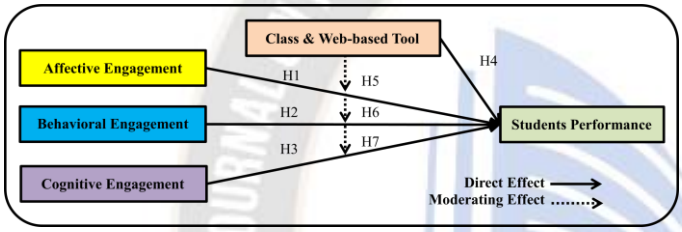

Figure 1: Research Model

The framework was developed based on further research from the high indexed journals, published and unpublished data, practical experience, and various e-learning definitions. Figure 1 represents the research model consisting of 4 independent variables (affective engagement, behavioural engagement, cognitive engagement, and class & web-based tool) and the relationship with the dependent variable (student's performance) with moderating variables (class & web-based tool). Thus, the research model has a direct relationship with independent and dependent variables and an indirect relationship with the moderating variables.

3. METHODOLOGY

The self-made questionnaire was utilised for this study with two parts. The study population consisted of students attending online classes during the COVID-19 period in the education sector in Bahrain, including bachelor students (1st, 2nd, 3rd & 4th year). Therefore, the sample respondents of the study are students of bachelor's degrees from different universities.

The questionnaire utilised a 5 point Likert scale (5-strongly agree, 4-agree, 3-neutral, 2-disagree, 1-strongly disagree). Part 1, with four variables (Affective Engagement (AE), Behavioural Engagement (BE), Cognitive Engagement (CE) and Class & Web-based Tools (CW) with three questions for each variable, and Part 3, Students Performance (SP) with six questions for the direct effect. All the students are selected as per the bachelor programme. There were 979 students, and all were considered for the study. The students were observed for three months, and data were also collected through online surveys and face-to-face interviews to understand the students' engagement level on their performances. Jamovi was used to analyse the descriptive statistics; SmartPLS was used to test the goodness of fit, Cronbach's alpha, discriminant validity, and check the instrument's validity and reliability. SmartPLS 3.3.2 was used to test the Structural Equation Model for the respondents of this study. The hypothesis test was also done in PLS software to prove the structural equation model is accepted or rejected. The hypothesis was tested at a 0.05 level of significance and could be interpreted to accept or reject the hypothesis for significant and moderating effects. The sample size of 979 is more than enough to study the analysis in the PLS and prove that the model has a positive influence on the constructs.

4. RESULT

The result analysis was done based on the data collected from the bachelor program students on students' engagement and performance with the moderating effect of class and web-based tools. Further results were interpreted based on the descriptive statistics, the goodness of fit, and discriminant validity for the measurement instrument and structural equation model to find the direct and moderating effect of student engagement on student performance of bachelor students.

4.1 Descriptive study

Table 1. Descriptive Statistics

	AE	BE	CE	CW	SP
N	979	979	979	979	979
Missing	0	0	0	0	0
Mean	3.65	3.89	3.84	3.80	3.94
Median	3.80	4.00	4.00	4.00	4.00
Standard deviation	0.927	0.869	0.927	0.834	0.985
Minimum	1.00	1.00	1.00	1.00	1.00
Maximum	5.00	5.00	5.00	5.00	5.00

Table 1 explains the descriptive statistics of the collected data with the number of respondents (N) 979. Missing 0 represents no missing data; all the study respondents collected data. Mean, median, and standard deviation of the independent and dependent variables represents students' perception of students' performance with the moderating effect of class and web-based tools.

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4.2 Goodness of Fit

The goodness of fit suggests evaluating the observed data with the expected data under the model using some fit statistic or discrepancy measure criteria such as SRME, NFI, residuals, Chi-square, or deviance [46]. In structural equation modelling (SEM), the research's goodness of fit is essential [24].

Table 2. Goodness of Fit

Fit Criteria	Value
SRMR	0.062
d_{ULS}	0.661
d_G	0.708
Chi Square	344.394
NFI	0.802

Table 2 represents the goodness of fit values; standardised root means square residual (SRMR) 0.062, less than 0.080, indicating the goodness of fit [33]. Geodesic discrepancy (d_G) and determine unweighted least squares discrepancy (d_{ULS}) < 95 per cent of bootstrap quantile considered as a conventional view; the computed result of 0.708 and 0.661 reflect the met criteria [47]. A Normed Fit Index (NFI) of .802 indicates the model of interest improves the fit by 80.2% relative to the null model [34]; therefore, the model attains a good fit. The higher the NFI value indicates a better fit.

Table 3. Indicator Reliability, Internal Consistency, Convergent Validity and Fornell-Larcker Test of Discriminant Validity

	Alpha	CR	AVE	AE	BE	CE	CW	SP
AE	0.862	0.916	0.784	**0.898**				
BE	0.798	0.881	0.712	0.688	**0.844**			
CE	0.893	0.934	0.824	0.631	0.729	**0.886**		
CW	0.895	0.935	0.826	0.666	0.743	0.639	**0.889**	
SP	0.871	0.903	0.708	0.789	0.805	0.761	0.766	**0.890**

The acceptable range of Cronbach's α is 0.7. Table 4 revealed that the reliability and validity of the variable stay above 0.80, indicating an internal consistency of the data. The discriminant variability assessment indicates that composite reliability above 0.70 and AVE values within the frame of 0.729 and 0.839 could accept the measurement model. In Table 3, all the values stay within the constrained frame, so the overall measurement model is accepted and supports the constructs. The discriminant validity refers to how the construct differs from one another empirically. There is a positive correlation with the variables; the calculated values are less than 0.9, so the discriminant validity was accepted. The results proved that the measurement scales are reliable and valid.

4.3 Structural Equation Model

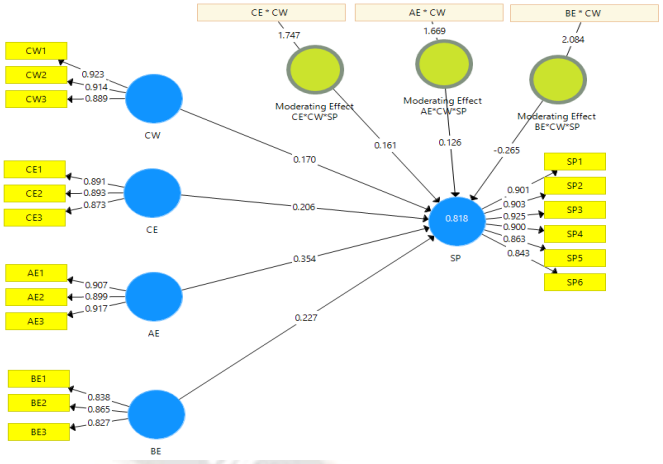

Figure 2: PLS Result

Figure 2 shows that the estimated equation R^2 value is 0.818 (81.8 per cent) of the student's performance is described by the classroom and web-based technology, cognitive engagement, affective engagement, and behavioural engagement.

Table 4: Path Coefficient

	Beta	t-Statistics	P-Values	Decision
Affective Engagement → Student Performance	0.091	3.880	0.000	Supported
Behavioural Engagement → Student Performance	0.098	2.330	0.020	Supported
Cognitive Engagement → Student Performance	0.072	2.854	0.005	Supported
Class & Web-based Tool → Student Performance	0.095	2.870	0.004	Supported
Affective Engagement * Class & Web-based Tool → Student Performance	0.110	12.59	0.001	Supported
Behavioural Engagement * Class & Web-based Tool → Student Performance	0.100	6.660	0.009	Supported
Cognitive Engagement *Class & Web-based Tool → Student Performance	0.090	12.08	0.001	Supported

Table 4 shows that data has been tested with the Jamovi and PLS with the excellent result attained from the PLS algorithm. To test the hypothesis using the analysis techniques expressed the significance level at 5%. The result of the study indicates that affective engagement affects the student's performance (β=0.091, t-value=3.880, p<0.05); therefore, H_1 is supported. Furthermore, the finding suggests that the H_2 effect of behavioural engagement on students' performance is supported (β=0.098, t-value=2.330, p<0.05). The finding from the table also reveals that cognitive engagement affects the student's performance (β=0.072, t-value=2.854, p<0.05); therefore, the H_3 is supported. The table also reveals that class & web-based

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tools affect the student's performance (β=0.095, t-value=2.870, p<0.05); therefore, the H_4 is accepted.

The outcome expressed that moderating effect H_5 class & web-based tool between affective engagements on student performance in the bachelor programme is accepted at (β=0.110, t-value=12.59, p<0.05). Furthermore, the study expressed that moderating effect H_6 class & web-based tool between behavioural engagements on student performance in the bachelor programme is accepted at (β=0.100, t-value=6.660, p<0.05). Finally, the result expressed that moderating effect H_7 class & web-based tool between cognitive engagements on student performance in the bachelor programme is accepted at (β=0.090, t-value=12.08, p<0.05).

5. CONCLUSION

The study's finding reveals a positive correlation between the engagement level and students' performances. The moderating variable could be using multiple classroom tools to affect the students' stress level or privacy issues when using the online platform. Online discussions were one of the least valuable strategies, contradicting the students' understanding of the concepts. Students' engagement agrees that they sometimes get confused or stressed using multiple tools. It was also observed that students are eager to participate in online education tools online quizzes, but answering the quiz questions will have less probability of being on the first three podium winners. The sharing of extra information in the class could also make the students overload the concepts, and in this concept, the respondents have given good results. The students' self-confidence changes have affected their participation level in seeking the goals and developing an interest in learning. They were very comfortable with the instructor and classmates for sharing the ideas relating to lessons. In our studies, the students have highly agreed on developing their confidence and communication in an online class with the help of different assessments through online games and resource-sharing platforms like Moodle.

6. FURTHER RESEARCH

Future studies related to this engagement level can be considered with the same framework but with different mediating and moderating variables. Also, some of the variables could be excluded from the conceptual model and added according to the change in the education trends. It will be more appropriate to select the studies in different training centres, master students, and even consider respondents with different grades. To find more relevant results, the research could be done with quantitative analysis to understand in detail the engagement levels.

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