Enhancing Classroom Engagement Through Padlet as a Learning Tool: A Case Study

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Abstract—**Activities conducted in classrooms are important to acquire students' understanding and participation in a learning environment. Some of perceived barriers that prevent students to participate in classroom activities include difficulty to speak, shy, fear to interact or provide comments. This paper focuses on using Padlet for e-learning and presents the activities of engaging and stimulating students in active learning. This is one way of how instructors can obtain information from each student by encouraging participation. The research employs quantitative approach. A semi-structured questionnaire was distributed among 39 postgraduate students who enrolled in the Business Statistics for Data Science course. Factors such as motivation, active learning, collaboration, learning opportunity, usefulness, ease of use, and satisfaction were used to measure their engagement. The findings show that active learning through Padlet has a significant effect on improving students' engagement in classroom activities.**

Keywords—**New learning environment, Active Learning, Engagement, Padlet**

I. INTRODUCTION

Teaching and learning in the 21st century classrooms are more student centered than teacher centered. The learning style in 21st century also differs in which students can learn at any time and anywhere (Yáñez-Aldecoa, Okada, & Palau, 2015). 21st century learning consists of four essential learning and innovation skills known as 4Cs. They are the critical thinking and problem solving, creativity, collaboration, and communication (Partnership for 21st Century Learning, 2019). Besides, the 21'st century learning

is an integral part of future educational thinking and planning. Even though technology changes, educators and administrators are actively searching for new ways to prepare students for the future, and the educational system has been evolving faster than ever before (Jennifer, 2019). Therefore, it is important that students are actively involved in classroom activities such as asking questions, participating in discussions, and offering opinions. From these activities, students are able to acquire new ideas when they share information and knowledge (Zhi & Su, 2016). Students who do not take part in activities might be perceived to be unprepared, disinterested, hostile, lazy, or bored (Fuchs, 2014; Thum, 2019). In addition, the role of teachers as facilitators is important to enhance students' responsibility for their own learning (Beltrán-Martín, 2019; Hamid, Rosli, & Yunus, 2019). Based on new learning environment in teaching and learning activities, the quality of teaching is also important because each student has different learning styles (Thum, 2019).

Student engagement is a term to describe an individual's interest and enthusiasm in learning which impacts academic performance and behavior (Gallup, 2013). There are several studies related to student engagement factors. Barkley (2010) mentioned that the student engagement is the intersection between two factors such as motivation and active learning. The motivation is the intercept between expectation and value. Meanwhile, according to Becker (2013), the new meta-model of student engagement is the intercept of motivation, active learning, expectation, and value. Other researchers mention that

student engagement involves the perceived usefulness, perceived ease of use, teaching presence, and self-efficacy (Jung, Y., & Lee, J. , 2018). In addition, student engagement also correlates with students' satisfaction (Kuh & Vesper, 1997; Garnham & Betts; 2018).

Bransford, Vye & Bateman (2002) state that there is a pedagogical approach that can be used in teaching and learning to increase student engagement which is called How People Learn (HPL) framework. This framework is depicted in Fig. 1. In the framework, there are four primary elements which are:

a. Learner-centered; refers to framing the delivery of the knowledge in a learning environment that takes students' prior knowledge and assists them in making connections to real world;
b. Knowledge-centered; refers to what would we intend students to know and do after going through a lesson and finally the whole course;
c. Assessment-centered; refers to the kind of assessment that helps students to obtain feedback on their performance level and provides a chance for them to improve themselves, and;
d. Community-centered; refers to students being part of a learning community consisting of peers and instructors.

The four elements in HPL can be used as the criteria for assessing a learning environment for students' engagement and effectiveness (Gibson, 2009). Previous studies have shown that an HPL-informed instructional strategy promotes students' learning of content (Pandy *et al.,* 2004; Birol, Liu, Smith, & Hirsch, 2006). HPL framework provides a convenient way to organize a great deal of information about the nature of competent performance and ways to help people develop their own competence or expertise (Bransford, Vye, & Bateman, 2002; Palou *et al.,* 2012) or break depending on experts (Brookfield, 2002).
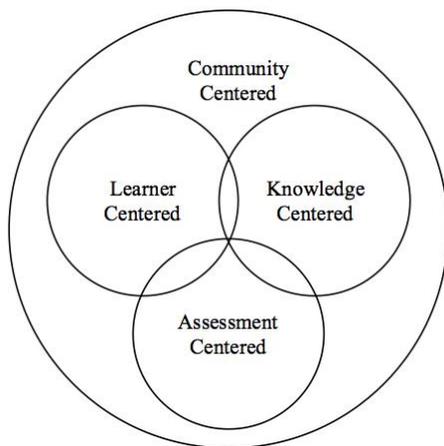

Fig. 1. How people learn framework (Bransford, Vye, & Bateman, 2002)

Digital technologies play an integral role in the success of teaching and learning. Learning tools are important to enhance students' participation and motivate them to learn (Ahmed, Almuniem, & Almabhouh, 2016). In 21st century learning, there are many learning tools that can be utilized to support teaching and learning activities. Each tool has its own functions and roles in order to encourage classroom engagement among students. In Table 1, various tools are divided into four main categories which are content creation, content distribution, content curation, and content assessment.

TABLE 1 Type of teaching and learning tools

Type of teaching and learning	Purpose	Example of Tools
Content Creation	Screen casting	• Screencast-O-Matic • ScreencCastify • PowerPoint
	Video scribing	• VideoScribe • Sparkol • GoAnimate
	Animation	• PowToon
	Camera-based solution	• Smartphones • Tablet • iPad
Content distribution	Disseminating the content	• LMS – Schoology, Google Classroom • Video sharing – YouTube, Daily Motion, Vimeo • MOOC website: OpenLearning • Microsoft OneNote or Clas Notebook • Edpuzzle • Padlet
Content Curation	Gathering existing information	• Getpoket • Pinterest • Evernote • Padlet • Tes Tech with Bendspace
Content Assessment	Peer assessment	• WebPA, Peergrade
	In class and pre-class assessment	• Webclickers or Poll Everywhere
	Submission assignment	• OneNote Class Notebook
	Online quizzes	• Socrative, Pear Deck, Microsoft Form

In Table 1, Padlet is one of the tools that falls under the categories of content distribution and content curation. This study employs Padlet to get students' participation in classroom activities.

Padlet is a website and application that allows students to curate information onto virtual bulletin boards using a simple drag-and-drop system. Padlet acts like a page full of post-it notes, where students can start with a blank page and add videos, text, links, documents, and images. Students are able to add as many notes to a wall as they like and it scrolls in all directions. Instructors can moderate all the posts that require students to display their names on the board for

assessment purposes. The tool provides many advantages to students, such as the opportunity to collaborate with their peers in real-time. Other advantages are: a) easy and intuitive to use, b) instant collaboration (any student can see when anyone else is uploading something in the wall), c) support many file types and multimedia (almost everything can be linked and shared on the Padlet), d) mobile (it can work on many different devices), e) beautiful and fun interface which allows for aesthetic modifications, f) private and secure, g) flexible and versatile, and h) can be saved and exported to other format such as pdf, CSV, image or excel file (Beltrán-Martín, 2019; England, 2017; Zhi and Su, 2016). Besides, Padlet can also add personal profile, search. Padlet also has advantages in term of student features. Previous studies show that students' learning motivation improves when using Padlet (England, 2017; Kimura, 2018; Zhi & Su, 2016). This motivation catalyzes opportunity for interaction and engagement during class hours. Indirectly, it also enhances collaboration among students (Beltrán-Martín, 2019; Ellis, 2015; England, 2017). Ellis (2015) has shown that Padlet helps to reduce the barriers that students face when discussing with lecturers and enhances the overall learning experience through providing opportunities for students to engage with the subject material and views posted by their classmates. Padlet is also a useful tool for brainstorming activities (Kimura, 2018). With all that being said, Padlet is a useful tool that can be used in conventional and non-conventional teaching and learning activities. Therefore, the objective of this study is to identify the level of student engagement using Padlet as the learning tool.

II. METHODOLOGY

This research employs a quantitative approach. An open-ended questionnaire has been constructed to acquire the appropriate data.

A. Participants

The participants were 39 postgraduate students (20 males and 21 females) who enrolled in Business Statistics for Data Science (MANB 1123) course. This is one of the courses required to obtain Master of Science (Business Intelligence and Analytics) at one of the top public universities in Malaysia. In this course, there are only six classes throughout the semester, which starts from 9.00 am to 5.00 pm, and totals up to 120 hours per semester. This course introduces students to a range of statistical techniques that relates to data science in a business environment. Fig. 2 shows the distribution of the participants in this study in terms of gender and age group. Most of the female students' ages are between 20 and 30 years old, while male students are between 31 and 40 years old.
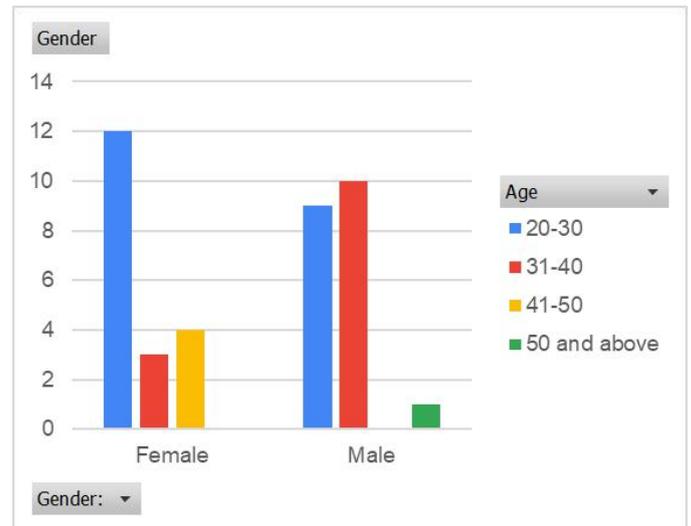

Fig. 2. Participant's distribution in terms of gender and age group

B. Research Instrument

There was only one research instrument that was used in this study. The instrument was semi-structured questionnaire known as 'Padlet for Business Statistics in Data Science'. It was adapted from Ellis (2015) and Rashid, Yunus, & Wahi, (2019). The objective of this questionnaire is to identify students' level of engagement in using Padlet as a learning tool for Business Statistics in Data Science course. The questionnaire was divided into three sections. Section One was the demographic information that had two items, Section Two had 25 items in a 5-point Likert scale format that focused on motivation, active learning, collaboration, learning opportunity, usefulness, ease of use, and satisfaction. Section Three had four items in a 2-point Likert scale in the form of open-ended questions. These questions were to identify students' experience using Padlet. The survey was done online through Google Survey. To examine the data, statistical analysis was done and the findings are explained in Section III. Two experts validated the questionnaire.

C. Research Procedure

To add student names in Padlet, an instructor has to invite students in the Padlet session through email. At the top right in the Padlet, the instructor has to add click button to share. The example of adding students in Padlet is illustrated in Fig. 3. Students are invited through email and the instructor can add or edit members in the Padlet. If students are not invited in the Padlet, "Anonymous" will be displayed on the Padlet wall.
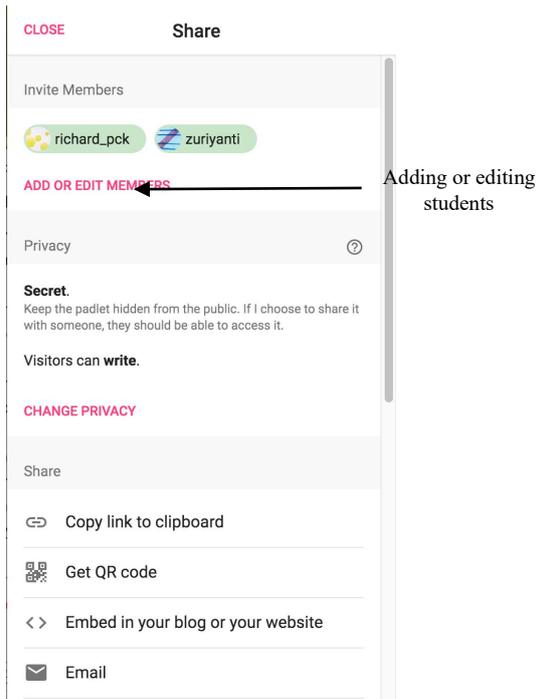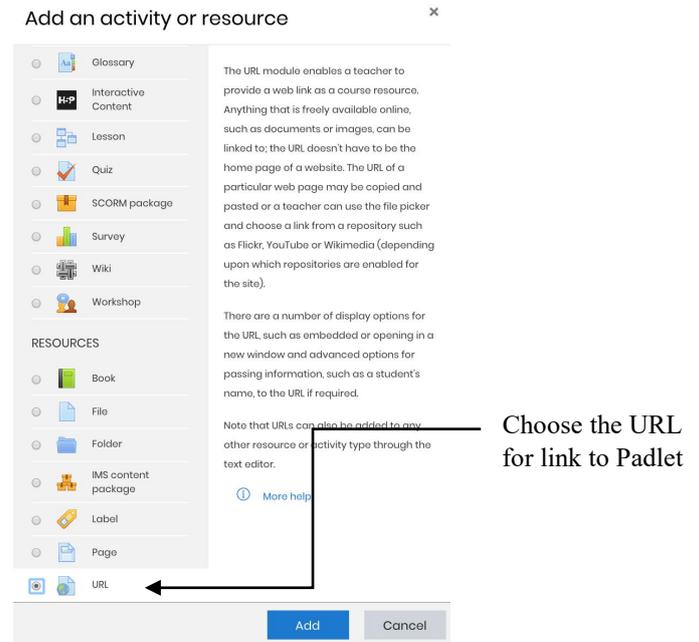
Fig. 3. Example of adding students in Padlet

Fig. 4. Link from e-learning to Padlet

In this study, the public university has a Learning Management System or known as the e-learning system to host apps and tools that support students' learning. Lecturers are encouraged to use e-learning and apps for their teaching and learning activities. Padlet is more versatile and adds flexibility to learning activities, and this feature is not offered on the university's e-learning system. To add a link from e-learning to the Padlet, the instructor has to choose URL. Once this is set, the e-learning will have a link to the Padlet page that will be used for class activity. This example is presented in Fig. 4.

D. Task Analysis

A series of Padlet tasks was designed for students to carry out after class hour and they were related to activities in the following class. The reason for this was to supplement the activities or discussions in class. It was also used as a tool to ensure that each individual work outside of class was carried out and submitted within the time given. Students' posts on the Padlet wall were analyzed. Fig. 5 describes the screen captured from Padlet on the class activities assigned. Meanwhile, Fig. 6 showcases the examples of tasks given to students.
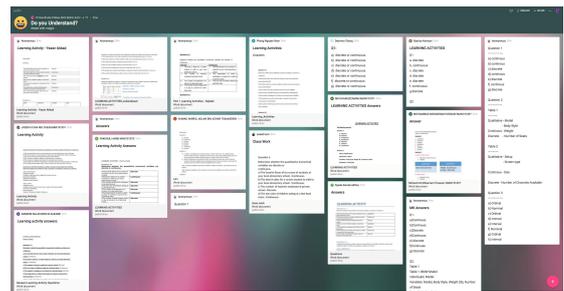
Source: https://padlet.com/nurulhuda_firdaus/bjjn1v96dy2e

Fig. 5. Screen capture of topic choice for full time students

LEARNING ACTIVITIES: DO YOU UNDERSTAND?

PADLET (in pairs) https://padlet.com/nurulhuda_firdaus/bjjn1v96dy2e
Click the link above and put your answer. To post your answer click + sign

Questions # 1:
Determine whether the quantitative (numerical) variables are discrete or continuous.
a) The favorite flavor of ice cream of students at your local elementary school.
b) The time it takes for a certain student to walk to your local elementary school.
c) The number of teachers employed at private school.
d) The eye color of children eating at a fast-food chain.
e) The number of employees of a branch of a fast-food chain.
f) The temperature at which a beef burger is cooked at a branch of a fast-food chain.
g) The number of beef burgers sold in a day at a branch of a fast-food chain.

LEARNING ACTIVITIES

Questions # 2:
• Identify the individuals, variables, and data corresponding to the variables. Determine whether each variable for Table 1 and Table 2 is qualitative, continuous, or discrete.

Model	Body Style	Weight (lb)	Number of Seats
3 Series	Coupe	3362	4
5 Series	Sedan	4056	5
6 Series	Convertible	4277	4
7 Series	Sedan	4564	5
X3	Sport utility	4012	5
Z4	Roadster Coupe	3505	2

Table 1: BMW Model

Setup	Size (in)	Screen Type	Number of Channels Available
A	48	Projection	298
B	50	Projection	112
C	55	Plasma	425
D	56	Plasma	269
E	45	Plasma	290

Table 2: HD TV

LEARNING ACTIVITIES

Questions # 3:
Determine the level of measurement of each variable.
a) Birth order among siblings in a family
b) Favourite movie
c) Volume of water used by a household in a day
d) Year of birth of college students
e) Highest degree conferred (high school, bachelor's, and so on)
f) Eye colour
g) Ages of children: 4 years, 5 years, 6 years, 7 years, and 8 years
h) Monthly temperatures: 63°F, 68°F, 73°F, 78°F, and 83°F

Fig. 6. Task given to the students

III. FINDINGS

The results of the analyzed questionnaires are tabulated using cross tabulation approach since the data obtained is nominal data class. Based on the findings, the participants agreed that Padlet could motivate them during the learning process. All figures shown (Fig. 7 until Fig. 9) have supported the findings based on age group and gender. The findings are also based on factors on motivation, active learning, collaboration, learning opportunity, usefulness, ease of use and satisfaction among students. The first row in Table 2, Table 4, Table 6, Table 8, Table 9, Table 10 and Table 11 used the 5-point Likert scale from strongly disagree (1) to strongly agree (5). All the results in tables are in percentage.

A. Motivation

Table 2 shows that majority of the participants agree that the use of Padlet can indirectly enhance learning activities in classrooms. The questionnaire was distributed to the students after the courses ended. Over 79.5 per cent finds that Padlet motivates them to complete task and 61 per cent agrees that Padlet motivates them to interact with group members outside of classroom. 76.9 per cent agrees that Padlet encourages interaction and completion of task together.

TABLE 2. Analysis of student's response: motivation

No	Questions	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)
1	Padlet motivates me to complete tasks assigned by my instructor.	2.6	0	17.9	43.6	35.9
2	Padlet motivates me to interact with my group members outside of class.	2.6	7.7	28.2	41	20.5
3	Padlet motivates my group to interact and complete tasks together.	2.6	5.1	15.4	53.8	23.1

Fig. 7 presents that majority (87.2 per cent) of the participants agrees that Padlet motivates them in learning activities in classroom.
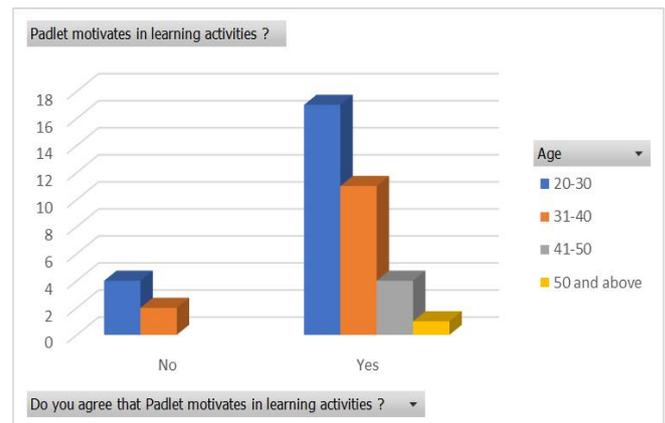

Fig. 7. Excerpt on motivation factor based on age group

Statements in Table 3 show three examples of findings related to motivation. The participants state that they feel encouraged and supported by their colleagues in completing their assignments. The interaction among classmates is also supported by this application which enables them to keep track on the changes and exchange information between students and the instructor. The ability of Padlet software in notifying the updates enables to catalyze competitiveness among students in writing and contributing more accurate and more complete information to others. The students also feel more inspired and are eager in completing assignments.

TABLE 3. Excerpts on motivation factor

Participant A:	"Padlet motivates me to complete task easily, it is easy to use and fun using it. It also encourages team discussion between students and lecturer".
Participant B:	"Padlet motivates me to finish task by doing discussion with my team member at the same time encourages me to interact with friends and the instructor. By doing this, it helps me to understand the content better and inspires me to add more information to complete task given by the instructor".
Participant C:	"It is quite interactive and I particularly like it because it motivates me to view other's work or note as well"

B. Active Learning

Active learning is an approach which actively engages students with the course material in or outside classrooms. For the active learning factors, Table 4 shows that half of the students prefer to work in group because it is less stressful and more engaging compared to working individually.

TABLE 4. Analysis of student's response: active learning

No	Questions	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)
4	When using Padlet for class activities, I prefer to do it in a group rather than to do it individually	5.1	7.7	35.9	25.6	25.6
5	When using Padlet as group activities, I feel less stress	2.6	7.7	33.3	30.8	25.6
6	After using Padlet, I was more engaged in my learning	5.1	15.4	25.6	23.1	30.8

Overall, 82.1per cent agrees that they feel more active doing their work in-group and feel less stressful. This can been seen in Fig. 8.
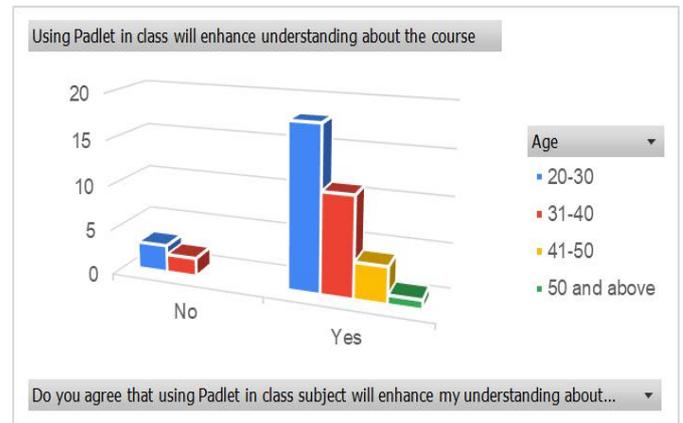

Fig. 8. Excerpt on active learning based on age group

For active learning factor, participants show positive reaction in which they have found Padlet could enhance their motivation to work in groups with reduced stress. Information could be shared online and they would depend on Padlet in initiating discussions on certain topic. The concept of dividing task is able to reduce stress among the classmates. They could determine the amount of task they would require in order to make the task performed among the group members is equally shared. The three examples of excerpt on active learning are shown in Table 5.

TABLE 5. Example of excerpt on active learning

Participant A:	"Padlet shares information and allows group discuss online, which is a big help to me, I feel less stressful and the use of Padlet should be more encouraged for group discussion."
Participant B:	"Working with team to finish the Padlet task reduced my stress, because tasks were being done by looking at topics that have been divided among team members."
Participant C:	"We can share our point and get immediate response from the lecturer and team members. Editing can be done simultaneously by everyone."

C. Collaboration

Collaboration in education takes place when members of an inclusive learning work together to succeed in both offline and online environment. The results in Table 6 show that 61.5 per cent of the respondents agree that Padlet does motivate them in term of interacting with group members. 69.3 per cent mentions that Padlet encourages them to work on the task together. Besides, 77 per cent is positive that Padlet helps them to collaborate with their group members.

TABLE 6. Analysis of student's response: collaboration

No	Questions	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)
7	Padlet motivates me to interact with my group members	0	5.1	33.3	33.3	28.2
8	Padlet encourages me to complete tasks together	2.6	0	28.2	30.8	38.5
9	Padlet help me to collaborate with my group members	2.6	0	20.5	46.2	30.8

In the collaborative factor, Padlet encourages the participants to use diagram and multimedia presentation when interacting. Fig. 9 shows that 84.6 per cent agrees that Padlet helps to collaborate among group members according to age group.
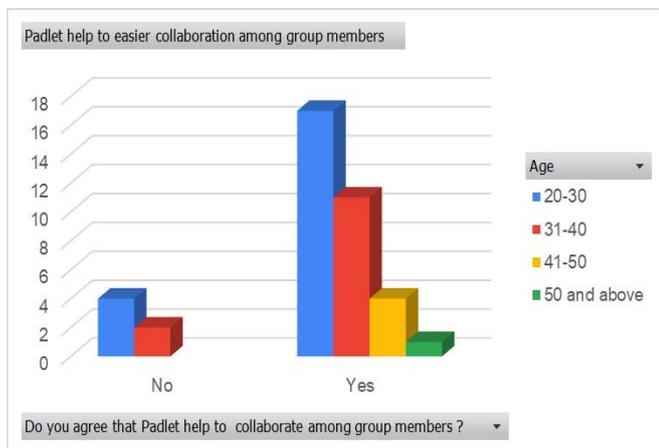

Fig. 9. Excerpt on collaboration factor based on age group

Table 7 shows the selected opinion from the three participants related to the collaborative factor. The collaboration between the classmates is a success factor to complete the task, increase productivity, and at the same time it enhances engagement.

TABLE 7. Example of three excerpts on collaboration (interaction, complete group together)

Participant A:	"Padlet is easy for group members to complete the tasks together because Padlet is user friendly in including diagram and video for interaction."
Participant B:	"Padlet is the platform for team members to interact in order to complete the work together at the same time."
Participant C:	"Interaction and participation from all members enhance productivity."

D. Learning Opportunity

Learning opportunity is working through informal or formal learning in completing tasks. Table 8 shows the

responses on learning opportunity. 87.2 per cent agrees that Padlet allows student to learn from classmates when posting or commenting in Padlet. Besides, 76.9 per cent agrees that Padlet helps them to prepare for independent learning. Based the tasks that are given to students, 79.5 per cent agrees the understanding on the topics discussed is enhanced.

TABLE 8. Analysis of student's response: learning opportunity

No	Questions	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)
10	Padlet allows me to learn from my classmates by reading their posts and comments on our class wall.	0	5.1	7.7	41	46.2
11	Using Padlet helps me to prepare for my independent learning in subjects	5.1	2.6	15.4	43.6	33.3
12	Padlet helps me to learn on understand further about subjects based on the exercise given	5.1	5.1	10.3	48.7	30.8

E. Usefulness

Table 9 depicts the analysis related to usefulness. It is found that 71.8 per cent of the respondents feel more connected to the topics discussed using Padlet. Besides, 66.5 per cent agrees that Padlet is also useful to help them in learning the topic and meeting the expectations.

TABLE 9. Analysis of student's response: usefulness

No	Questions	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)
13	Padlet helps me more effective in learning about subjects	2.6	5.1	20.5	33.3	38.5
14	Padlet is useful in understanding further about Business Statistics	5.1	2.6	25.6	41	25.6
15	Padlet meets my expectations	2.6	0	30.8	41	25.6

F. Ease of Use

Padlet is easy and simple to use and 92.3 per cent of the respondents agree with this (refer to Table 10). Besides, 87.2 per cent agrees that Padlet is user friendly and 84.6 per cent agrees that it only takes several steps to accomplish the tasks on Padlet.

TABLE 10. Analysis of student's response: ease of use

No	Questions	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)
16	Padlet is easy to use	2.6	0	5.1	33.3	59
17	Padlet is simple to use	2.6	0	5.1	35.9	56.4
18	Padlet is user friendly	2.6	0	10.3	30.8	56.4
19	Padlet requires the fewest steps possible to accomplish what I want to do with it.	0	2.6	12.8	33.3	51.3
20	Padlet can be use without reading instruction.	5.1	0	15.4	38.5	41

G. Satisfaction

Table 11 presents the satisfaction analysis among respondents related to Padlet. Most of them are satisfied (82.1 per cent) and would recommended Padlet to friends (76.9 per cent). Seventy nine point five per cent agrees that Padlet is also fun to use and they would like to use it in future. In addition, 82.1 per cent agrees that they would also like to use the software in other courses.

TABLE 11. Analysis of student's response: satisfaction

No	Questions	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)
21	I am satisfied with Padlet	0	2.6	15.4	43.6	38.5
22	I would recommend Padlet to my friends	0	5.1	17.9	33.3	43.6
23	Padlet is fun to use	0	2.6	17.9	38.5	41
24	I would like to use Padlet in the future	2.6	2.6	15.4	48.7	30.8
25	I would like to use Padlet in other courses	2.6	2.6	12.8	43.6	38.5

IV. DISCUSSION

This article provides an overview on 21st century learning approach in teaching and learning. It employs students of the Business Statistics for Data Science course as a case study. It identifies students' engagement using Padlet as a learning tool in classrooms. This study contributes to previous study that are related to student engagement factors. Seven factors such as motivation, active learning, collaboration, learning opportunity, usefulness, ease of use, and satisfaction were measured. Almost all the factors measured receive positive feedback and they support the use of the software. All the factors measured are constantly supporting and adding values to teaching and learning activities. In addition, three best students provided their feedbacks related to four factors like motivation, active learning, and collaboration. Based on the HPL Framework (Bransford, Vye, & Bateman, 2002) the respondents provided responses on the questions using Padlet. One of the elements measured is the knowledge-centered which is the understanding of the sub topics and by using Padlet, students were able to relate to the sub topics discussed in the course of Business Statistics for Data Science. In this case study, the assessment-centered focused on the exercise given to the sudents. Examples of the tasks are shown in Fig. 6. Another element in HPL is the community-centered in which it describes how students interact with classmates and instructor in classroom. All the factors measured have shown constant support and added values to teaching and learning activities. However, there are also limitations found in this study and these are related to the collection of data and the interpretation of results. One single questionnaire was used to measure all constructs, therefore the strength of the interpretation of the factors may be rather inflated. Further research involving a larger sample of students is recommended to strengthen these findings and explore more insights on the use of Padlet as an innovative teaching strategy to enhance students' learning.

V. CONCLUSION

The findings show that Padlet software could help students improve their learning by intensifying engagement in activities in or outside classrooms. The software supports many features and allow students to work in their own space for individual and group tasks. Students will be collaborators for specific tasks and by doing this, the tasks given can be more manageable and less stressful for them. When students are not met with too much stress in completing their work, they can perform better and the learning process can be said to be a more effective one. This study has shown that the use of Padlet could help to enhance students' comprehension in topics studied. Therefore, the use of more learning software should be encouraged and further developed to achieve more successful learning and teaching process.

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