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Analysis of Student Learning Engagement in Project-Based Learning

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ABSTRACT
The Covid-19 pandemic forced learning through distance learning using online learning. Student learning engagement through online education is critical. Online education using zoom and other media requires a substantial learning commitment of students to do independent learning. And independent learning will result in student engagement in the learning process. One of the learning models that can improve student learning independence is through Project Based Learning (PjBL). Project-Based Learning is believed to increase student motivation and engagement in learning. Students who are fully involved in their emotions, cognition, and behaviour in education tend to have more meaningful learning. However, if the student does not have learning engagement, they only fulfil administrative requirements, but not learning substance. The prior research has proven that the application of student-centred learning methods will increase student engagement, affecting student learning outcomes. This study found student engagement factors, namely emotional, cognitive, and behavioural, in online project-based learning methods. Based on the responses and assessments from students, information was obtained on how students were involved, and then analysis was carried out using factor analysis. Researches results resulted in a combination of new indicators to create a new model that was slightly different from the previous findings. The dominant factor influencing student engagement is emotional engagement, namely frustration, boredom, and anxiety.

Keywords: *engagement learning, emotional learning, cognitive learning, behavioural learning, factor analysis*

1. INTRODUCTION

Currently, the world of education is still struggling with digitalisation and the challenges of digital transformation as the optimal way to adapt during the Coronavirus pandemic that affects academic activities [1]–[3]. Although the change is not entirely new, the learning process is now forced to shift from traditional to virtual teaching and learning because conventional educational models are no longer able to adapt to the challenges that change the educational environment [4]. So that during the pandemic online learning becomes a necessity [5]. Because lecturers and students must be limited by distance, mobility and social interaction are by the Covid-19 protocol recommended by the government through referrals from WHO (World Health Organization) [6]; [7]. So then learning during the pandemic is primarily online or also known as (daring) [8]; [9].

This condition forces the educational environment information and communication technology (ICT) to be used entirely to add data in education and learning, and e-learning has become an emerging paradigm of modern education [10]. The utilisation of e-learning depends on several information systems, services, and technologies. Information systems include information services and information technology (IT), where service is understood as the use of IT. Furthermore, user experience (UX) and usability of information technology and services also affect the e-learning process, technical and social aspects [11]. Considering that Covid-19 is a relatively new event worldwide, e-learning has become necessary as one of the optimal solutions for the world of education [12]. E-learning has

played an important role during this pandemic, helping to facilitate student learning during traditional classroom closures [13].

Various online learning media used by lecturers to assist communication between lecturers and students in order to improve learning interaction such as Facebook social media, what's app, and some others, google classroom, Windows Microsoft Teams [14]; [15]. However, the effectiveness of learning through e-learning according to students' perceptions is very difficult, tedious, and worrying because the pressure of the task is very heavy, the supervision is weak, the signal network is limited in rural areas and the high cost of internet packages [8].

All parties in Higher Education are responsible for improving educational outcomes. So, it is a must to improve the student experience by getting students involved in lectures and learning to achieve the potential and benefits of participation. So lecturers are obliged to develop creative initiatives that help overcome the problems and limitations of online teaching. Lecturers actively collaborate to improve online teaching methods as creative solutions and increase students' willingness to learn [16].

One of the learning successes during the pandemic was influenced by a suitable learning model to increase student motivation and engagement in learning; one of the learning models is project based learning (PjBL)[17], [18]. [19] [20], Project based learning is able to increase interaction between lecturers and students and between students and students [21]. Especially, it is then strengthened by a process of reflection and assessment that involves students in learning [22].

High interaction between lecturers and students will result in student engagement on learning which will ultimately improve student learning performance [23]; [24]; [25]; [26]. Engagement which consists of cognitive, emotional and behavioral engagement are 3 dimensions that researchers often use to measure student engagement. These dimensions have been described in more detail by [27].

Several research studies have found that the application of the Project Based Learning method increases student engagement and directly impacts student performance [28], so it is important to identify the factors that influence student engagement and increase the level of that engagement. This article will discuss the learning experiences of Economic Education students in project based learning, and how their emotional, cognitive, and behavioral involvement as proposed by [29] in learning in Development Planning, Development Economics, and Human Resource Economics classes.

2. LITERATURE REVIEW

2.1. Student Engagement

The theory of student engagement comes from [30], [31], [32]. Based on Chickering, [32] and [33] found that engagement was positively related to objective and subjective measures of improving general and critical thinking skills. Student engagement is positively related to grades and levels of persistence as well as institutional policies and practices that influence student engagement levels on campus. According to the opinion expressed by [35] based on works written by [36], engagement is seen as the result of a combination of intention and successful academic and social integration within the university environment. Krause [37] broaden the view of engagement as a combination of intellectual application, persistence and participation in a learning community, supported by a goal. The basic idea underlying it is that students should be involved in learning activities through interactions with other people and useful tasks. The definition of engagement is the quality of the effort that students themselves devote to educational activities that directly affect the desired outcomes and are related to the efforts made by the institution to use effective educational practices [38].

Carini, et al. [39] consider engagement as a construct of sociological, social network, organizational, psychological, cultural, pedagogical, and economic research. Engagement is more than just engagement or participation; student engagement is generally considered to be a predictor of learning and personal development. The more student's study or practice a subject, the more likely they are to learn it.

In addition, student involvement is an interpersonal component where interactions with teachers and other students are an important part of the learning experience. Findings of evidence for four dimensions of student involvement in general, namely, learning skills, emotional involvement with class material, peer participation/interaction, and performance, as well as characteristics of student involvement, namely being actively involved by asking questions, or collaborating with other students[40].

Student engagement consists of three dimensions of behavioral (behavioral), cognitive (cognitive), and emotional. Behavioral engagement refers to positive behavior, involvement in learning, and participation in extracurricular activities, such as attending class, following class rules, asking questions, and concentrating. Cognitive engagement indicates students' use of deep learning strategies, motivation, and expectations. Emotional engagement is student involvement in fun, interest in assignments, reactions, and relationships with teachers, classmates, and administrators that encourage a love of learning[29].

This engagement requires emotional understanding and activity [41], [42]. Engagement without being accompanied by emotional involvement only leads to obedience, and feel involved without any action is dissociation [29].

Previous research has shown that using effective teaching methods can stimulate student engagement, and student engagement will lead to a good learning process [43]–[45]. In increasing student engagement, one of the underlying assumptions is that educational technology positively influences student engagement, an important characteristic of high-quality teaching and learning in higher education, and learning outcomes [46].

The utilization of technology as a learning tool will increase student engagement, as evidenced by [47] previous researchers who discussed the impact of online learning on student engagement and learning outcomes. This has also been demonstrated in studies involving economic education and social media activities such as blogs [48], podcasts [49], and Facebook [50]. Most studies show that technology in education can support online learner engagement [46]. It has been shown that students learn better from computer-based instruction containing words and graphics than words alone in academic learning [51].

2.2. Student Engagement Toward Project-Based Learning

Student-centered learning activities are emphasized to increase student knowledge with the help of social interactions with teachers and peers that only exist in constructivist learning environments [52]. Among the learning approaches based on constructivist social development, theory is the project-based learning (PjBL) approach. PjPL is characterized by social constructivism, which states that collaborative learning allows students to build true knowledge with a more meaningful process [52], [53]. The application of project-based learning (PBL) is more effective in increasing student engagement compared to traditional knowledge [54].

2. METHOD

This research was conducted in 3 classes of Introduction to Development Economics, History of Economic Thought, and Human Resource Economics with the project-based learning method online. Measurement of learning engagement adopts the theory developed by [55] on a four-point answer scale for RAPS-S constructs (1 - “not at all true,” 2 - “not very true,” 3 - “sort of true,” and 4 - “very true”). The student engagement in online learning is cognitive, behavioral, and emotional involvement that affect student learning performance [24].

At the end of the study, students fill out a questionnaire in the form of a google form, based on the questionnaire questions adopted from [56];[57]; [21]. The questionnaire distributed adapts the opinion developed by [58] in table 1.

The results of this study are the impact of learning project-based learning activities carried out on three classes, namely:

Table 1. Courses and Number of Student

No	Course	Student
1	Economic Human Resource	30
2	Economics Development	19
3	Economics Planning Development	19
	Total	68

Source : Primary Data, 2021

Data analysis was performed using factor analysis with the help of SPSS software. Several requirements must be met in the application of factor analysis, namely, the data used must meet the requirements of the normality test seen from the sig value. a-symp greater than > 0.05; KMO MSA value must be greater than > 0.05 and sig value. Barlett's test is small < 0.05; the anti-image correlation value per item is greater than > 0.50, which indicates a strong relationship between variables.

3. RESULT AND DISCUSSION

3.1. Student Learning Engagement Factors

Student engagement in online learning is seen as having an important role in education; in the reflection that is carried out, their perceptions are also asked about the extent of emotional engagement, cognitive engagement, and behavioral engagement. Factors formed from the results of the analysis using SPSS software are listed in the table below:

Table 2. Student Learning Engagement Factors

No	Variable	Anti-Image Correlation	Communalities (Extraction)
1	Enthusiastic	0,856	0,821
2	Interest	0,838	0,926
3	Satisfaction	0,857	0,823
4	Enjoyment	0,809	0,882
5	Bored	0,707	0,806
6	Worried	0,894	0,567
7	Frustrated	0,679	0,892
8	Taking Notes	0,878	0,657
9	Remember	0,833	0,636
10	Read	0,849	0,585
11	Planned	0,827	0,732
12	Summarizing	0,850	0,742
13	Commentariat	0,725	0,861

14	Content	0,817	0,607
15	Appreciation	0,891	0,615
16	Join the discussion	0,816	0,755
17	Assignment	0,883	0,589

Source: Primary Data, 2021

The requirement to continue the factor analysis has been met, seen from the MSA value of each variable greater than > 0.50 so that all variables are valid and feasible to use. Likewise, the community value of each variable is greater than > 0.50, which means the conditions are met with an average factor that can explain 73.50%. And the rotation formed by the cumulative Variance value of 59.30%.

After rotating the variables using SPSS with factor loading, a new model is formed that describes the cognitive involvement factor resulting in a total extraction of 5,731 = interest, enthusiasm, pleasure, satisfaction, diligence in writing, remembering, summarizing, doing assignments, planning activities. Behavioural engagement factors, total extraction 3.118 = Appreciation, participating in discussions, following content, engaging in comments. Emotional Involvement Problem Factor, complete extraction 1,232 = Frustrated, Bored, and Anxious

Table 3. Matrix Factor Rotation

No	Indicator	Factor 1	2	3
1	Interest in Studying Online Materials	0,844	0,293	-0,262
2	Enthusiastic about online learning	0,791	0,189	-0,234
3	Enjoy following online learning	0,771		-0,400
4	Satisfied with online learning techniques	0,758	0,145	-0,296
5	Write accurately about what my lecturers said during online lectures in zoom meetings, Google meet, or other applications.	0,628	0,270	
6	Remembering the answers from the references given in the e-learning	0,608		
7	Learn new material in online learning and summarize it in your own words	0,510	0,504	0,104
8	Doing group member tasks in the group	0,510	0,358	
9	Make a plan to achieve the desired grades in this semester's courses	0,479	0,460	0,152
10	Commenting on every e-learning discussion and forum		0,886	
11	View content in e-learning		0,696	
12	Actively participate in group discussions.	0,266	0,662	0,121
13	Appreciating “likes” on e-learning activities	0,330	0,629	
14	Understand what is meant by technical terms in e-learning by reading eBooks’ and other books	0,271	0,526	0,169
15	Frustration in online learning			0,922
16	Bored of following online learning			0,858
17	Anxious to follow online learning	-0,220		0,682

Source: Primary Data, 2021

Factor 1: Cognitive Engagement

Factor 2: Engagement Behavioral

Factor 3: Emotional Engagement

Then, calculate the Average Variance Extracted (EVA) value if it is greater than 0.50. Then, the factor is eligible to be one of the factors, with the Composite Reliability (CR) value also above 0.50. With the loading factor value as follows:

Table 4. Value of Loading, AVE, and CR of Each Factor

Factor	**Factor Loading**	**Average Variance Extracted (AVE)**	**Composite Reliability (CR)**
Interest	0,84	0,59	0,77
Enthusiastic	0,79		
Enjoyment	0,77		
Satisfaction	0,76		
Taking notes	0,63		
Remind	0,61		
Summarizing	0,51		
Assignment	0,50		
Commentariat	0,89	0,59	0,77
Content	0,70		
discussion	0,66		
Appreciation	0,63		
Reading	0,53		
Frustration	0,92	1,23	1,11
Bored	0,86		
Worries	0,68	.	

From the factor loading value of each variable, the dominant factor that affects student engagement is frustration which is in emotional engagement. Furthermore, the most dominant behavioral factor is comments, while the most dominant cognitive factor is student interest.

The implementation of online project-based learning methods in three classes of Introduction to Development Economics, History of Economic Thought, and Human Resource Economics shows the involvement of students in the learning process, according to previous research by [19] [20], [21] Project-based learning able to increase the interaction between lecturers and students and between students and students.

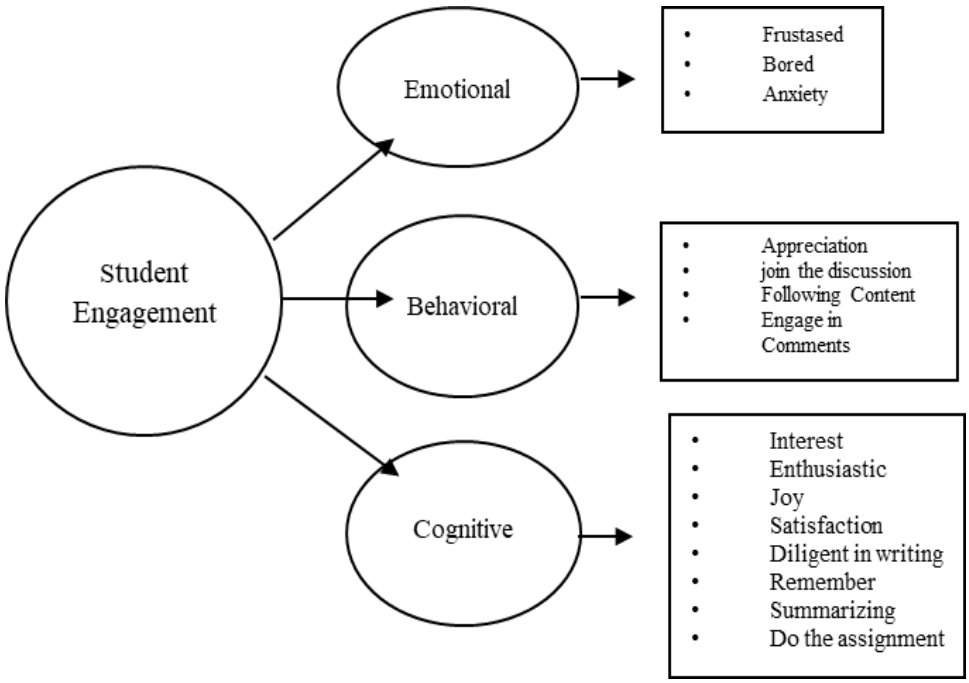

Figure 1. Empirical Framework, Student Engagement Learning in PjBl

The factors that show engagement are divided into three dimensions: emotional, cognitive, and behavioral. After the analysis is carried out, the dominant factors that shape student engagemoutcome from emotional engagement, namely frustration, boredom, and anxiety. So that the results of this study are slightly different from previous research by [59] on how positive and negative emotions generated in learning situations affect engagement in learning activities. Positive emotions related to enthusiasm, interest, satisfaction, and pleasure, while the emotional components that had no effect were boredom, anxiety, and frustration.

4. CONCLUSION

The In project-based learning, student project-based experience generates student engagement factors in online learning. 1) Engagement Learning students in the cognitive engagement aspect are related to their interest in learning the material, their enthusiasm for participating in online learning, happy to participate in PjBl online learning, Satisfied with online learning techniques, Writing what the lecturer explained during the zoom meeting, Remembering the answers from the references given in online learning, summarizing in their own words, and compiling lecture assignments. 2) Engagement learning student in the Behavioral Engagement aspect is related to indicators of giving appreciation to PjBL learning, actively participating in discussions, following content made by lecturers, and being involved in discussion comments. 3) Engagement learning students in the emotional aspect of engagement; students experience a lot of frustration, boredom, and anxiety over the online process with distance learning.

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