Active learning to improve self-learning among student teachers

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Abstract

PETE, as a place for PE teacher training, requires an analysis of the functioning of subjects related to the SDGs. Since 2006, Active Learning Models (ALM) in track and field courses have aspired to provide contextual learning experiences to PE teacher candidates. However, there is no in-depth analysis of ALM implementation in ensuring the readiness and independence of student learning during lectures. The purpose of this study is to strengthen the evidence that ALM can build the self-regulation and self-efficacy of prospective PE teachers. This research is a weak experimental type using a one-shot case study design. The sample involved 142 students（M= 83 and F= 59) who followed the ALM syntax for one semester. Portfolios and log-activity scores were used to measure self-regulation, while the Authentic Learning Self-Efficacy Scale (ALSS) questionnaire was used to measure Self-Efficacy. Data analysis used descriptive, correlation, ANOVA, and regression. The results showed that the students possessed adequate self-efficacy while participating in ALM. The differences in the characteristics of students based on the class that necessitated adjustments in the implementation of the instructional model were discussed. In addition, learning activity was determined as the most important variable in explaining student self-regulation in successfully achieving academic achievement.

Keywords: instructional model, PETE student, self-efficacy, learning activity, and academic achievement.

INTRODUCTION

Enhancing the quality of teachers means assisting the UN in achieving its 4th Sustainable Development Goals (SDGs), namely improving the quality of education (Albareda-Tiana et al., 2018). Research has shown that teachers need to develop sustainable competencies (Evens et al., 2018; Vangrieken et al., 2017). The demand for increased competence is often encountered during a change in curriculum. Hence, teachers must update their knowledge and competence to fit the demands of the curriculum (Coenders & Terlouw, 2015).

Meanwhile, universities are the agencies most responsible for preparing teachers. They are required to truly maintain their products by screening prospective teachers (Digiacinto et al., 2017) because the educational process in higher education can have an important influence on the quality of future education, which further affects the readiness of graduates to work in the workplace (Asún et al., 2020). Universities must provide quality lecture services to create great teachers. Conducting

appropriate lectures for student learning is the core task of the lecturer in designing learning. At least two aspects of conformity need to be considered, namely consistency with the demands of the times and students' learning needs. Conformity with the era's demands refers to preparing prospective teachers to cope with digitalization (Martin, 2018) while meeting student learning needs involves achieving predetermined standards (Taliaferro et al., 2017). Therefore, universities should modify passive learning into the active form by training students with the contents of the real world to hone problem-solving and critical-thinking skills (Nelson & Crow, 2014).

Active learning focuses on facilitating students to participate in and interpret all forms of activities related to learning goals. Active learning focuses on ensuring students are guided to obtain an independent learning experience in a collaborative and cooperative (Elahi et al., 2016) and problem-solving skills (Songserm & Tosola, 2017). The independence of prospective teachers in acquiring teaching materials can be facilitated by integrating distance, face-to-face, and digital learning methods through a blended design (Buran & Evseeva, 2015). This strategy has proven to provide a habit of independence to foster lifelong learning needs and provide an easy and unlimited source of learning (Yao, 2019). Collaborative and cooperative environments can only be realized with an atmosphere involving groups to achieve active learning outcomes (Elahi et al., 2016). Students can discuss their goals, share ideas, and help each other solve problems in collaborative learning situations. Problem-solving is an important skill in the 21st century. It is defined as a collection of skills, knowledge, and abilities needed to manage complex effective, unusual situations in different domains (Funke et al., 2018).

Subsequently, this research explained the advantages of active learning models developed since 2006 in the athletic study discipline. Active learning models have provided a minimum of four facilities, namely virtual learning facilities (https://vi-learn.unesa.ac.id), a personal account of log-activity (https://atletik.unesa.ac.id), an event organizer, and assistance

to the school (Suroto, 2018). Learning activity is a variable and a reference for self-learning students consisting of the learning content, assignments, quizzes, and face-to-face activities. The application of active learning processes relies on the level of self-regulation (Virtanen et al., 2017). The level of student learning participation is a measure used in organizing their learning activities independently. Self-regulation, self-efficacy, and self-directedness can explain student persistence (Stephen et al., 2020), high self-efficacy and positive self-regulatory behaviors are reliable predictors of academic success (Bradley et al., 2017). Teachers and students both give positive perceptions of active learning, which proves that there is an impact on student performance and quality of learning so as to support the use of active learning in all learning (Daouk et al., 2016). This research also highlighted the efforts to reform the learning system at PETE and improve the university's preparation and productivity of great teachers, particularly in the physical education field.

Athletics learning is the only course that has implemented the ALM syntax since 2006, however, a study on the condition of the learning ecosystem has not been carried out until now. For this reason, ALM as a model choice that is considered effective in forming an independent learning ecosystem for students, needs to be strengthened by the results of this study. In the future, this research can be used as a basis for teachers to duplicate active learning processes in facilitating the development of student learning independence.

METHOD

Research design

This research is a weak experimental, the design used is a one-shot case study design (Fraenkel et al., 2012). The treatment used is the Active Learning Model (ALM). While the variables measured are self-efficacy, self-regulation, and academic achievement.

Subject

This research employed 142 students as the subjects (Gender: M= 83 and F= 59; Age: *Mean*= 19.5 years, Min= 17 years, and Max= 24 years), who was in the second semester when taking athletic courses in 2019. They were divided into four groups based on the recruitment process and were made to follow the face-to-face learning process as well as an independent study through virtual learning, personal accounts, and social media. The lecture occurred over the course of 16 meetings.

Research Instrument

Academic achievement It is interpreted as students' mastery of various competencies determined at the beginning of a lecture. The four assessment components used as references to determine the final value were participation, task, summative-1, and summative-2. These references had components that were used as indicators of completeness. Participation and summative-1 had weights of 20% each, while task and summative-2 had scores of 30% each.

Self-efficacy. This was measured using the Authentic Learning Self-Efficacy Scale (ALSS). Online questionnaires that were proven to be valid (loading factor= 0.334-0.994) and reliable (Construct reliability= 0.97) (Tezer et al., 2018), the rule of thumb for validity is that ≥0.3 and reliability is>0.7 (Hair et al., 2014). The measurements comprised nine dimensions, namely Dimension I: problem-solving skills and bonding; II: metacognitive skills and permanence in learning; III: interaction with real life and online environments; IV: interaction with real life and learning experiences; V: the creation of social bonds in online collaborative learning environments; VI: structured support in effective learning and internalization of information; VII: keeping up with technological advancements; VIII: multiple evaluation and feedback; and Dimension IX: collaborative working skills and product development.

Self-regulation. It is interpreted as students' thinking power and behavior in systematically regulating the learning process to achieve their target (Usher, 2012). This variable was interpreted as a learning activity in this research and employed four factors, namely the number of learning

activities recorded in the personal log-activity account (https://atletik.unesa.ac.id), the number of quizzes during virtual learning (https://vi-learn.unesa.ac.id), face-to-face lectures, and assignments. Log-activity is a student's involvement in achieving the predetermined targets in each task. Quizzes are an effort of lecturers to provide a vehicle for students to independently (through online methods) understand the learning material. Face-to-face lectures are the activities of students while participating in class. An assignment describes students' independence in completing an assigned task and choosing the weight according to their beliefs. Based on these four factors, the independence of student learning can be determined and correlated to their self-regulation.

Research procedure

Active Learning Model

Students attending athletic learning classes are to understand and apply the rules of competitions. Hence, they were assigned to create and organize athletic championships for elementary, middle, and high school students. During the lecture, the students implemented the Active Learning Model syntax, which was summarized as targeting, preparation, monitoring, implementation, and reporting and evaluation, as shown in Figure 1.

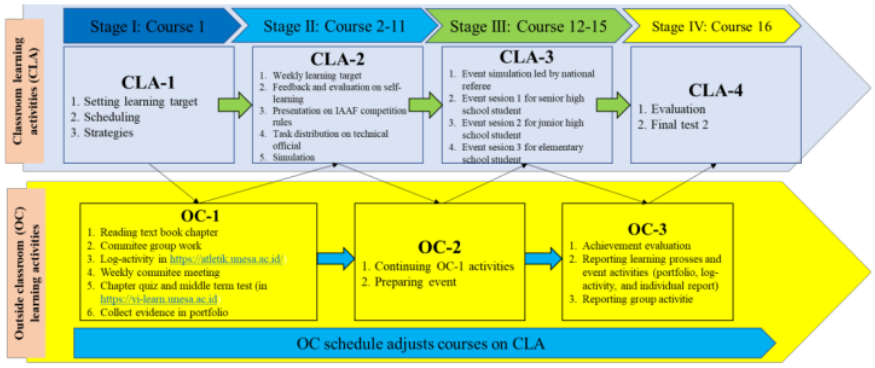

Figure 1. Active Learning Model

The lectures were designed in two ways: in and outside the classroom. Learning in the classroom employed the face-to-face approach

to discussing learning targets, strategies for their achievement, the subject matter, and the simulation of race officers in the field. Conversely, lectures outside the classroom involved independent learning and collaboration between students in achieving their targets. The targets in CLA-1 are learning outcomes that are relevant to the program learning outcome in the study program, and lecturers formulate weekly targets (CLA-2) for student learning outcomes every week which must be completed through collaboration and/or individuals. This form of learning was monitored via a Whatsapp Group, a personal account in https://atletik.unesa.ac.id, sharing material, and performing quizzes through https://vi-learn.unesa.ac.id. Actually, the most powerful monitoring that can be done is through a personal account at https://atletik.unesa.ac.id. There they have to make a log activity in accordance with student activities outside the classroom. Although sometimes, the WA Group is also used to monitor whether students are actively learning by using it for discussions or interactively with lecturers.

Scoring of academic achievement

This entailed defining the learning targets to be achieved by students of athletic courses. As shown in Table 1, various assessment components were agreed upon and used by the lecturers and students.

Table 1. Assessment Components of the Students' Learning Achievement

	Evaluation component	Category	Proportion	Resource
A. Participation				
1	Daily attendance	(Part-1)*	60%	SIAKADU (academic management system in Unesa)
2	Simulation attendance	(Part-2)	10%	Event simulation led by national referee
3	Event attendance	(Part-3)	30%	Attendance at event
B. Task				
4	Quiz	(Task-1)	50%	Quiz score at Vi-Learning Unesa (https://vi-learn.unesa.ac.id)
5	Assisting the school	(Task -2)*	30%	Event registration (https://atletik.unesa.ac.id)
6	Learning evidence	(Task -3)	20%	Portfolio book
C. Summative-1				
7	Financial contribution	(S-1)*	60%	Sponsorship fundraising and individual contribution
8	Middle term test	(S-2)	40%	Middle-term test score at Vi-Learning Unesa (https://vi-learn.unesa.ac.id)

Evaluation component		Category	Proportion	Resource
D. Summative-2				
9	Activities related event	(S-1)	60%	Log activity at Atletik Unesa (https://atletik.unesa.ac.id)
10	Final test	(S-2)*	40%	Final test score
Final Score				20% Participation 30% Task 20% Summative-1 30% Summative-2

Note: *) obligatory

Following the Unesa regulations, four assessment components were used: participation, task, summative-1, and summative-2. The final value was the students' academic achievement in mastering the expected competencies in an athletic learning course. The final score in the category is divided into four levels, namely: 100 ⩾ excellent ⩾ 80; 80 > good ⩾ 70; 70 > fair ⩾ 55; 55 > fail ⩾ 0.

Analysis

Academic achievement data and self-efficacy were tested for validity using the internal correlation, and the internal consistency of the self-efficacy questionnaire was tested using Cronbach's alpha. ANOVA was applied to determine the differences in self-efficacy and the final four-class academic achievement. Furthermore, tiered regression was used to explain the relationship between self-efficacy, self-regulation, and academic achievement.

RESULT

Academic Achievement

A total of 142 successful students followed the ALM syntax. The descriptive academic achievement in Table 2 shows that the final score was 81.58 (4.97), which is in the excellent category. The participation and task values were 89.13 (8.22) and 85.02 (6.89), while the summative-1 and summative-2 values were 86.94 (5.68) and 69.53 (8.02), respectively.

Table 2. Descriptive statistics and final score of the academic achievement and internal correlation of each component

Evaluation component	N	Mean	Std.Dev	Component → Final Score
A. Participation	**142**	89.13	8.22	0.592**

1	Daily attendance		92.63	7.93	
2	Simulation attendance		77.61	34.72	
3	Event attendance		85.97	15.84	
B. Task		**142**	85.02	6.89	0.663**
4	Quiz		80.58	13.73	
5	Assisting the school		91.14	2.01	
6	Learning evidence		86.92	3.75	
C. Summative-1		**142**	86.94	5.68	0.684**
7	Financial contribution		100.00	0.00	
8	Middle term test		67.35	14.21	
D. Summative-2		**142**	69.53	8.02	0.768**
9	Activity-related event		73.04	7.47	
10	Final test		64.27	13.92	
E. Final Score		**142**	81.58	4.97	

Catatan: **) Correlation is significant at the 0.01 level

The quality of the assessment component was determined by testing the correlation between the value component and the final score. The internal correlation of each component with the final value was considered significant at level $p < 0.01$.

Self-Efficacy

The correlation between factors and the total self-efficacy obtained various values for each dimension. The correlation of dimension I with other values was 0.67 - 0.89, while the total was 0.94. The range for dimensions II, III, IV, and V were 0.70 - 0.89, 0.68 - 0.88, 0.62 - 0.86, and 0.72 - 0.87, while the totals were 0.96, 0.93, 0.92, and 0.93. Furthermore, dimensions VI, VII, VIII, and IX had ranges of 0.66 - 0.90, 0.60 - 0.72, 0.67 - 0.90, and 0.60 - 0.82, with totals of 0.92, 0.75, 0.94, and 0.86. The r value was significant at 0.01, meaning all dimensions were harmonious in determining the value of self-efficacy, and the data obtained were considered valid.

Table 3. Descriptive statistics, matrix correlation, and reliable measurement of self-efficacy from the OALSS questionnaire

Dimension	Mean	SD	D1	D2	D3	D4	D5	D6	D7	D8	D9	Cronbach's Alpha
D1: problem-solving skills and bonding	4.03	0.55	1.00									0.90
D2: metacognitive skills and permanence in learning	4.06	0.55	0.89	1.00								0.93
D3: relation and interaction with real-	4.01	0.57	0.87	0.88	1.00							0.89

Dimension	Mean	SD	D1	D2	D3	D4	D5	D6	D7	D8	D9	Cronbach's Alpha
life and online environments												
D4: interaction with real life and learning experiences	4.11	0.61	0.85	0.85	0.84	1.00						0.89
D5: creating social bonds in online collaborative learning environments	4.05	0.61	0.84	0.85	0.83	0.86	1.00					0.89
D6: structured support in effective learning and internalization of information	4.07	0.62	0.82	0.86	0.82	0.84	0.86	1.00				0.87
D7: keeping up with technological advancements	4.11	0.72	0.67	0.70	0.68	0.62	0.72	0.66	1.00			0.88
D8: multiple evaluation and feedback	4.06	0.61	0.83	0.88	0.83	0.85	0.87	0.90	0.67	1.00		0.94
D9: collaborative working skills and product development	4.03	0.61	0.78	0.77	0.82	0.75	0.79	0.82	0.60	0.81	1.00	0.82
Total	4.03	0.54	0.94	0.96	0.93	0.92	0.93	0.92	0.75	0.94	0.86	0.99

The dimensions and their total items were tested using Cronbach's Alpha. The values obtained were dimension I = 0.90, II = 0.93, III = 0.89, IV = 0.89, V = 0.89, VI = 0.87, VII = 0.88, VIII = 0.94, and IX = 0.82, with a total of 0.99. All Cronbach's alpha values> 0.70 indicated that the data obtained was reliable (Fraenkel et al., 2012a).

Table 4. Results of Different Self-Efficacy and Academic Achievement by class characteristics

Class/subject	Self-efficacy					Final score				
	N	Mean	SD	f	p	N	Mean	SD	f	p
2018A	36	4.04	0.583			36	83.16	4.969		
2018B	39	4.04	0.536			39	83.29	4.066		
2018C	33	4.14	0.511	1.098	0.352	33	79.94	5.855	6.580	0.000
2018D	34	3.90	0.512			34	79.53	3.707		
Total	142	4.03	0.538			142	81.58	4.967		

Student learning readiness was determined to be good, with a value of 4.03 (0.538) for self-efficacy (Tezer et al., 2018). Self-efficacy was equal in each class ($F = 1.324$, $p > 0.05$), while for the final score was stated differently ($F = 6.580$, $p < 0.01$). Significant differences occurred in classes A-C, A-D, B-C, B-D, and C-D, while A-B was declared the same.

Table 5. Model Regression among Self-Efficacy, Self-Regulation, and Final Score

Variables	R	R^2	F	P
I: Self-efficacy→Final score	0.055	0.003	0.418	0.519
II: Self-efficacy, Learning activity→Final score	0.467	0.218	38.24	0.000
III: Self-efficacy, Learning activity, Product→Final score	0.490	0.241	4.086	0.045

In model 1, the contribution of self-efficacy as a final score predictor was 0.3%, and the F value was 0.418 ($p = 0.519>0.05$), signifying that self-efficacy was unable to predict the final score. The learning activity in model 2 was considered a good predictor of the final score, as evidenced by changes in effective contributions from 0.3% to 21.8%. The donation was declared significant with an F value of 38.24 ($p = 0,000<0.01$). In model 3, the product was able to predict the final score and the effective contribution of 21.8% to 24.1%, with F value = 4.086 ($p = 0.045<0.05$). Therefore, self-efficacy and self-regulation jointly predicted the height of the final score. Self-regulation was also shown to moderate the relationship between self-efficacy and the final score.

DISCUSSION

This study aims to examine how ALM can provide a learning ecosystem that supports student learning independence. The variables of academic achievement, self-efficacy, and self-regulation need to be examined as things that can explain the condition of the learning ecosystem formed through the application of ALM. Self-efficacy is an important psychological aspect for predicting student success in attaining academic achievement. Several aspects of learning independence are important to note at higher education levels due to the types of models used. Hence, this research needs to examine self-regulation as part of self-efficacy. Self-regulation is the ability of individuals to organize themselves during learning and is interpreted as a form of learning activity.

According to the research results, self-efficacy positively contributed to student learning outcomes through self-regulation. This shows that independence in active learning to achieve learning targets is a good moderator in determining academic achievement. These findings support other research results, which indicate that learning independence through

self-regulation can affect self-efficacy and improve learning achievement (Lai et al., 2018).

The log-activity score is the value obtained from several independent activities in mastering material and increasing the competencies related to athletic learning. The results showed the absence of a correlation between self-efficacy and the log activity score. This contradicted the notion that self-efficacy effectively predicts student learning motivation variables (Taheri-Kharameh et al., 2018). Research showed that students with high self-efficacy should be highly motivated during learning to promote the performance and achievement of learning goals (Zimmerman, 2000). However, this study found that there was no correlation between self-efficacy and self-learning activities.

Problem-solving skills should be honed from student learning experiences and activities. The research results showed that dimension I increased student learning activities. This signifies that learning materials and activities are obtained from teaching and lecture material, and the learning processes in real situations are deliberately designed to provide meaningful experiences to students in order to achieve the goals. The real condition entails an athletic championship involving agencies, schools, coaches, teachers, and students (as athletes). This condition will automatically engender problems that students must face and resolve. This will lead to complex situations outside the learning routines that will create problems and assist in honing the students' problem-solving skills. Officiating is a task designed to be a long project for students at the end of the lecture. The success of the active learning process supported the findings that independent project assignments can increase students' critical thinking according to their self-regulation abilities (Stefanou et al., 2013).

Committee working groups are formed to carry out the learning process outside the classroom. In completing project tasks, committee work groups are formed according to the needs of the officiating task (see Fig. 1 OC-1). The execution of these assignments in one semester via

small groups that involved all students. Each small group had a coordinator, and the big group had a general chairman. The formation of these groups was expected to provide a collaborative environment and influence the self-efficacy of students with learning weaknesses. (Araban et al., 2012). Consequently, these limitations will be eliminated by students with higher learning activities.

Currently, teachers are forced to instantly master online learning--distance learning due to the Covid-19 pandemic (Larkin, 2022). The initial capital of distance learning is self-regulation, where students can regulate themselves in achieving academic achievement (Yan et al., 2020). Based on these conditions, the implication of this research is to provide evidence and examples of best-practice using the ALM model that involves face-to-face and online learning to successfully create an effective learning ecosystem.

CONCLUSION

This study succeeded in explaining the learning process that applies ALM based on academic achievement, self-efficacy, and self-regulation. The interaction of these three variables in explaining the ALM process is that self-efficacy contributes positively to academic achievement through self-regulation. Therefore, the learning independence of participants in the learning process using ALM can enable the achievement of learning targets. Student learning activity has succeeded in functioning as a good moderator in determining academic achievement.

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