



The Influence of Online Learning on Students' Academic Achievement: Mediated by Collaborative Learning

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ABSTRACT

Universities oblige to develop students' academic achievement and to prepare for the industrial revolution 4.0. This study aims at determining the effect of online learning on students' academic achievement towards collaborative learning. There were 351 selected respondents of 13 (thirteen) private higher education institutions, known as STMIK, in Indonesia as the samples chosen in the proportionate stratified random sampling method. The data were collected using the media of google form and were analyzed in the Structural Equation Modelling (SEM) model, then were processed in the Analysis of Moment Structure (AMOS). The results of this study indicate a positive despite a less significant impact on students' academic achievement. Meanwhile, the online learning mediated in the collaborative learning scheme positively and significantly contributed to the remarkable achievement of students' academic achievement. Therefore, it is necessary for universities these days to manage teaching methods to develop student's interest in the environment of collaborative learning. The findings of this study are expected to support universities in improving their online teaching process by involving students actively to engage in the activities.

Key words : students' academic achievement, online learning, collaborative learning.

1. INTRODUCTION

Education has an important role in human life to prepare them ready for a professional workforce. All kinds of innovation in their lives begin with education [1]. Numerous countries prioritize their citizen to gain access to education as part of human rights [2]. Accessing higher education for every citizen has become the Indonesian government's huge effort to increase [3]. The educational institutes, towards higher education, are expected to generate knowledgeable students based on their scientific fields. Students are required

to optimally benefit the academic achievement. This is necessary as the quality of a student can be reflected on the Student's Academic Achievement. Moreover, the achievement itself can be measured by the students' academic ability [4]-[6] indicated in the Grade Point Average (GPA) [7]-[9], the leadership ability [10], [11] and the communication skills [12], [13]. Students' academic achievement has always been a challenge in the field of higher education. Various efforts have been made by universities to assist students in attaining their academic achievement. One of the efforts was exhibiting information technology in the learning process. In the era of the industrial revolution 4.0 nowadays, universities can provide digital technology services in their learning processes. One of the digital technology services that play a role in the educational world recently is online learning [14]. The online learning process has become a challenge amid the COVID-19 pandemic that emerged in early 2019 that has affected the way the lessons are delivered [15], [16]. Thus, the online learning implemented in Indonesian universities aims to ease students in accessing materials anytime, anywhere.

One of the information and communication technology innovations in education is in utilizing e-learning in the online learning environment. Implementing e-learning has recognizably been effective in achieving the goals of teaching and learning in higher education [17]. The e-learning platform creates a fundamental contribution to recent education and puts a great influence on students' academic achievement [18], including to higher education students [19]-[21]. Data obtained in 13 (thirteen) private STMIK in Indonesia, with a sample of 351 students, shows a terrific result. Students in high distinction category ($\geq 3.0 \text{ GPA} \leq 4.0$) were totally 301 people (85.75%), Students in distinction category ($\geq 2.3 \text{ GPA} < 3.0$) were 34 people (9.69%) and those in credit categories ($\geq 0.0 \text{ GPA} < 2.5$) were 16 people (4.56%). Based on these data, the result shows that most students reached a maximum achievement of 85.75% of the Academic Achievement where they obtained a Grade Point Average at above of 3.00.

As in the achievement indicator in higher education and its growing popularity worldwide [22]-[24], it is essential to distinguish the impact of online learning on students' academic achievement, particularly in Indonesian private institutions. Furthermore, in the future, online learning will grow into a new model in teaching activities [25]. Various research on the effect of online learning on students' academic achievement has been done previously [26], [27]. However, there are only a few studies that appointed collaborative learning connected to online learning and students' academic achievement, specifically in Indonesian universities. Thus, this study was conducted to determine both the direct and indirect effects of online learning variables on students' academic achievement through collaborative learning mediation. Education to date is required to be more innovative and be able to motivate students in the learning process. Stakeholders necessitate formulating collaborative learning arrangements through a digital platform, as his model has a positive relationship to students' personalities [28]. Students have decent readiness in carrying out collaborative learning practices due to devices' (computers, laptops, or tablets) availability to support the learning process [29]. A reliable and structured collaborative learning arrangement enhances the learning experience in students' involvement, their communication skills, and collaborative learning [30]. Collaborative learning assigns students to create peer engagement, and encourages them to work in a group, and eventually increases the interaction among members [31].

2. LITERATURE REVIEW

2.1 Students' Academic Achievement

Education has become the expectation to develop driven, creative and innovative attitudes in the globally competitive world [32]. The level of higher education student's Academic Achievement is measured by the Grade Point Average (GPA) model [33]. GPA is considered as the main indicator that describes the student's achievement in the study based on a systematic assessment process [34]. Students reach Academic Achievement through the intensity of involvement activity units [35]. Low Academic Achievement becomes a big challenge for students and higher education institutions due to its negative impact [36]. Therefore, these achievements are required to be simultaneously enhanced in various aspects. In addition, universities and stakeholders oblige to find the key factors in achieving Academic Achievement [37]. Regarding the information technology role, academic achievement in higher education can be improved through e-learning strategy [38].

2.2 Online Learning

In the information technology era, students are expected to gain a lot of information straightforwardly regarding the course content to support and develop the learning process [39] and to change their learning mindset [40]. During the COVID-19 pandemic, the educational model has been

re-designed from face-to-face time to online [41] which utilizes information and communication technology [42]. The rapid development of information technology has shown that online learning has become an actual trend in education [43]. The online learning method eases people to access the course contents [44] and removes time and distance barriers [45]. Moreover, online learning continues to increase as a means of learning and improves the quality of education. In the future, the education methods particularly for universities will focus on online learning [46]. This highly-dependent-on-technology method is very supportive in carrying out teaching and learning activities for students as well as in putting them in collaborated learning [47]. Online learning is similar to several identical learning methods such as e-learning, internet learning, web-based learning, teleconference, and distributed learning [48]. Online learning frequently applies the e-learning model and it has proven significantly to give a positive effect on the students' academic achievement [49], [50]. This continuous development of online learning provides a huge opportunity for students to take part in peer interaction and to be facilitated in collaborative learning [51].

2.3 Collaborative Learning

Learning outcomes by and large are strongly influenced by the lecturers' learning and teaching model [52]. Collaboration, including in the learning activity, is a process where individuals actively interact with each other. Most academics have reached their success through their participation in a community. They aim to share ideas, knowledge, and skills in the scope of collaborative learning [53]. Collaborative learning encourages not only social presence but also promotes new knowledge and teamwork skills [54]. A well-designed collaborative learning activity benefits the students [55]. Meanwhile, technology has played an important role in the implementation of collaborative learning and continues to support collaborative learning [56]. By combining the application of the Learning Management System (LMS) with a strong commitment of the higher education institutions, this becomes the main pillar for universities in achieving collaborative learning [57]. Students' independence, with self-paced learning regulation, combined with the challenging, opened, yet complex group assignments can create more effective collaboration [58]. Collaborative learning involves social fluctuations in students' participation and engagement in the cognitive interactions [59]. In a technology-based online learning environment, lecturers employ online media such as Google Docs, wikis, and discussion boards to facilitate the collaboration [60]. Students develop the knowledge, competence, satisfaction, and problem-solving skills because of collaborative learning in a digital learning environment [61].

3. RESEARCH METHOD

This research adopted a survey approach in exploiting a quantitative method. There were variables and their

relationships in between to be examined with. The purpose of this study is to exhibit a description of the relationship among the variables studied. The research data was in the form of numbers and its analysis uses statistics. The population in this study are the existing students at the bachelor's degree of private STMIK in Indonesia. There were 394 sample respondents selected by the proportionate stratified random sampling method. Data were collected using the online questionnaires, namely, google form. A total of 351 questionnaires were returned (89% response rate). Questionnaires were distributed once and were brought forward for analysis using the Structural Equation Modeling (SEM) model with the assistance of the Analysis of Moment Structure (AMOS) computer program. The sampling technique was employed using the proportional stratified random sampling, where the population sample was randomly and proportionally stratified. The questionnaire was used to collect data using a 6-point Likert scale, namely, 1 = Strongly Disagree, 2 = Disagree, 3 = Tend to Disagree, 4 = Tend to Agree, 5 = Agree, 6 = Strongly Agree. The use of the 6 Likert scales provides more accurate data by eliminating the doubt factor [62]. The following was conducting the interviews in a specific group by merging five selected participants as key informants.

4. RESULTS AND DISCUSSIONS

The Descriptive Respondent Analysis explored the participation of the respondents' characteristics. The study conducted at 13 (thirteen) accredited private colleges in Indonesia, namely the College of Information and Computer Management (STMIK), focused on the unit analysis of the even semester students starting from the 4th to 14th semester. The number of 394 questionnaires in the Google Form application was then distributed online to students. The minimum number of samples to be processed was 5 times the number of question indicators on the research questionnaire [63]. This study used 52 indicators, so the least recommended sample size was 260. However, the number of questionnaires that had been filled in exceeded the minimum limit at 351. In terms of quantity, the total sample of 351 has fulfilled the SEM criterion and the Maximum Likelihood requirement of 100-200 samples [64] (see Table 1).

Table 1: Distribution of Respondents by Name of College

Private Universities in Indonesia	Sample	Participant	Participant (%)
STMIK Atma Luhur	19	16	84,2%
STMIK Dipanegara Makassar	52	52	100%
STMIK Banjarbaru	19	19	100%
STIKOM Bali	75	42	56,0%
STMIK Amikom Purwokerto	37	37	100%
STMIK Tasikmalaya	26	19	73,1%
STMIK Bina Sarana Global	23	23	100%
STMIK Hang Tuah Pekanbaru	7	7	100%

STMIK Indonesia Padang	21	21	100%
STMIK Royal Kisaran	51	51	100%
STMIK Widya Cipta Dharma	27	27	100%
STMIK AMIK Riau	20	19	95,0%
STMIK Pontianak	18	18	100%
	394	351	89%

Source: Research Compilation, 2020.

By taking the number of people as the sample to differentiate the highest number from those of the lowest number, the data presented in Table 1 above showed that the highest number of the samples came from STIKOM Bali with a total of 75 people. However, the number of respondents who filled out the questionnaire only reached 42 people (56.0%). Regarding the lowest number of the sample, STMIK Hang Tuah Pekanbaru reached only 7 people with 100% of the written feedback. Of these 13 institutions shown in Table 1, there were 9 (nine) universities that fulfilled 100% of the written feedback. Due to the significant difference in population in each university, the number of samples from each university presented a slight difference in population. The highest number of the respondents' written feedbacks proved their strong willingness to involve in this research (see Table 2).

Table 2: Distribution of Respondents by Semester

Semester	Respondent	Percentage
4	157	44,7%
6	97	27,6%
8	90	25,6%
10	6	1,7%
12	0	0,0%
14	1	0,3%
	351	100,0%

Source: Research Compilation, 2020.

By taking semester as a benchmark, Table 2 showed the highest number of respondents was in the 4th semester, amounting to 157 people. Meanwhile, the lowest number of respondents was in the 14th semester, amounting to only 1 person. Whereas, there were none of the 12th-semester respondents involved in this research. These 4th, 6th, 8th, and 10th-semester presence of respondents have proven that student participation was from the existing semester.

Table 3: STMIK Students' academic achievement Based on Location

Name of Province	Students' academic achievement (GPA)		
	High Distinction	Distinction	Credit
Bangka Belitung Island	93,8%	6,3%	0,0%
South Sulawesi	76,9%	9,6%	13,5%
South Kalimantan	78,9%	0,0%	21,1%
Bali	95,2%	4,8%	0,0%
Central Java	81,1%	13,5%	5,4%
West Java	89,5%	5,3%	5,3%

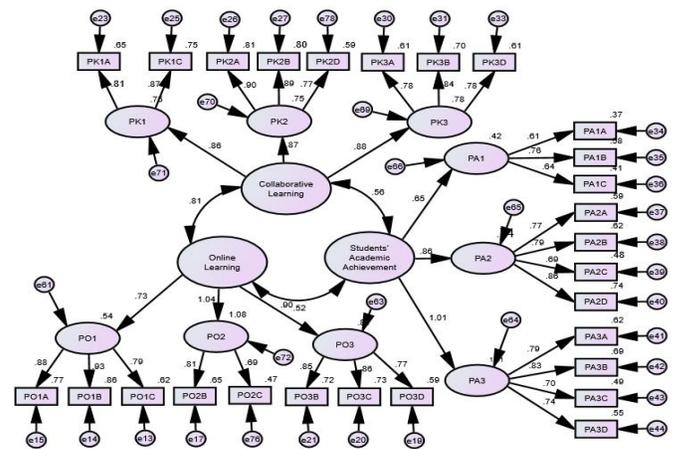
Banten	100,0%	0,0%	0,0%
Riau	100,0%	0,0%	0,0%
West Sumatera	85,7%	71,4%	9,5%
North Sumatera	66,7%	29,4%	3,9%
East Kalimantan	92,6%	7,4%	0,0%
West Kalimantan	100,0%	0,0%	0,0%

Source: Research Compilation, 2020.

By taking the location as a benchmark to differentiate the very good category from those of the sufficient, exhibited the variety of achievement. Banten, Riau, and West Kalimantan Provinces reached all the 'very good' achievement levels. This can be interpreted all the respondents showed excellent academic achievement (see Table 3). As the aim of this study was to determine the effect of online learning on students' academic achievement through collaborative learning using Structural Equation Modeling (SEM) analysis, it is crucial to utilize IBM SPSS AMOS 23 software. The theoretical model illustrated in the path diagram will be examined based on the data taken.

4.1 Measurement Model

The model analysis measurement was carried out using the Secondary Order Confirmatory Factor Analysis (CFA). The reason to adopt this analysis was that there was an initial assumption between the indicator relations applied and its variables. Then, this was developed based on the theoretical frameworks and the previous research. The confirmatory analysis was employed on the exogenous and endogenous constructs. Online learning was the exogenous construct, whilst collaborative learning, and Academic Achievement were the endogenous constructs. The validity assessment was conducted using the CFA test or construct (indicator) validity test to measure the ability of the construct (indicator) to reflect the latent variable. In this phase, the convergence validity test and the discriminant validity test were applied. The purpose of this validity test was to ascertain whether the construct (indicator) has a high proportion of variance or not. The indicator would be declared as valid if it could measure certain constructs when the Critical Ratio (CR) of the regression weight showed a value above 2.0 with a p-value less than 0.05. The results of the confirmatory factor analysis on the exogenous and the endogenous variables showed that each indicator formed a high significance. Thus, the forming latent variables indicators are signaled as decent dimensions of the measuring tool. This has been proven on the calculation results of all respondent data using AMOS 32 software (see Figure 1).



Source: Research Compilation, 2020.

Figure 1: Measurement Model Path Diagram

The indicator of a construct would be assumed valid convergently if the Critical Ratio (CR) value of the indicator is greater than twice the Standard Error (S.E) value. This also could be achieved using the other parameters, by calculating the probability value of the indicator to be less than 0.05. Confirming the endogenous variable indicator was the construct for the endogenous variable, then, examining the loading factor value of each endogenous variable indicator would be the next phase (see Table 4).

Table 4: Factor Loading Estimates and Validity Test Results

Construct	Indicator	Collaborative Learning	Online Learning	Academic Achievement
Collaborative Learning	PK1A	0,809		
	PK1C	0,868		
	PK2A	0,898		
	PK2B	0,894		
	PK2D	0,766		
	PK3A	0,783		
	PK3D	0,840		
Online Learning	PO1A		0,878	
	PO1B		0,929	
	PO1C		0,788	
	PO2B		0,805	
	PO2C		0,686	
	PO3B		0,848	
	PO3D		0,855	
Academic Achievement	PA1A			0,607
	PA1B			0,763
	PA1C			0,640
	PA2A			0,770
	PA2B			0,789
	PA2C			0,692
	PA2D			0,861
	PA3A			0,785
	PA3B			0,830
	PA3D			0,703

Source: Research Compilation, 2020.

By taking the loading factor value as a benchmark shown in Table 4 above, the table showed a variety of interaction achievements. In the Collaborative learning column, the highest rate was in facilitating the interaction with instructors

(PK2A), with a value of 0.898 in the interaction with instructors’ dimension, and the lowest rate was in exchanging information with instructors (PK2D) with a value of 0.766 in the same dimension. These scores were considered valuable in the collaborative learning process. Through collaborative learning, students could communicate concepts and ideas to lecturers, even though exchanging information with lecturers showed a slightly lower intensity. For online learning, the highest score in the peer collaboration dimension was sharing knowledge (PO1B) with a value of 0.929, and the lowest rate in the learning management dimension was activeness in learning (PO2C) with a value of 0.686. These rates reflected the benefits of online learning for students to share knowledge easily as well as to complete the assignments. However, students were considered less active, yet lack in the form of independent learning. For students' academic achievement, the highest score in the dimension of leadership was in directing others (PA2D) with a value of 0.861, and the lowest score in the dimension of academic ability was about the Grade Point Average (GPA) (PA1A) with a value of 0.607. The scores were interpreted that students reached the Academic Achievement through leadership proven by the ability to supervise others. Meanwhile, the achievement by means Grade Point Average (GPA) was not in line with students’ satisfaction.

Table 5: Results of the CFA Measurement Model for All Major Constructs

Construct	Dimensions	Loading Factor	Composite Reliability (CR)	Average Variance Extracted (AVE)
Online Learning	Peer Collaboration	0.735	0.930	0.810
	Learning Management	1.039		
	Cognitive Problem Solving	0.901		
Collaborative Learning	Peer Engagement	0.865	0.900	0.760
	Student Instructor Interaction	0.866		
	Students’ Involvement	0.881		
Academic Achievement	Academic Skill	0.649	0.890	0.730
	Leadership	0.863		
	Communication Skill	1.007		

Source: Research Compilation, 2020.

The results of the CFA measurement model for all key constructs (see Table 5). The construct gained its reliability if the value of Construct Reliability (CR) was ≥ 0.70 and its variance extracted was ≥ 0.50 . The interpretation of the CR measurement was good if the score is higher than 0.40. In this study, the reliability test on the measurement model path diagram resulted in the Composite Reliability (CR) > 0.60 , so that, all items were considered valid. The validity test with the Average Variance Extract (AVE) method is a confirmatory test that worked by examining the average of the variance extract between indicators of a latent variable. All indicators

in this study were fulfilled because the value of the AVE was > 0.5 . The next construct reliability test was to evaluate the discriminant validity including the cross-loading and to compare the AVE root value with the correlation between constructs.

Table 6: Cross Loading Average Variance Extract (AVE)

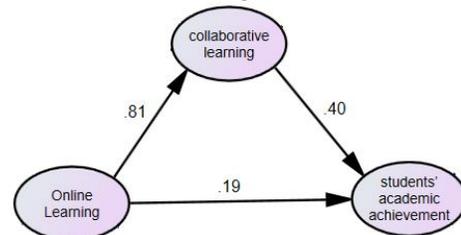
Construct	Online learning	Collaborative learning	Academic Achievement
Online Learning	0,900		
Collaborative Learning	0,806	0,872	
Academic Achievement	0,516	0,556	0,854

Source: Research Compilation, 2020.

The validity test with discriminant validity examined how far indicators were different from one another (see Table 6). The indicator became valid if the square root of the average variant extracted value for each variable is higher than the correlation value between the latent variables. Moreover, the minimum value required was 0.5 [65]. The results of the discriminant validity test showed that the score of the AVE test of each latent variable correlation was higher than the other latent variables with a minimum value of 0.854. The above Cross Loading revealed a conclusion that all of the indicators have had a greater correlation coefficient to each construct than those of the correlation coefficient indicators to construct blocks in other columns. Thus, each indicator in the block was the compiler of the construct in the column.

4.1 Structural Model

The significance of this structural model testing utilized the Goodness of Fit Index (GOFI) criteria [66]. A structural model is a relationship between causal relationship (cause-effect) constructs; thus, a structural model consisted of independent (exogenous) variables and dependent (endogenous) variables (see Figure 2).



Source: Research Compilation, 2020.

Figure 2: Path Diagram Structural Model

This structural model consists of one exogenous variable, namely online learning, and two endogenous variables, i.e., collaborative learning and Academic Achievement. Collaborative learning in the structural model above is enacted as a mediating or intervening variable for it has antecedents (preceding variables) and consequences (subsequent variables).

Table 7: Model Fit Indices

Goodness of Fit Measure	Cut Off Value	Indeks Value	Description
χ^2 (Chi Square)	$\leq 553,80$	1449,036	Poor Fit
Cmin/DF	≤ 2.00	2,275	Good Fit
Significance probability (p)	≥ 0.05	,000	Poor Fit
Adjusted Goodness of Fit (AGFI)	≥ 0.90	,844	Marginal Fit
Goodness of Fit Index (GFI)	≥ 0.90	,871	Marginal Fit
Comparative Fit Index (CFI)	≥ 0.90	,934	Good Fit
Tucker Lewis Index (TLI)	≥ 0.90	,926	Good Fit
Root Mean Square Error of Approximation (RMSEA)	≤ 0.08	,060	Good Fit

Source: Research Compilation, 2020.

By taking the Goodness of Fit statistics from AMOS 22 software as a benchmark to differentiate good fit criterion from those of poor fit, out of the eight criteria, the only one did not fit the criterion (see Table 7). The other 7 (seven) criteria have represented the goodness of fit, that are, absolute fit indices, incremental fit indices, and parsimony fit indices. These results revealed the decent of the SEM model development. The recommended AGFI score for this model was ≥ 0.90 (Schumacher and Lomax, 2010). Meanwhile, the AGFI score in this study resulted at 0.844 which was moderately decent. The GFI rate of 0.871 in the suitability criterion was considered at the moderate level. The CFI and TLI scores in the criterion of conformity were at the satisfactory level at 0.934 and 0.917 respectively. The RMSEA score in the level of conformity score has been proven in a good criterion at the level of 0.060. To sum up, these 4 to 5 goodness of fit criteria applied have supported the feasibility test of a model, as those absolute fit indices, incremental fit indices, and parsimony fit indices were well represented [67].

Table 8: Significance Test Variable

Path Significance Test	Estimation	C.R.	P-Value	Description
Online learning → Collaborative learning	0,874	10,592	0.001	Significant
Online learning → Academic Achievement	0,144	1,761	0,078	Less Significant
Collaborative learning → Academic Achievement	0,274	3,444	0.001	Significant

Source: Research Compilation, 2020.

By taking the significance test as a benchmark to differentiate significant effects from those of the least significant and

revealed interesting results (see Table 8). Not all variables had higher C.R rates than the t-table (which was 1.96). The online learning for the Academic Achievement provided a C.R score of 1.761 meant ≤ 1.96 . This indicated that online learning did not put a significant effect on students' academic achievement. On the other hand, online learning provided a positive, yet significant impact on collaborative learning. Meanwhile, collaborative learning also gave a positive and significant effect on students' academic achievement. The determination effect analysis in SEM was utilized to determine the contribution of exogenous variables to endogenous variables captured in the adjusted R square. The coefficient of determination (R²) described the amount of influence given by the independent variable (X) on the dependent variable (Y) simultaneously. It essentially measured how far the model is capable of defining the endogenous variation [68].

Table 9: R-Square (Determinant Coefficient)

Direct Influence	Path Coefficient	Standard Error	R-Square (Koefisien Determinasi)
Online learning terhadap Academic Achievement	0.144	0,082	0,332 (33.2%)
Collaborative learning terhadap Academic Achievement	0,274	0,080	

Source: Research Compilation, 2020.

The R square score of the Academic Achievement variable at 33.2% (see Table 9). Both variables of the online and collaborative learning provided an influence to the Academic Achievement, which revealed in this study at the value of 33.2%. Reflecting on this finding, it can be inferred that both online learning and collaborative learning were capable to elaborate the variation of the Academic Achievement variable by 33.2%.

Table 10: Path Coefficient Direct & Indirect Impact

Path	Impact	
	Direct Effect	Indirect Effect
Online learning → Collaborative learning → Academic Achievement		3,257
Online learning → Collaborative learning	0,874	
Collaborative learning → Academic Achievement	0,144	

Source: Research Compilation, 2020.

The results of the research path diagram suggested (a) an indirect influence of online learning on students' academic achievement employing collaborative learning at the path coefficient of 3.257; (b) the direct effect of the online learning on collaborative learning at the path coefficient of 0.874; and (c) the direct effect of the online learning to the Academic Achievement at the path coefficient of 0.144 (see Table 10).

By taking the Sobel test as a benchmark calculation to obtain an indirect effect, the online learning construct gives positive

and significant effects on the student's academic achievement variable through the collaborative learning evidenced in the z-Sobel value of 3.275 (see Table 10). This score can be interpreted that the greater students' interest in collaborative online learning, the higher students' academic achievement gained. Students were highly supported in the online learning process through peer and student-lecturer interactions. Collaborative learning was considered approvingly valuable to accomplish Academic Achievement. Students' academic achievement cannot be attained solely by relying on online learning. The finding of p-value at 0.078, which was greater than 5% (0.05) confirms evidence that online learning does not have a significant effect on students' academic achievement. Instead, online learning has shown a significant effect through mediated collaborative learning.

This study found a significant difference in learning practice dimensions from previous studies. The prior researches accounted for the impact of online learning on students' academic achievement, where online learning has been significantly proven beneficial in achieving students' academic achievement [69]. Student activeness, combined with the technology-based Learning Management System (LMS) facility in online learning provided positive engagement among them, and eventually increased students' academic achievement. The flexible nature of the online learning process expanded students' exploration of knowledge globally more than what they obtained in the class meeting. Meanwhile, this study has evidenced that the Students' Academic Achievement can be accomplished through the assessment of collaborative learning. The learning process in a virtual classroom group has demonstrated the increase of students' academic achievement. The teaching-learning enterprise becomes more active and student-centered. Students were engaged in peer interaction to discuss and to share the information of the course contents. Students also can discuss the topics with lecturers and complete the assignments, virtually.

Based on the significance test, there is a direct, positive, yet significant influence of the online learning variable on the collaborative learning variable (see Table 8). This has been evidenced by the path coefficient value of 0.874 and a significance value of 0.001 smaller than 5% (0.05), suggesting that collaborative learning can be accommodated online. Moreover, online learning has increased the popularity of collaborative learning as a form of computer-mediated education.

The online learning variable provided a direct, positive, but less significant impact on the student's academic achievement cluster. It is shown by the path coefficient value of 0.144 and a significance value of 0.078 greater than 5% (0.05) suggesting that the online learning practices are not sufficient to achieve students' academic achievement due to the extension of the significance value. The e-learning platform support system Moodle-based was less sufficient in achieving

excellent Academic Achievement. Online learning has peer-collaborated dimensions (PO1), learning management (PO2), and cognitive problem solving (PO3) with their path coefficient values are 0.735, 1.039, and 0.901 respectively. By taking the path coefficient values as a benchmark to differentiate the highest from those of the lowest, the learning management dimension ranked the highest score of 1.039, from that of the lowest, which was peer collaboration at 0.735. This suggested to further focus on problems related to learning management due to its crucial goal. In these circumstances, Students are demanded to move their learning nature onto an active, yet independent learning orientation, particularly in finding various sources related to the course contents. This is suggested to optimally provide greater opportunities for attaining the best of the Students' Academic Achievement.

The collaborative learning variable has a direct, positive, yet significant effect on the student's academic achievement cluster. This revealed that the path coefficient value was 0.274 with its significance was at 0.001, much smaller than 5% (0.05) suggesting that despite its lower achievement, students can accomplish a good Academic Achievement through collaborative learning practices. Furthermore, collaborative learning has been equipped with peer engagement (PK1), student-instructor interaction (PK2), and student involvement (PK3) dimensions with each of them valued at 0.865; 0.866, and 0.881 respectively. The student's involvement factor placed the highest score of the path coefficient value at 0.881. Meanwhile, the peer engagement dimension reached the lowest value of the path coefficient at 0.865. Reflecting on these data, it is necessary to focus on problems related to the dimensions of student involvement. To find solutions, each student in a small group is required to always actively provide ideas and propositions. Working altogether to achieve certain goals in small, heterogeneous groups is a characteristic of collaborative learning that provides a positive impact on students' achievement.

5. CONCLUSION AND FUTURE RESEARCH

This study revealed that the online learning variable towards collaborative learning held a positive, and significant effect on student's academic achievement. Online learning has been linked to the improvement of collaborative learning practices. Students can perform active engagement with friends and lecturers in an online learning environment. However, the online learning activities provided relatively less significant value to students' academic achievement. Towards online learning, students can effectively conduct their independent study and access materials from various sources. This practice cannot be managed in a single performance, but it has to be completed by a peer group. The study has provided very important evidence for the institutions in Indonesia to bring collaborative learning in an online learning environment as a reference to attain students' academic achievement.

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