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The Analysis of Social Media Use in Collaborative Learning on The Implementation of Online Knowledge Sharing to Improve Student Academic Performance

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Abstract: This research aims to analyze social media use in collaborative learning on the implementation of online knowledge sharing to maximally improve student academic performance. The research method used a survey with a quantitative approach. The research sample was taken by purposive sampling on diploma 3 and undergraduate students at several public and private universities in Java Island, Indonesia. As a result, 359 respondents filled out an online questionnaire distributed via a google form link. Data analysis using SEM PLS path analysis with SmartPLS program version 3.0. The results of this research stated that social media used in collaborative learning correlated with online knowledge sharing. The ease of sharing knowledge accelerates the dissemination of material delivered by teachers to students as a trigger for collecting questions and recommendations based on the student's point of view. Online knowledge sharing is related to student engagement, where students always update the knowledge that has been stored in their social media groups. Active student engagement will be assessed optimally by the teacher as a student reward so that academically the student's GPA increases, learning goals can be achieved, and students can contribute actively to spreading their knowledge through social media.

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Introduction

The Covid-19 pandemic has changed many aspects of our lives, from social, economic, and health to education. A distance learning system provides education during the Covid-19 pandemic. Universities apply various ways to conduct effective learning, one of which is using social media that helps teachers and students discuss actively with each other. Based on previous studies (Abbas, Aman, & Nurunnabi, 2019), the social media use among teachers and students is one way to create successful education. It is also supported by research (Halawa, 2021) success learning is assessed through continuous innovation by teachers, teachers are obliged to continue and upgrade their understanding, including using and utilizing various kinds of learning media.

The increasing massive social media use can be seen in data from (The we Are Social 2022) report 2022 regarding the highest number of social media users aged 18-24 years at 32%, at ages 25-34 years at 32.6%. The social media that are most accessed are WhatsApp as much as 92.1%, Instagram as much as 86.5%, Facebook as much as 83.3%, Telegram as much as 64.3%, and Twitter as much as 60.2%. Based on this data, it is known that social media users are widely used by users aged 18-24 years; this is then responded positively by university teachers who use social media in their learning programs.

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Teachers, as teachers of the class that create a conducive learning environment must have pedagogical competence. It has been regulated in Law Number 14 of 2005. Pedagogy is the method and practice of teaching, which includes teaching style, teaching theory and feedback (Indonesia, 2005). In the social constructivism approach, it is explained that the approach that sees teaching is guided by the teacher (teacher) and centered on students (Rachmawati, Al Ghozali, Nasution, & Firmansyah, 2021). The pedagogical competencies possessed by teachers must be adjusted to the student's characteristics to create a conducive learning and focus on learning achievement (Nurwahidah & Muhtar, 2022). In other words, pedagogical constructivism will encourage collaboration between teachers who create quality learning and students who do learning to get maximum results in accordance with learning goals.

Collaborative learning is a learning method carried out by teachers and students to help develop knowledge, higher critical thinking, communication, management, confidence, and responsibility in achieving learning goals (Boruzie, Kolog, Afful-Dazie, & Egala, 2022). Collaborative learning provides opportunities for interaction, discussion, and building online learning communities and encourages a change in learning culture, especially in online learning (Napitupulu, Ananda, Rayne, & Rahmadini, 2020). Collaborative learning involves interactions between teachers and students, allowing the creation of a new community of learners that actively discusses new knowledge with various viewpoints from its members, especially if this community will actively dialogue through social media as a tool for communication. Learning communities in social media are a means to create environments and situations where learners engage in joint tasks and collaborate, each member can utilize resources and demonstrate skills to each other (Aziati & Hamid, 2020).

Social media, which has been applied to the education system, supports knowledge sharing. Knowledge sharing is the key to successful knowledge management (Tønnessen, Dhir, & Flåten, 2021) which is defined as an activity to share new knowledge between individuals and organizations. Online knowledge sharing is a product of interactivity in collaborative learning. The existence of knowledge shared by both teachers and students actively will spur more conducive learning activities. Online knowledge sharing is an activity of knowledge exchange between individuals, groups, and organizations conducted through online media. Knowledge sharing can be written as the process of providing information and knowledge to help others collaborate in solving problems, developing new ideas, or implementing policies (Ahmed, Ahmad, Ahmad, & Zakaria, 2019). Activities to share information with group members are carried out based on the willingness of individuals involved in collaborative learning (Koranteng, Wiafe, & Kuada, 2019). The use of social media in collaborative learning helps group members to share text, video, and voice materials, allowing for long-term and continuous knowledge storage (Rahman et al., 2020). Social media used to share knowledge online helps the member get better results in the learning process (Ansari & Khan, 2020). Activeness in knowledge sharing activities through social media will strengthen student engagement to provide new knowledge to each other to show their abilities and self-existence in an online learning group.

Student engagement is a perception of students resulting from their interactions with friends and teachers during the learning process (Qureshi, Khaskheli, Qureshi, Raza, & Yousufi, 2023). Research by (Aziz, 2020) finds that online learning has a positive effect on student independence. Asynchronous online learning through learning applications or instant messaging applications makes students actively read, discuss with students or ask lecturers directly. The involvement of students in learning through social media will allow students to

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gain much knowledge from various sources. Therefore, it is expected that the ease of gaining new knowledge can improve their assignment work (Aziati & Hamid, 2020).

Student academic performance is an increase in GPA and feedback from assignments and student understanding of learning tasks achieved by students in each semester (Habes et al., 2018). GPA improvement can be achieved by actively involving themselves in discussion forums, developing themselves, increasing their knowledge, and increasing their creativity and skills when utilizing social media in a collaborative learning environment (Rahman et al., 2020)(Habes et al., 2018). Student academic performance can also be seen through increasing creativity and self-development through collaborative learning to achieve learning goals (Hosen et al., 2021). Student engagement is not only in the form of participation but also in feelings and thought processes. The critical thinking process will open students' knowledge to reflect the learning outcomes in their personal lives or life experiences.

As we know, students in university are different from students in school. Students in university must have independence in learning, where this independence will hone their confidence in expressing their opinions and creative ideas. Learning independence can be realized when students can actively control everything that will be done, evaluated and planned for the next stage to support learning activities (Arifin Maksum & Ika Lestari, 2020). The results of learning independence are realized by being active in doing assignments, expressing opinions, and sharing new knowledge with teachers or classmates so that there is new knowledge that both the teacher and other students continuously update in the class.

The social media use in the learning environment at university makes it easier for students to apply learning independence. Various websites or digital platforms can be accessed easily to help students in doing assignments or finding new knowledge related to lecture material. With this convenience, students should be able to share knowledge and increase effective collaborative learning. Using the research framework of (Ansari & Khan, 2020), this study will examine the importance of using social media for collaborative learning in supporting online knowledge sharing among students. The results of this research analysis provide insight into the relationship between the use of social media for collaborative learning and knowledge sharing, which has implications for student engagement and improving student academic performance. The findings of this study are expected to advise teachers and students on learning methods using social media as a platform to share knowledge actively. It is to determine the extent of students' engagement in disseminating knowledge, which will lead to students' confidence and better understanding of knowledge in achieving learning goals.

Research Method

The research method used a survey with quantitative research. The survey is a research method that aims to survey and distribute questionnaires to a small group of society who are sampled to identify trends in attitudes, behavioral opinions, or characteristics of a population (Suprapto, 2019). Quantitative research is an analysis of questionnaire data obtained in the form of numbers that will be processed using the SEM - PLS method (Structural Equation Modeling - Partial Least Square) (Poluan & Honandar, 2023).

The sampling technique in this research was purposive sampling. That is a sampling technique based on the consideration of the researcher or evaluator about which sample is the most representative (Heri, 2017). The sample size was based on the Hair et al. reference (Sholihin & Ratmono 2021). In this study, there were 10 indicators to measure all constructs, so the minimum samples size was 200 respondents. In this study, there were 359 respondents

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of Diploma 3 and Undergraduate level at several public and private universities in Java Island, Indonesia, who filled out the questionnaire completely during the period August - October 2023.

Data were collected through a questionnaire with a rating scale (1-5) distributed via Google form to lecturers who use social media in their learning, student associations, and contacting students directly via WhatsApp and Telegram. After that, data was collected and processed using the analysis path of SEM PLS with SmartPLS software version 3.00. The instruments in this study are based on indicators and previous research studies consisting of four variables, such as social media for collaborative learning (SMCL) variables consist of 5 indicators referring to (Sabah, 2022)(AL-Rahmi & Othman, 2013)(Qureshi et al., 2023), online knowledge sharing (OKS) variables consist of 4 indicators referring to (Jogezai et al., 2021)(Sabah, 2022)(Hosen et al., 2021), student engagement (SE) variables consist of 2 indicators referring to (AL-Rahmi & Othman, 2013)(Qureshi et al., 2023), and student performance academic (SPA) variables consist of 4 indicators referring to (Sabah, 2022)(Qureshi et al., 2023).

Data processing and analysis were carried out through outer model testing by testing validity to measure convergent validity and discriminant validity. Convergent validity was calculated using outer loading and Average Variance Extracted (AVE). Then, discriminant validity was calculated using Cross Loading and Fornell Larcker. Then, the reliability was calculated using composite reliability and Cronbach alpha. In addition, the inner model test is also used in this study by calculating R Square and hypothesis testing.

Results and Discussion

Respondent Description

A total of 359 respondents' answers were used in this analysis, where the respondent data is shown in Table 1.

Table 1. Respondent Description

Measure	Value	Frequency
Gender	Male	190
	Female	169
	Total	359
Education	Diploma	31
	Bachelor	228
	Total	359
Age	17-19	113
	20-22	203
	23-25	34
	26-28	4
	>28	5
	Total	359
Social Media	Whatsapp	332
	Telegram	271
	Instagram	161
	Youtube	266

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	LinkedIn	92
	Others (Facebook, Twitter, TikTok)	94
The aim of SM	Communication with student and teacher	327
	Coordinate schedules or other announcements in class	286
	To get new knowledge	277
	To download materials (slides), videos, and more	280
	To share materials (slides), videos, and more	271

Table 1 shows that the respondents who filled out the questionnaire consisted of 190 men and 169 women. The education level of the respondents was 31 people with a diploma or D3 and 228 people with a bachelor or S1. Most of the respondents ranged in age from 20-22 years, as many as 203 people. Based on this data, the average respondent who fills in is an active student from semester 3 to semester 7.

Based on Table 1, Whatsapp has as many as 332 people, which means that Whatsapp is the social media that is widely used by students in collaborative learning. This is due to Whatsapp, which provides a feature of sending documents in the form of PowerPoint slides, videos, and audio that can be accessed by students directly. The total number of users in social media utilization was more than 359 respondents. That is because each respondent may use more than one kind of social media as learning media to support the effectiveness of the learning environment. The highest reason for using social media, as listed in Table 1, is communication with friends and teachers, which amounted to 327 people. However, for other reasons the number is not much different. This suggests that social media is indeed a medium that is effective in communicating with teachers or students, where social media can also help in gaining new knowledge, sharing and uploading lecture materials, learning videos, or other documents that also facilitate collaborative learning activities.

Outer Model Analysis

The first stage of this research analysis is to measure the validity and reliability of the used outer model. Validity is evaluated based on convergent validity value and discriminant validity value. To measure convergent validity value, the outer loading value of each indicator should be more than 0,708. The Average Variance Extracted (AVE) value should be or more than 0,50. The results of the outer loading calculation in Table 2, items have a value above 0.708, which means that almost all items are valid.

Table 2. Outer Loading and AVE

Variable	Outer Loading	AVE
SMCL	0,732-0,845	0,611
OKS	0,740-0,834	0,549
SE	0,766-0,885	0,678
SAP	0,746-0,865	0,683

To evaluate discriminant validity using two approaches, such as cross loading and Fornell-Larcker. The first approach is cross-loading by looking at the correlation of the construct with the measurement item is greater than the size of the other constructs. The model has good discriminant validity if each loading value of each indicator has the largest loading value with other loading values. Table 3 shows that the cross-loading score (Bold) on the item of the variable has the greatest value compared to other variables. Thus, all indicators in each variable in this study have satisfied discriminant validity.

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Table 3. Cross Loading

Item	SMCL	OKS	SE	SAP
SMCL1	**0.754**	0.641	0.541	0.553
SMCL2	**0.746**	0.540	0.455	0.413
SMCL3	**0.771**	0.543	0.447	0.451
SMCL4	**0.804**	0.527	0.489	0.494
SMCL5	**0.795**	0.580	0.507	0.532
SMCL6	**0.845**	0.605	0.506	0.531
SMCL7	**0.843**	0.607	0.496	0.531
SMCL8	**0.732**	0.574	0.562	0.553
SMCL9	**0.737**	0.568	0.510	0.525
OKS1	0.557	**0.740**	0.578	0.564
OKS2	0.553	**0.749**	0.565	0.615
OKS3	0.619	**0.766**	0.601	0.602
OKS4	0.593	**0.801**	0.602	0.655
OKS5	0.576	**0.781**	0.549	0.605
OKS6	0.514	**0.728**	0.445	0.462
OKS7	0.585	**0.751**	0.573	0.604
OKS8	0.591	**0.834**	0.573	0.636
OKS9	0.610	**0.811**	0.579	0.640
OKS10	0.493	**0.728**	0.528	0.585
OKS11	0.474	**0.793**	0.527	0.498
OKS12	0.528	**0.773**	0.578	0.581
OKS13	0.372	**0.793**	0.461	0.503
SE1	0.518	0.657	**0.805**	0.641
SE2	0.544	0.606	**0.885**	0.671
SE3	0.551	0.574	**0.833**	0.627
SE4	0.503	0.617	**0.766**	0.643
SAP1	0.549	0.671	0.689	**0.842**
SAP2	0.540	0.701	0.626	**0.828**
SAP3	0.559	0.669	0.630	**0.852**
SAP4	0.521	0.629	0.658	**0.865**
SAP5	0.562	0.673	0.651	**0.818**
SAP6	0.561	0.627	0.698	**0.831**
SAP7	0.484	0.585	0.581	**0.746**

The second approach is Fornell Larcker compared the AVE Value. If the Fornell Larcker value (Table 4) is above than AVE value (Table 2), the item has a discriminant value. Based on Table 4, the SMCL Fornell larcker > than SMCL AVE value 2 is 0,782>0,611. The OKS Fornell Larcker > than OKS AVE Value is 0,741>0,549. The SE Fornell Larcker > SE AVE value is 0,823>0,678. The SAP Fornell Larcker > SAP AVE value is 0,827>0,683. It means that all indicators meet the discriminant validity value.

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Table 4. Fornell Larcker discriminant validity value

Variabel	SMCL	OKS	SE	SAP
SMCL	**0.782**			
OKS	0.739	**0.741**		
SE	0.643	0.746	**0.823**	
SAP	0.653	0.787	0.785	**0.827**

The next stage analyzes the outer model to determine reliability. The realibility score is from the composite reliability value and Cronbach alpha value. The construct is considered reliable if the composite reliability value and Cronbach alpha value are above 0.70. Based on Table 5, it is known that the composite reliability and Cronbach alpha values are above 0.70, Which means the construct of social media for collaborative learning (SMCL) is 0,920 and 0,934; those are above 0,70, online knowledge sharing (OKS) is 0,931 and 0,940, those are above 0,70, student engagement (SE) is 0,840 and 0,894, those are above 0,70, and student academic performance (SAP) is 0,922 and 0,938, those are above 0,70. It means that all constructs are reliable.

Table 5. Cronbach Alpha and Composite Reliability

Variabel	Cronbach's Alpha	Composite Reliability
SMCL	**0.920**	0.934
OKS	**0.931**	0.940
SE	**0.840**	0.894
SAP	**0.922**	0.938

Structural Model Analysis or Inner Model

After ensuring that the constructs and variables are valid and reliable, path analysis is then carried out to determine the significance between variables. This analysis is based on the results of the structural model evaluation or inner model. The sign or direction on the path coefficient must be in accordance with the hypothesized theory. Significance between variables is evaluated from the results of the t-test or T statistic obtained from the bootstrapping process (resampling method). Inner model or structural model testing is used to prove the inter-construct relationship by looking at the significance value and R-square of the research model. Structural model testing is used to test the R-square value, which is a goodness-fit model test.

Table 6. R-square Value

Variabel	R Square	R Square Adjusted
OKS	0.546	0.545
SE	0.612	0.609
SAP	0.617	0.616

Table 6 indicates that The R-Square value of OKS is 0.546, meaning that SMCL affects OKS by 54.6%, while the remaining 45.4% states that OKS is affected by other factors outside the study. The R-Square value of SE is 0.612, meaning that SMCL and OKS affect SE by 61.2%, while the remaining 38.8% states that SE is affected by other factors. The R-Square value of SAP is 0.617, meaning that SMCL OKS and SE affect SAP by 61.2%, while the remaining 38.8% states that SAP is affected by other factors outside the study.

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Hypothesis Testing

The research hypothesis utilizes the significance value of the estimated parameters to indicate the correlation between the research variables. The bootstrapping result tests are listed in Table 7.

Table 7. Hypothesis Testing

Hipotesis	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
SMCL -> OKS	0,740	0,742	0,039	19,085	**0,000**
OKS -> SE	0,391	0,400	0,082	4,753	**0,000**
SE -> SAP	0,785	0,788	0,023	34,225	**0,000**

In Table 7, it is found that testing all hypotheses has a positive effect. This is based on the comparison of the t-count value with the t-table obtained from 359 samples is 1.960, and the p-value <0.05 with an error rate (α) of 5%. The results of hypothesis test can be described as follows:

Analysis of the Correlation between Social Media Use for Collaborative Learning (SMCL) to Online Knowledge Sharing (OKS)

In Table 7, it is known that the correlation between SMCL and OKS has a t value > t table, namely 19.085 > 1.96, with a p value of 0.000 or <0.05. This states that there is a relationship between SMCL and OKS. The use of social media in collaborative learning supports online knowledge sharing activities. This activity is shown through the teacher sharing the material in the group before class starts through the group, students reviewing the material, teacher give an opportunity to ask questions, meaningful responses and feedback from both teachers and student when discussing, social media is also considered as a medium that provides various sources of knowledge on various platforms that can fulfill information needs. Students independently search for information to gain new knowledge, new skills, and experiences to discuss between members. Research by (Ansari & Khan, 2020) states that the use of social media for collaborative learning has a positive relationship with knowledge sharing behavior, in other words, this indicates that collaborative learning activities carried out through social media will be more easily carried out by teachers and student, so that a lot of knowledge will be shared in the group and make the class more effective. Research by (Hosen et al., 2021) The dissemination of various types of material forms on document exchange, building virtual communication, and in-class contributions has a positive effect on knowledge improvement. Self-esteem by the teacher in class activity makes students more likely to engage and contribute to sharing their knowledge through social media. Furthermore, this can also improve students' reputation through social media.

Analysis of the Correlation of Online Knowledge Sharing Activities (OKS) to Student Engagement (SE)

In Table 7, it is known that the correlation between OKS to SE has a T statistic value > than the t table, which is 4.753> 1.96, with a value of 0.000 or <0.05. It states that there is a correlation between OKS to SE. Online knowledge-sharing activities conducted by teachers and students on social media increase student engagement actively in collaborative learning. It is shown that students are able to design collaborative and interactive activities to share materials in various forms of files so that they create many knowledge resources that can be easily accessed by groups every time and everywhere. In addition, knowledge-sharing activities are indicated as the opportunity to provide responses and new information to group

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members, so students who are active in class feel appreciated and their opinions are retrieved in their class. Research by (Hosen et al., 2021) document exchange positively affects student academic performance; there is a role of teachers in facilitating students to be willing to exchange their learning materials and engage in discussions, as well as work on assignments through their social media groups. Research by (Ngoc Hoi, 2023) that the development of competence in knowledge sharing and self-assessment together affect improvement in the social environment as a result of active student engagement to seek and share knowledge. Therefore, knowledge-sharing behavior may not be beneficial to the engagement of students who lack confidence in the knowledge they share with their community.

Analysis of the Correlation between Student Engagement (SE) to Student Academic Performance (SAP)

In Table 7, it is known that the correlation between SE to SAP has a T statistic value > than the t table is 34.225 > 1.96, with a p-value of 0.000 or <0.05. This states that student engagement in collaborative learning through social media correlates with improving student academic performance. This is seen in the activity of students when they express their overview; they feel a sense of worth when they successfully convey their opinions in class. This sense of worth gives rise to a sense of joy in carrying out collaborative learning, thus making discussion activities more active, creating a deeper understanding of the material, achieving learning goals, and increasing the GPA score. This is supported by (Ansari & Khan, 2020) students who are actively involved in collaborative learning via social media will produce better academic achievement. Social media usage in a collaborative learning environment, which is utilized effectively by teachers or students in sharing knowledge, will increase student involvement and directly have an impact on increasing student academic performance. The other research by (Qureshi et al., 2023), there is a positive correlation between student engagement and academic performance. The more interaction between group members, they tend to have high engagement in the curriculum, which helps them to improve their learning performance.

Based on the results of the previous analysis, this finding helps teachers design their classes by creating collaborative learning through social media use. The teacher provides material as a trigger for students to criticize the material and encourage other students to respond. The existence of scientific communication in this collaborative learning supports knowledge-sharing activities between teachers and students. The ease of finding new information using the internet motivates students to keep updating their knowledge and share it with other friends. Support and appreciation can be given by teachers to these students to increase student involvement to participate actively. This has a positive impact on improving student academic performance, where students increasingly understand the material from various perspectives, students can express their opinions freely and responsibly, learning objectives can be achieved, and GPA values increase.

This research also enriches the understanding of teachers and students regarding the use of social media in various platforms, such as WhatsApp, Instagram, Telegram, Youtube and others, as a means of sharing knowledge so that it will increase content that has knowledge value for the community. Furthermore, knowledge-sharing activities on social media will increase the involvement of students who feel proud of themselves because their thoughts are valued so that the wider community can receive the usefulness of knowledge.

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Conclusion

Social media use for collaborative learning correlates with online knowledge sharing; teachers provide material through student social media groups as a trigger for students to respond with questions, recommendations, or other things based on their knowledge perspective. Online knowledge-sharing activities carried out via social media between teachers and students are able to increase student engagement in continuously updating the knowledge stored in the group. Active student engagement has a positive relationship with student academic performance; where teachers will give awards to students who actively share knowledge so that their GPA will increase, students feel their opinions are valuable, and in a wider environment, students feel confident to share new knowledge to the public, especially by using their social media.

Recommendation

Based on the results of this study, recommendations that can be offered for further research include: 1) Knowledge sharing activities that students actively carry out can be investigated more deeply regarding the motivation underlying these activities. This is to see the extent to which educational content can attract public attention, rather than viral content without any educational value in it. 2) How teachers design collaborative learning activities, one of which is the blended learning method, where teachers conduct face-to-face and online learning. Teachers can provide factual problems that can be analyzed and presented in digital form and published through social media that students own. This is a challenge and a new thing that can attract students to play an active role in teaching and learning activities.

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