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The Use of Smartphones for Online Learning Interactions by Elementary School Students

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Abstract

The purpose of this study was to determine the effect of using smartphones for online learning on teachers' and students' interactions in learning that occurred during the COVID-19 pandemic. Respondents were 303 elementary school students, randomly selected by filling out questions through a Google form application. 20 items were provided, 10 items for the OLWS variable and 10 items for the TSI variable, which were adopted from several literature articles and adapted to the problem of this research. The data normality test was previously carried out and continued with testing the level of validity and reliability of the instrument, followed by evaluation of the structural model related to hypothesis testing using SPSS and SmartPL. The result determined by the PLS-SEM algorithm is 0.507, which is greater than the recommended value, indicating that the model has a reasonable level of justification for the variance in user behavior objectives. The only hypothesis (H1) is supported by the t-value of 15.399 (> 1.96) and a P-value of 0.000 (0.05), which indicates that OLWS has a positive and significant effect on TSI. Since the teacher's role in conveying knowledge to pupils demands specific, complex, and modern equipment that is widely available, easy to use, and follows technological changes, teachers and students can communicate appropriately, effectively, efficiently, and encourage quality results.

Keywords: Online learning, Smartphones, learning interaction.

Introduction

The spread of smartphone device technology, such as cellular phones, tablets, and others, is widely reported to have caused a revolutionary shift in the mobile learning paradigm into creative learning, appropriate for 21st-century learning. The Systematic literature review studies on online learning with the digitization of learning devices, a large amount of literature that discusses the digitalization technology in online learning during the COVID-19 pandemic was discovered, as well as ideas for a sustainable society. By (Mustapha et al., 2021) including a TAM-based SLR mobile learning study that can explain user intentions towards technology adoption that continues to increase from year to year. (Alsharida et al., 2021), then, the use of mobile technology is also studied which triggers the change and revolution of mobile learning in the mobile technology approach in the fields of intelligent pedagogy and mobile pedagogy.

Smartphones are used for all activities of human life, and as a preparation for life in old age, it is taught to use smartphones to have a better life in old age. Using smartphone lenses in daily life can effectively increase one's attention, sensitivity, and imagination to the surrounding environment, which then leads to increased creativity abilities (Yeh et al., 2020). Innovation and creativity can stimulate significant changes in the professional domain or knowledge by using digital literacy (Nelson et al., 2011), including using smartphone devices as a means of digital literacy today.

In many countries today, having a smartphone at the age of an elementary school student is still prohibited, but this is different in Indonesia, where elementary school students already have a smartphone. They don't just use it for 8–10-hour-a-day activities like studying and online learning (Salehudin et al., 2021).

Sunday et al. (2021) discovered negative attitudes toward research findings in a meta-analysis study to comprehensively synthesize existing research to investigate the effects of smartphone addiction on learning. The authors analyzed 44 studies (45 effects), resulting in a sample size of N = 147,943 students (Sunday et al., 2021), but on the positive side, research has found that teachers believe mobile technology is an

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important addition to the curriculum for all children; however, the iPad is only a small part of the curriculum and is used to encourage and support children's involvement in everyday learning. (Zipparo et al., 2015).

From several views of research results and references that suggest the use of smartphones for students, it is interesting for us to conduct research with the aim of knowing the analysis of online learning using smartphones (OLWS) with the teacher and student learning interactions (TSI). Thus, smartphones have two sides that provide value to each other, there is a positive side as well as a negative side, even so, smartphones can be used for learning activities, as a learning tool, and at the same time a means of interacting with teachers and discussing well, it is also used to find learning resources.

Online Learning with Smartphone (OLWS)

In online learning utilising the flipped classroom method, it was discovered that student achievement was highly correlated with their perception of deep learning and the amount of time spent on learning activities.. The problematic aspects of the flipped classroom are time expectations, insufficient teaching materials, and the lack of advice received from the instructor. (Tekin et al., 2020). In addition, there is the impact of multimedia in course design on student performance and the online learning experience, although other impacts on other learning such as assessment and instructional design as examined are not discussed in this study (Davis & Frederick, 2020).

Smartphones have become the most popular device for studying as well as capturing moments in life among students (Yeh et al., 2020). The main advantage of the smartphone app is that it can be used anywhere and at any time as long as you have your smartphone with you. Therefore, it is a suitable means for practicing lecture concepts and hence for study progress and routines (Pauli et al., 2020a).

The use of mobile, namely smartphone-based mobile learning, has a significant positive effect on the knowledge, skills, attitudes and learning styles of elementary school students. In similar research with student objects that Mobile learning on smartphones might be an alternate or supplementary technique for enhancing nursing education (Kim & Park, 2019). Jurkovič (2018) In another example it is also found that investigated the use of smartphones for informal online learning of English among undergraduate students in Slovenia (Jurkovič, 2019). In Iran, smartphones for life training determine the effect of using smartphone communication applications on the parents' Quality of Life (QoL) (Hosseini et al., 2021). Using perceived usability and perceived quality would be a valuable extension in the context of smartphone learning, it is likely that smartphones serve as u-learning enablers. Users may want to use smartphones as telecommunication tools as well as u-learning (ubiquitous learning) applications (Shin et al., 2011).

In addition to the positive side above, smartphones also have a negative side, according to Shao-I research. Chiu (2014) analyzed the mediating effect between learning self-efficacy and social self-efficacy on the relationship between students' perceived life stress and smartphone addiction (Chiu, 2014)few have analyzed the potential protective factors inherent in individuals that may benefit future intervention programs for smartphone addiction. Thus, this study established a model for analyzing the mediating effect that learning self-efficacy and social self-efficacy have on the relationship between university students' perceived life stress and smartphone addiction. Sampling 387 Taiwanese university students, we distributed scales surveying for university students' life stress, learning self-efficacy, social self-efficacy, and smartphone addiction. Data retrieved from the scales were analyzed using structural equation modeling (SEM. As a result, the level of smartphone addiction can have an impact on academic stress, which will become a bad habit for students. Moreover, the addiction to using the internet and smartphones has other influences on self-efficacy and also social efficacy, because both were found to have an effect on predicting the attitudes and behavioral intentions of smartphone users (Shin et al., 2011).

Teacher Student Interaction (TSI)

The implementation of online learning has increased significantly in recent times (Zulherman, Zain, et al., 2021). One of the keys to success in online learning is student interaction. Active learning strategies will involve students interacting with the course or learning process. Research that predicts one of the students' activities that will improve student learning outcomes, even though all activities are related to non-human interactions. But in this study, it was confirmed that working on problems using concept virtual interaction gave significant results in improving student learning outcomes in online learning (Ulfa & Fatawi, 2020),

Learning interaction between students and teachers is the main activity in learning, whether carried out face-to-face or online learning (Huang, 2018). The interaction gives a good impression that students give a positive response to the lessons delivered by the teacher, and the teacher explains and describes well various materials and materials. Teaching is presented according to the subject matter of the lesson.Based on the findings of the literature, it is interesting to examine the research problems that state the impact of smartphones on learning and their effects on students. Therefore, this study aims to determine how much influence online learning with smartphones has on the learning interactions of elementary school students.

Method

Population and Sample of the Research

This research was conducted at elementary schools in two big cities in East Kalimantan, Indonesia, selected randomly by distributing questionnaires. The research design uses a direct survey technique to the respondents to answer the statements in the google form that has been provided. Of the students who used smartphones in online learning, 107 students had their own smartphones, 182 students used their parents' property, and 114 students used their brother's or someone else's. The details of the respondents are as follows:

Instrument

The instrument was processed from several article sources, adapted to the problem of this research, where the statement in the questionnaire has been validated by field and language experts, so that it meets the valid rules and was created in the form of questions using a Likert scale with four choices.

Measurement evaluation model

The measurement model was evaluated (external model) to ensure the relationship between the latent variable and the indicators studied in order to adequately describe each indicator related to the latent variable. This relates to the authenticity and reliability of the instrument (Tehseen et al., 2017). The discriminant and convergent validity of this instrument were determined.

Data were analyzed using SEM, (Brown, 2015) structural models related to hypothesis testing, SPSS, and SmartPLS, which had previously been tested for data normality and also use of spss and SmartPLS to analyze non-parametric. The instrument's level of validity and reliability were then tested, followed by an evaluation of structural models related to hypothesis testing.

Findings

Some interesting findings in this study, the OLWS variable on the TSI variable, from the instruments distributed and answered by students, it was found that in the OLWS variable there were five valid items (q1, q2, q3, q4 & q10), and in the TSI variable, there were six valid items (Q2, Q4, Q6, Q7, Q8, Q9).

Factor loading model

The findings from (Cheah et al., 2018) were evaluated by assessing the load factor values for each indicator in the displayed structure.

The instrument items are as follows:

Code	*Adapted and Adjusted Instrument of OLWS*
q1	It easier to do schoolwork from teacher
q2	The work and submission of schoolwork from the teacher becomes faster.
q3	Teachers use smartphones to distribute assignments. I'm able to work on a more organized timetable.
q4	I can complete more assignments from the teacher and on time
q5	I study using my smartphone for a long time (5-6 hours) a day
q6	I use my smartphone not only for studying or doing school work
q7	I use my smartphone as a learning resource through Google, etc.
q8	I use my smartphone for discussion with my peers in studying
q9	I use smartphone if I can't or I don't understand the material delivered by the teachers
q10	I am satisfied with using my smartphone to study during this online learning
Code	Adapted and Adjusted Instrument of TSI
Q1	Our elementary school teachers always use e-learning tools such as Google Classroom, Google Meet, Edmodo, and Webex, and they are useful in helping the learning process.
Q2	Our elementary school teachers always use social media, such as WhatsApp, Youtube, and Facebook, and it is useful in helping my learning process.
Q3	Do teachers teach using interactive or face-to-face online learning
Q4	Do teachers teach by giving assignments/homework online?
Q5	I expect teachers to continue to use smartphones in the future in teaching
Q6	I always pay attention to the teacher's explanations and instructions to follow and obtain the subject matter?
Q7	I always take the time to submit assignments from the teacher using my smartphone.
Q8	I always take the time to discuss with the teacher
Q9	I am allowed to use my smartphone for school learning every school day
Q10	I frequently use apps on my smartphone and the internet to complete my homework.

Each indicator has a greater than or equal loading factor at 0.70 (> 0.70), which meets the validity criteria. This means convergent validity exists. The PSE3 indicator load is less than the minimum value (0.70), implying that both indicators should be eliminated. This is in accordance with the statement of (Hair et al., 2012), who noted that the indicator is considered a good item if the loading factor is greater than 0.70.

In the picture, it can be seen that only valid indicators are valid, where the OLWS variables are valid indicators: q1, q2, q3, q4 & q10, while the TSI variables are valid indicators, namely: Q2, Q4, Q6, Q7, Q8, Q9.

Convergent Validity

Composite reliability values (CR), average extracted variance (AVE), Cronbach's alpha, and rho A values were used to assess the reliability of the instrument, as shown in the table. 1.

The composite reliability coefficient (CR) in the table above exceeds the fundamental threshold of 0.905 to 0.922 (> 0.7). The Cronbach Alpha coefficient varies between 0.874 and 0.894. All coefficients exceed the lower limit (> 0.7) and are considered permissible. Rho A has a score of 0.878 and a score of 0.897, which are all greater than 0.7. Between 0.614 and 0.703 is the average Extracted Variance Value (AVE). This means that the AVE value obtained has exceeded the minimum recommended value. The reliability test revealed a very high level of internal consistency.

Table 1: Condition of respondents

Sex	Male	144
	Female	159
Students' smartphone	Personal smartphone	107
	Parents' smartphone	182
	Siblings' or others' smartphone	114
Domicile	City	124
	Village	179
Total Respondent		303

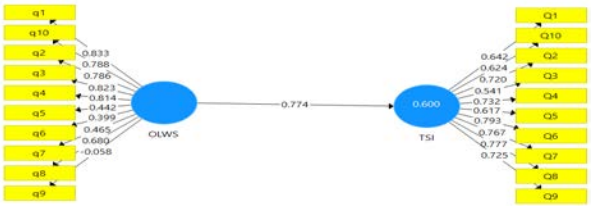

Fig. 1. Proposed research model

Discriminant Validity

The discriminant validity of this study was determined using Fornell and Larcker criteria. The Fornell and Larcker criteria compare the AVE value (average of extracted variance) with the variance of a construct and other constructs. The diagonal represents the square root of the latent variable AVE and represents the highest value in one of the columns. Thus, discriminant validity is sufficient because the square root of the corresponding construct AVE (average variance extracted) is larger (> 0.50) than any correlation with the other constructs (Fornell & Larcker, 1981).

Hypotesis Testing

Intensity of the relationship hypothesis is determined by comparing it to the structure outlined in the conceptual environment. Validation of the structural equation model was accomplished by measuring the path coefficients connecting structures and evaluating the significance and level of significance of the route coefficients. The critical level of direction was found using the bootstrap approach using a two-sided t-distribution table to determine the T value in Smart PLS. The path coefficient and significance level were determined with a sample size of 5000 using Smart PLS. The results are summarized in Table 4, followed by Figure 2. The variable interaction theory tested the strength of the relationships between the structures described in the conceptual framework. The structural equation model was validated by measuring the path coefficients between the structures and assessing the significance of the path coefficients and the level of significance. To determine the importance of direction in Smart PLS, the value of T was determined using the bootstrap method and a two-sided t distribution table. Path coefficients and significance levels were determined using Smart PLS at a sample size of 5000. self-funding. The results are summarized in Table 4, followed by Figure 2.

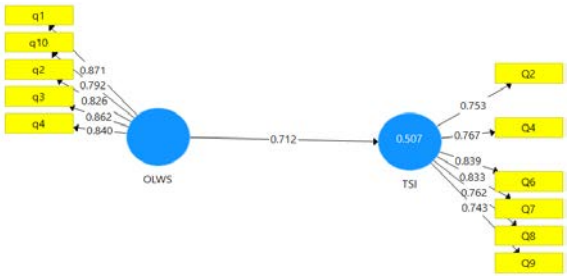

Fig. 2. Outer loading model

Table 2: Convergent Validity

	Cronbach's Alpha	*rho_A*	*Composite Reliability*	*Average Variance Extracted (AVE)*
OLWS	0.894	0.897	0.922	0.703
TSI	0.874	0.878	0.905	0.614

The only hypothesis (H1) was supported by a t-value of 15.399 (> 1.96) and a P-value of 0.000 (0.05), which indicated that OLWS had a positive and significant effect on TSI.

R square

In addition, the evaluation of the structural model measured the value of R square which is also known as the coefficient of determination. R2 is said to be a measure of the predictive capacity of the model because it corresponds to the degree of variance represented by the endogenous variables. R2 had a value range of 0 to 1, with a higher value indicating a higher level of prediction accuracy. According to (Cohen et al., 2013), a successful model requires an endogenous variable with an R2 value greater than 0.26. Based on the results in Table 4, the R2 value determined by the PLS-SEM algorithm was 0.507, which was greater than the recommended value, indicating that the model had a reasonable level of justification for the variance in user behavior objectives.

Discussion

The results of the only hypothesis test (H1) were supported by a T-value of 15.399 (> 1.96) and a P-value of 0.000 (0.05). which indicated that OLWS had a positive and significant effect on TSI. From the above findings which found a positive or significant impact of OLS, there was a relationship between learning using smartphones or mobiles and learning interactions in the form of a new model. Means, not only to apply a holistic m-learning approach that was able to overcome these challenges but also to help schools and a stakeholder responsible for the national e-learning initiative, proposed a comprehensive mobile learning model in the context of a smart classroom environment as part of a holistic approach to implementing an efficient Technology Enhanced Learning (TEL) environment (Al-hunaiyyan et al., 2017).

The results are summarized in Table 4, followed by Figure 2. The variable interaction theory tested the strength of the relationship between the structures described in the conceptual framework. The structural equation model was validated by measuring the path coefficients between the structures and assessing the significance of the path coefficients and the level of significance. If it was wrong to use a smartphone, then research has been found that examines the impact of a smartphone that can be used and was predicted to significantly affect life pressures that affect student smartphone addiction (Chiu, 2014)few have analyzed the potential protective factors inherent in individuals that may benefit future intervention programs for smartphone addiction. Thus, this study established a model for analyzing the mediating effect that learning self-efficacy and social self-efficacy have on the relationship between university students' perceived life stress and smartphone addiction. Sampling 387 Taiwanese university students, we distributed scales surveying for university students' life stress, learning self-efficacy, social self-efficacy, and smartphone addiction. Data retrieved from the scales were analyzed using structural equation modeling (SEM. From the respondents' data in this study, 107 elementary school students already had their own smartphones. It will allow elementary school students to have an impact with their smartphones (Albion & Tondeur, 2018; Pauli et al., 2020b; Yang & Shih, 2020).

From the evaluation results of the structural model, measuring the value of R2 which is also known as the coefficient of determination, R2 is said to be a measure of the predictive capacity of the model because it corresponds to the degree of variance represented by the endogenous variables. R2 has a value range of 0 to 1, with a higher value indicating a higher level of prediction accuracy. Then the higher the value of R2 will prove the level of accuracy the better the accuracy.. Online learning with smartphones (OLWS) has been widely used in accordance with applications that are widely available

Table 3: Formell-Larker

Fornell-Larcker Criterion		
	OLWS	*TSI*
OLWS	0.839	
TSI	0.712	0.784

Table. 4. Cross Loading

Cross Loadings		
	OLWS	*TSI*
Q2	0.530	0.753
Q4	0.563	0.767
Q6	0.620	0.839
Q7	0.574	0.833
Q8	0.569	0.762
Q9	0.479	0.743
q1	0.871	0.606
q10	0.792	0.642
q2	0.826	0.519
q3	0.862	0.626
q4	0.840	0.573

Table 5: Hypothesis Testing

	Original Sample (O)	*Sample Mean (M)*	*Standard Deviation (STDEV)*	*T Statistics (|O/STDEV|)*	*P Values*
OLWS -> TSI	0.712	0.714	0.046	15.399	0.000

Table 6: Rsquare

	R Square	*R Square Adjusted*
TSI	0.507	0.505

and used in learning today (Gruber, 2015). The online learning model uses reverse learning (Elfeky et al., 2020; Kinteki et al., 2019; Tekin et al., 2020), using zoom meetings and other LMS applications (Salehudin et al., 2021; Zulherman, Nuryana, et al., 2021). Using a smartphone makes learning easy to follow and will increase the potential of students to carry out learning activities because smartphones are equipment that cannot be separated from student activities, including learning.

To avoid negative consequences, appropriate and measurable learning scenarios with clear assessments are required to assist elementary school learning in achieving good learning outcomes. Students' daily lives will be less disrupted by uncontrolled smartphone use if teachers and students work together to learn how to use smartphones. Learning to use smartphone symptoms is not new, but they can be developed into interesting learning models that stimulate the relationship between learning outcomes in cognitive, affective, and behavioral aspects of students' learning. Online learning that is oriented to the internet network can make the learning environment a new thing for elementary school students.

The Indonesian government's policy during the COVID-19 pandemic has directed the occurrence of online learning using available learning devices. In this case, the easy and practical way is to use a smartphone or mobile to create interaction between teachers and students, because the teacher's role in transferring knowledge to students requires special skills. It must keep up with technological advances, so the focus of interaction with the use of electronic learning (e-learning) and virtual classes (classroom), which is the adoption of learning styles from developed countries, is a driver of the quality of learning outcomes using smartphones. So e-learning with a smartphone or mobile becomes important in the learning process around the world. The parties involved need to be assessed so that the best programs in learning can continue to support the community (Ouma et al., 2013).

During the COVID-19 pandemic, learning in Indonesia was carried out online, where teachers taught from home. using smartphones was considered the right and best choice because the online learning model during the COVID-19 pandemic had a significant relationship with competence in using social media (Salehudin et al., 2021). The teacher's role in learning using social media also gives positive results because it had a direct impact on teacher-student interactions and increased students' enthusiasm for learning (Syaiful et al., 2019). From the results of the learning process, it can be proven that the learning achievement is according to the expected target set by the teacher (Alabdulkareem, 2015). Learning style trends should look like face-to-face learning. Online learning in real life should also be applied in primary and secondary education. It is easy to use virtual media, such as social media, to standardize the quality and insight of teachers in the use of technology (Awouters & Jans, 2009). Teachers use social media in the learning process, and the ability of students to use smartphones has been implemented and has been going on for a long time. The ability of teachers and students to use social media as a means of online learning can be applied properly, It is because social media has been used in daily activities.

Thus, online learning requires learning interactions between teachers and students, and while the selection of smartphone equipment and devices by teachers and students can facilitate its implementation, the findings of this study provide positive and significant things as evidence that online learning with smartphones can affect teacher and student interaction activities in the learning process.

Conclusion

Based on our findings and the discussions that have been carried out, we conclude that online learning with smartphones (OLWS) provides significant or positive results. For several reasons, smartphones can affect learning interaction activities between teachers and students (TSI) and also because smartphones have become equipment used in students' lives, even students have their own smartphones for activities, including in the online learning process that requires sophisticated equipment and the latest technology. . .. The Indonesian government's policy during the COVID-19 pandemic, especially on online learning with smartphones as an attractive and effective solution, because in transferring knowledge to students, teachers need special equipment that is readily available, easy to use, and consistent with technological advances so the interaction between teachers and students in learning can occur properly, effectively, efficiently, and will encourage the quality of learning outcomes.

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