The Implementation of E-Learning Supported by Social Reality Videos in Mobile Applications: Its Impact on Student's Learning Outcomes

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Abstract—This study aims to apply e-learning containing social reality videos in a mobile application and explore its effect of improving students' learning outcomes. To attain the research aim, this study used an experimental design (pretest-posttest control group design), where two sample groups were used, they were the experimental and control groups. The experimental group was treated by using e-learning learning containing social reality videos, while the control group was given face-to-face learning and relied on the expository method. 28 students were involved in each of the two groups. The samples were those students who took basic natural science courses at the Mandalika University of Education. The pre-test and final-test was distributed with the same tasks in both groups. This study focuses on measuring student cognitive learning outcomes which are considered as the impact of induced learning in both treatment groups. Each data of students' learning outcomes was analysed descriptively (analysis of average students' learning outcomes and n-gain), and statistical analysis (testing the hypothesis of differences in students' achievement between treatment groups), statistical analysis at a significance level of 0.05. In general, the results of the study show that social reality video-contained e-learning has a significant impact on improving students' learning outcomes, and is found to be better than the expository method. Researchers recommend its simultaneous use in regular lectures in the classroom.

Keywords—e-learning, social reality videos, learning outcomes

1 Introduction

Digital learning platforms such as electronic learning (e-learning) are increasingly being employed. This is in line with the rapid technology development, and at the same time due to Covid-19 pandemic. Because of this, the demand of planning a new framework in the use of e-learning, and accompanied by learning problems cannot be underestimated, and the online education implemented currently does not have a clear learning scenario in which cases arise for courses during the Covid-19 pandemic. As far as the online teaching experience from the beginning of 2020 until now, students are experiencing boredom. However, students are spending more time to do online than ever

before, and online learning platforms continue to limit the scope for face-to-face activities among students. So far, the impact of online learning on cognitive learning outcomes has not progressed. It means that the impact that arises when teaching traditionally is face-to-face. Whereas currently there is no other choices to teach unless applying e-learning mode. It is true that managerial digital learning in its implementation is a motivating digital environment [1]. However, this is not possible without an interesting digital pedagogy. Even the impact is less convincing on learning outcomes or in-depth knowledge acquisition [2]. An anxiety of the application of online learning are also found when the presentation of large amounts of theoretical content that is not interactive has an adverse impact on many aspects of learning [3]. Students can be passive recipients if contact with the teacher is sporadic and acts as a mere conveyer of content [4].

Problems related to the implementation of digital learning, especially e-learning, need a big attention. The ways in which learning technology is used must be adapted to the needs [5]. Learning needs are not only oriented to presenting a large amount of the teaching contents causing boredom, and have a strong impact on low learning outcomes, but also can be oriented to attractive contents with other digital devices to motivate and to give an impact on better learning outcomes. In other words, every way of learning using a digital platform must seek positive consequences on student learning outcomes [6]. The flexibility of digital learning in its application can provide opportunities for the emergence of the new promising technologies. Digital technology can be integrated with other relevant technologies [7] that support a better learning process. In accordance with the context of the current study, researchers have an initiative to improve the performance of students' cognitive learning outcomes by implementing e-learning supported by social reality videos in mobile applications. Video-based virtual reality is an interactive visual technology that provides positive opportunities for student learning performance [8]. Reality video is also identified with interactive virtual reality as the research experience by Škola et al [9]. The results of previous studies showed that instructional video technology plays an essential role in improving the learning process [10]. The presence of mobile devices in learning is also a support for aggressiveness in all types of activities in the 21st century, especially to support students' ways of reasoning [11]. To see a more detailed impact on aspects of student learning outcomes, this study was conducted to employ e-learning supported by social reality videos in mobile applications and exploring its impact on improving students' learning outcomes.

2 Literature review

The development of technology and digitalization as predicted for a long time now become a reality [12]. The application of technology in society is a reflection of the facts of technological developments in many fields [13]. Technological advances have an impact on the ease of accomplishing daily tasks, speeding up, and even strengthening daily performance routines by utilizing them [4]. Technological advances in the field of education have been reflected in its development, this is referred to as information

and communication technology (ICT). In its use, the development of the teaching and learning process is directly influenced by ICT advances [14]. The utilization of ICT can generate new learning spaces and can promote innovative pedagogical actions as needed [15]. It allows access to a large amount of information globally [16]. Several previous studies showed the promising results regarding the use of technology in learning, including increasing students' motivation, learning autonomy, encouraging student involvement in learning, and encouraging good attitudes towards the content being taught [4], [17]. The role of technology in learning is currently increasingly interesting to study, and the trend of its studies is increasing every year. For instance, the picture of the bibliometric analysis by Ismail [18] shows that as many as 170 documents were found in the Scopus database based on subject area in the period 1994-2022. It is related to the theme of learning technology in educational professional development.

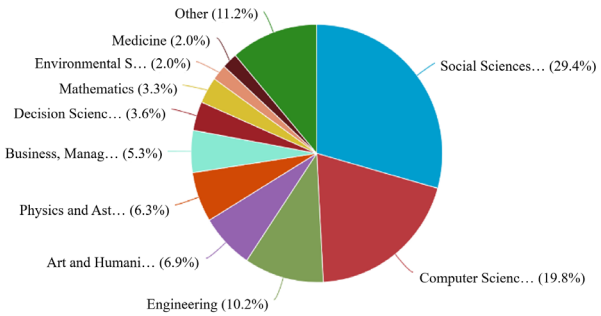

Fig. 1. Distribution of documents by subject area that examines the theme of learning technology in educational professional development [18]

E-learning is one of the technology-based pedagogical action performances. In a broader context. It is defined as a pedagogical action that takes place online with the use of the internet and technological devices, mobile technology, with synchronous or asynchronous connections, with connectivity and accessibility [19]. This is the reason the e-learning method then becomes a useful pedagogical device that can facilitate access to learning for students.

Currently, the use of digital platforms is increasingly crucial in the educational contexts. This is due to the Covid-19 that broke out in early 2020 to date, which has a strong direct impact on 1.6 billion students (94% of the world's student population) in more than 200 countries [20]. This is considered the most challenging transition, with the traditional whiteboard being replaced by an interactive whiteboard [21]. Adaptation of new ways of utilizing e-learning systems to new conditions is needed [7]. A digital learning framework is prepared, and teachers must take advantage of the online learning environment, no matter how strong their digital literacy level is [22]. This is clearly worrying because the use of an online learning environment requires the readiness of an adequate pedagogical infrastructure with the preparation of advanced digital learning tools. On the one hand, the use of the same digital tools (e.g., e-learning) does not necessarily provide the same benefits to all students. It depends on the preferences of each of them [7]. In addition, the readiness of the curriculum with online pedagogy

needs to be considered. Applied online education does not have a clear learning scenario in cases that arise for learning courses during the Covid-19 pandemic [8]. Curriculum transition is usually a problem when the curriculum prepared by the faculty is not in accordance with the online learning framework by the lecturer. Adjustment takes time and feels discomfort is usually due to content discrepancies [23]. Therefore, the role of digital learning is not yet clear, especially in improving students' cognitive learning outcomes [2], [24].

E-learning as a digital platform is considered a savior for the continuity of education and learning during the Covid-19 pandemic [20]. Its flexibility in terms of time, place, cost, and effort, makes e-learning the right choice to guide the learning process [25]–[27]. Any digital learning setting, its implementation can create a motivating environment [1]. Digital learning also provides the new promising technology integration opportunities [7], by leveraging the existing technological resources [27]. The technology resources can be desktops or computers, smartphones, tablets etc. While digital resources can be in the form of educational and learning videos, video conferencing, podcasts, social networks, learning platforms, and others [28].

Digital resources such as e-learning platforms have been researched as guides for an easy learning process [26], [27]. Other digital resources used in learning such as videoreality or virtual reality videos provide opportunities to create a better learning process [9], [10], and have a positive impact on students' attitudes and self-regulated learning [8]. The study done by EL-Ariss et al [29] believe that the use of video in blended e-learning can increase students' in-depth understanding. Another finding revealed that there was a positive attitude towards learning videos, the reason is because it can support active learning, increase learning motivation and student engagement, learning with videos is fun [30]. Furthermore, the technology resource that is intensely used in learning is mobile devices. Recent studies showed that mobile devices are valuable when they contain useful educational contents [31], and can even become modern learning tools that support twenty-first century skills [32].

The combination of learning that employs technological and digital resources should be based on students' learning needs [5], and of course cannot be separated from its role in creating an interactive constructivist learning environment [1]. Finally, competent human resources are needed to apply existing technology in e-learning systems [33]. Well-designed e-learning supported by other adequate technologies can serve as a digital pedagogy to enhance strong ways of thinking [34], and in the end it can improve better learning outcomes [35].

3 Method

This study applied an experimental design (the pretest-posttest control group design) [36], in which two sample groups were optioned. The first sample group becomes the experimental group, and the second sample group is as the control group. The two sample groups were given different learning treatments, the experimental group was treated using e-learning learning containing social reality videos in a mobile application, while

the control group was subjected to face-to-face learning and relied on expository methods. Both groups (experimental and control) were distributed a pre-test before the treatment, and the final-test was distributed after the final treatment.

The research sample is students who attend the class of the basic natural science courses from the Mandalika University of Education. There are 28 students involved in each group (experimental and control). Demographically, the age of the sample is raged 18-19 years on average, and the gender is relatively balanced between male and female. The demographic aspect is only limited to information because it is not considered as a variable that affects the result of this study.

This study focuses on measuring students' cognitive learning outcomes. Learning outcomes were measured using a test instrument in the form of an essay test which consists of ten questions. Aspects of cognitive learning outcomes that are measured are; understanding, application, analysis, synthesis, and evaluation. Each indicator of learning outcomes is distributed into two questions. Before being employed, the test of cognitive learning outcomes was stated on the content validity and reliability. Content validity refers to the extent to which the test instrument measures the content domain to be measured. The three dimensions of the content domain are definition, representation, and domain relevance [37]. The results of the validity test by employing two expert validators showed that the test was valid based on those domains. Furthermore, the reliability of the test was measured, this refers to the consistency of the measurement [38]. The reliability of the test is calculated according to the percentage of agreement equation of each validator [39], and the result showed the test was reliable.

Each learning outcome data was analyzed, both descriptively and statistically. Descriptively, learning outcomes are calculated on average from the initial test to the final test in the two groups, and the n-gain score is determined on an average basis. The increase of learning scores refers to three criteria: low (n-gain < 0.3), moderate (n-gain 0.3 - 0.7), and high (n-gain > 0.7) [40]. The learning outcomes criteria according to the average score range are: 0-20 (not good), 21-40 (poor), 41-60 (sufficient), 61-80 (good), and 81-100 (very good). Statistical analysis used the independent sample t-test which was preceded by a normality test. The statistical test used a significance level of 0.05. The statistical test of this study tested the hypothesis H_0 (there is no difference of students' cognitive learning outcomes between treatment groups), and H_a (there is differences of students' cognitive learning outcomes between treatment groups). Statistical test was assisted by SPSS 25.0 software tools.

4 Result and discussion

Descriptively, the summary of student learning outcomes is presented in Table 1. In the initial test it was seen that the two sample groups had almost the same average score and both were on the 'less' criteria. However, in the final test the average score and learning outcomes criteria of the two are different, the experimental group has an average score of 79.82 with the criteria of 'good' while the control group has an average score of 45.29 with the criteria of 'sufficient.'

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Table 1. The summary of student learning outcomes

Group	n	Average score & criteria				n-gain	Criteria
		Preliminary test	*Criteria*	*Final test*	*Criteria*		
Experimental	28	29.50	Less	79.82	Good	0.71	High
Control	28	31.46	Less	45.29	Sufficient	0.20	Low

The results in Table 1 also show that there are differences in the increase of the score (n-gain) of students' learning outcomes in the two groups. The n-gain criteria in the experimental group is declared in 'high' criteria with an n-gain score of 0.71, while the control group is stated in 'low' criteria with an n-gain score of 0.20. The visualization of descriptive analysis on students' learning outcomes is presented in Figure 2.

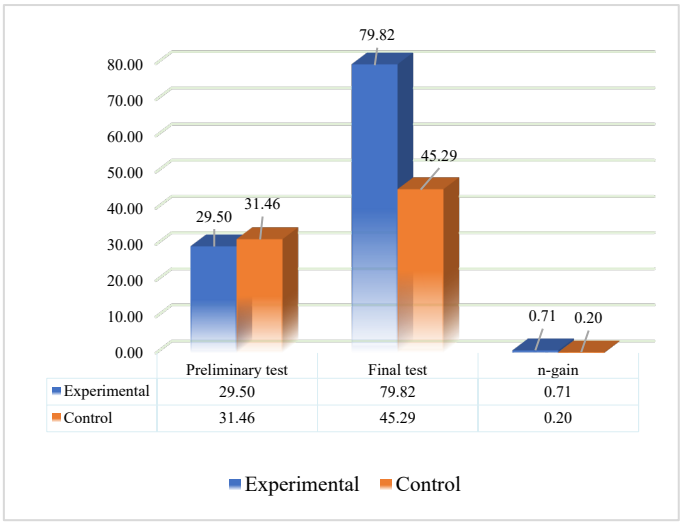

Fig. 2. The visualization of descriptive analysis on students' learning outcomes

The visualization of the results in Figure 2 clearly shows that the implementation of e-learning supported by social reality videos in a mobile application (conducted in the experimental group) is better than face-to-face learning with the expository method (conducted in the control group), even differentiation of the increase of the scores in the groups was very much adrift. The distribution of pre-test and final-test scores between the two groups given different learning treatments is presented in Figure 3.

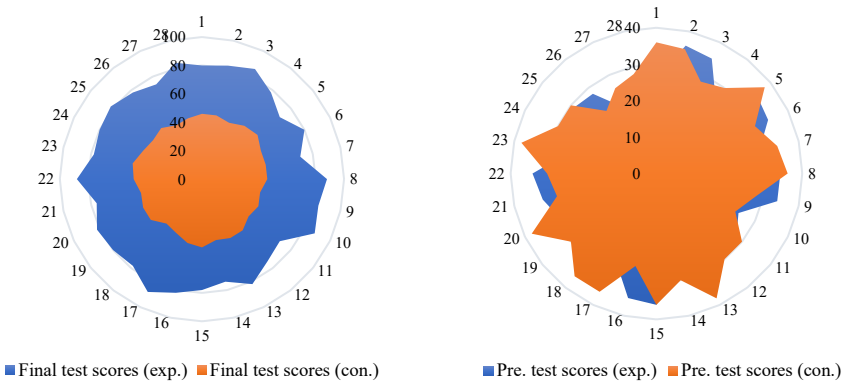

Fig. 3. Distribution of students' cognitive learning outcome in pre-test and final-test

The results in Figure 3 show the scores of students' individual learning outcomes which appear to be a gap between the two groups on the final test, but the distribution of individual learning outcomes scores that are relatively balanced during the initial test. The results of the descriptive statistical analysis can be seen in Table 2.

Table 2. The results of the descriptive analysis in each group based on n-gain parameter

Group	n	Mean	Median	Variance	Std. Dev.	Std. Err. Mean
Experimental	28	71.393	72.000	57.062	7.554	1.427
Control	28	19.893	20.000	29.729	5.452	1.030

Based on the n-gain parameter, each mean, media, variance, and standard deviation is different for each experimental and control group. Furthermore, a statistical test of the increase of learning outcomes scores was carried out in both groups, but this was preceded by a normality test. The results of the normality test and statistical test are shown in Table 3 and Table 4.

Table 3. The results of the normality test and learning outcomes, $p > 0.05$

Groups	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	*df*	*Sig.*	*Statistic*	*df*	*Sig.*
Experimental	0.105	28	0.200	0.970	28	0.589
Control	0.115	28	0.200	0.967	28	0.495

The results of the normality test using two test models (Kolmogorov-Smirnov and Shapiro-Wilk) showed that both groups were normally distributed, where the significance value in both normality test modes was greater than 0.000. Therefore, different tests were performed using parametric statistics (independent sample t-test).

Table 4. The results of independent sample t-test, $p < 0.05$

		t	df	Sig. (2-tailed)
Learning outcomes	EV. assumed	29.252	54	0.000
	EV. not assumed	29.252	49.127	0.000

The results of the different test in Table 4 show that the significance value (0.000) < 0.05, based on the criteria for testing the hypothesis, H_0 is rejected and H_a is accepted. It shows that there are differences of students' cognitive learning outcomes between treatment groups. This also clarifies the results of the descriptive analysis that social reality video-assisted e-learning is greater than face-to-face learning with expository methods in terms of improving students' cognitive learning outcomes.

This finding is in line with the results of a previous study by EL-Ariss et al [29] where the use of video in blended e-learning can improve students' in-depth understanding. Research by Busyaeri et al [41] also found that 27 students who were involved in learning using video was able to improve their learning outcomes, the average learning outcomes reached 80.63. In addition, there shows 79.63% of students stated that they strongly agree with the application of learning videos [41]. It means that they have a positive perception of the applied learning videos. Learning videos are seen as interactive media that are feasible to use in learning, and its implication can help students in the learning process [42]. The results of other studies [43]–[46] showed the effectiveness of learning videos in enhancing students' learning outcomes.

The results of this study confirmed the challenges of learning problems with e-learning, where the previous problems were related to student boredom, limited interaction space, and loss of motivation, all of which had an impact on students' learning outcomes with no progress. The presence of e-learning supported by social reality videos in mobile applications has become an effective pedagogical tool in improving students' learning outcomes. Our focus is also on the aspect of using mobile applications, in fact this can be a useful learning tool. It was also stated in previous studies that digital tools such as well-designed mobile devices can be effective and efficient learning tools [47]. If the mobile technology is used properly in learning, it can positively impact students' engagement in learning activities, student learning performance, and motivation improvement [48]. Mobile technology also supports seamless learning that bridges curriculum achievement in formal and informal learning atmospheres [49].

In the current study, although the social reality video-supported e-learning teaching intervention was carried out in a relatively short time, empirical evidence showed its impact on improving students' cognitive learning outcomes. In its implementation in e-learning mode, each student accesses social reality videos in the mobile application according to the learning theme, guided by the lecturer. Student activity was monitored attractively by presenting social reality videos, and in the end empirical evidence in this study showed that e-learning supported by social reality videos is better in improving cognitive learning outcomes than expository teaching. In the implementation of e-learning, the present study is able to meet the characteristics of learning according to expectations which refer to the findings of previous studies, where its implementation can promote dialogue and interactive activities in a study group, and improve interpersonal relationships among students [50], encourage active collaboration among students to

achieve learning goals [51], and the help of social reality videos can enhance students' learning motivation because the learning activities carried out is interesting for students.

Finally, referring to the findings of this study, researchers recommend the use of social reality video-assisted e-learning in mobile applications, especially to improve students' cognitive learning outcomes.

5 Conclusion

This study aims to implement e-learning containing social reality videos in a mobile application and explore its impact on improving students' learning outcomes. The justification of this goal refers to the challenges of learning problems with e-learning, where the previous problems are related to student boredom, limited interaction space, and loss of motivation, all of which had an impact on students' learning outcomes with no progress. Through the current study, the presence of e-learning supported by social reality videos in mobile applications has become an effective pedagogical tool in improving students' learning outcomes, in which the implementation has a significant impact on improving students' cognitive learning outcomes, and is greater than expository teaching. Due to this finding, researchers recommend the simultaneous use in different courses, as well as in regular lectures in the classroom. Despite the success of this study, researchers acknowledge the limitations of the study, including the relatively short duration of the instructional intervention, and the impact on other aspects of learning outcomes that need to be measured.

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