What is the Better Social Media for Mathematics Learning? A Case Study at A Rural School in Yogyakarta, Indonesia

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Abstrak
Penetrasi media sosial di masyarakat sudah sangat tinggi. Saat ini, hampir semua siswa di sekolah menggunakan ponsel cerdas untuk aktivitas keseharian mereka. Penelitian ini merupakan penelitian eksploratif kuantitatif deskriptif untuk mengetahui bagaimana respon siswa ketika belajar menggunakan media sosial sebagai sistem pembelajaran mobile. Data diambil dari empat sekolah berbeda di daerah pedesaan Yogyakarta, Indonesia. Pembelajaran matematika dilaksanakan dengan menggunakan media sosial yang berbeda (WeChat, Line@, Socrates, dan Edmodo) pada siswa kelas 7 di masing-masing sekolah. Pengumpulan data menggunakan kuesioner USE yang mengukur apakah model pembelajaran yang diimplementasikan dengan menggunakan media sosial dapat diterima dengan baik oleh siswa dan pembelajaran sesuai dengan harapan. Kuesioner USE memiliki 4 faktor terukur yaitu kegunaan, kemudahan penggunaan, kemudahan belajar, dan kepuasan. Dari data tersebut, terlihat bahwa semua faktor yang diukur memperoleh skor yang tinggi. Skor tertinggi adalah kepuasan (3,15) kemudian kegunaan (3,11), mudah dipelajari (3,00), dan mudah digunakan (2,94). Rata-rata, media sosial mendapat respon siswa yang tertinggi sebagai sistem pembelajaran yaitu Socrative (3.18), lalu Edmodo (3,15), Line@ (3,00) dan WeChat (2,89). Analisis lebih lanjut Anova menunjukkan bahwa Socrative dan Edmodo merupakan aplikasi yang cenderung dipersepsi paling baik oleh siswa. Temuan ini bermakna bahwa kedua aplikasi tersebut perlu dimanfaatkan dalam pembelajaran dengan berbagai strategi pembelajaran.

Kata Kunci: social media, mobile learning, STEM education, mobile technology, learning innovation

Abstract
The penetration of social media in the community has been very high. Nowadays, almost all students at the school are using smartphones for their daily activities. This study is a descriptive quantitative exploratory research to find out how the students' response when learning using social media is implemented as a mobile learning system. Data were taken from four different schools in the rural area of Yogyakarta, Indonesia. Mathematics learning using a different social media (WeChat, Line@, Socrative, and Edmodo) was applied to student of grade 7 of each school. Data collection used USE questionnaire which measured whether the implemented learning model using social media could be well received by students and appropriate learning expectations. USE questionnaire has 4 measured factors i.e. usefulness, ease to use, ease of learning, and satisfaction. From the data, it shows that all factors were high. The highest one was satisfaction (3.15) then, usefulness (3.11), ease to learn (3.00), and ease to use (2.94) respectively. On average, the social media got the highest student's response as a learning system was Socrative (3.18), then Edmodo (3.15), Line@ (3.00) and WeChat (2.89). Further analysis using statistical technique showed that students have good perception to Socrative and Edmodo. This finding implies that the social media especially Socrative and Edmodo are valuable to be used in the leaning using flexible learning strategy.

Keywords: social media, mobile learning, STEM education, mobile technology, learning innovation

INTRODUCTION

The concept of the 21st century learning has been widely adapted by a lot of countries in the world to do the learning revolution to create the better generation. This concept supports to provide the learning environment where students master the learning material while producing, synthesizing, and evaluating the information from various sources with awareness on respect towards various cultures (Farisi, 2016; Gulden et al., 2012). In this learning environment, students do not only master the three Rs (Reading, Writing and Arithmetic), but also nowadays using various software and virtual devices broadens their learning scope to be unlimited in terms of space, time and with whom they study (Farisi, 2016; Gulden et al., 2012; Zyad, 2016).

Optimism related to learning in digital era highly feels at schools in Indonesia as well as at other countries (Mahdi et al., 2014; Ülen & Gerlič, 2012; Uyanga, 2005). However, at schools in the rural area in Indonesia, there are various problems which need to consider in order to giving the same learning access to students (Sulisworo et al., 2017). This problem has also been studied by other researcher (Kola, 2013; Mahdi, et al., 2015; Okpurukhre & Esiekpe, 2013; Owate et al., 2014). The penetration level of ICT in Indonesia which evenly spread in every area becomes an opportunity for the implementation of the 21st century learning. With the existence of technology development nowadays, the question is whether technology can support the achievement as a useful human being in the society (Sulisworo & Toifur, 2016; Sulisworo et al., 2017). The use of technologies will continue to increase globally and it is a challenge for educators to ensure that technology will become a part of their use (Alzahrani & Laxman, 2016; Kabir & Kadage, 2017; Zyad, 2016). The unreadiness of the society particularly in education to utilize the technology may become a nightmare for students in learning to keep struggling as a society member (Sadaf et al., 2016; Sulisworo et al., 2016).

The rapid development of technology especially mobile technology has influenced the learning success criteria. The changing in learning environments and interactive learning between technology components will affect the strategies and approaches to learning in order to facilitate student success (Alzahrani & Laxman, 2016). Several researches show that kids now grow in the environments which utilize the technology especially mobile technology with its various functions (Kumar & Owston, 2016; Sulisworo & Toifur, 2016). They feel it in their daily life and it integrates to them. Meanwhile, there is a tendency that they do not get what is expected in learning at school. They face a learning situation using old approaches. This inappropriateness becomes one of failure factors in education now (Kabir & Kadage, 2017). An effective interaction among teachers, students, learning sources, learning media which utilize mobile technology becomes a success key in the learning competence achievement (Bozanta, 2017; Furberg, 2016; Kashorda, et al., 2007; Sadaf et al., 2016; Yadegaridehkordi et al., 2015).

Information technology has facilitated a variety of new learning approaches that allow students to develop naturally driven by their own interests (Fidaldo & Thormann, 2017; Gómez-rey et al., 2017; Yadegaridehkordi et al., 2015). They can find a wide range of knowledge through independent thinking and real-world experience. Their active role on navigating in cyberspace to make a decision about how to look for, where to look, what content to select related to their business and increase their understanding of the particular competence (Gulden et al., 2012; Sulisworo et al., 2016; Zyad, 2016).

Technology integration in learning can enrich learning experiences. Mobile learning gives opportunity for students to involve in their learning experience which now can't be got through static technology devices such as a desktop computer (Alzahrani & Laxman, 2016; Kumari & Chamundeswari, 2013; Zawacki-richter et al., 2017). At the moment, the changing in teaching and learning philosophy is driving from a teacher-centered approach to a student-centered approach. Two paradigm shifts in computation and education which is student-centered. In another side, mobile technology gives more possibilities to improve the teaching quality in many aspects. Student's ability in actively building the knowledge, rather than more passively responding a tutorial action is very important in the new learning approach (Barak et al., 2011; Sadaf et al., 2016). Constructivism learning approach drives to think explicit learning, reasoning, problem solving and effective skill planning, learning to learn from a mistake, and developing reflective meta-cognitive skill (Furberg, 2016; Ludvigsen et al., 2016).

General understanding of constructivism is by actively trying to make something concrete (physic or computation) to solve a problem. Articulation and reflection on their thought is whether it works or a necessary revision that is common in constructivist approach (Ludvigsen et al., 2016). Teacher and students have to involve in an active dialog. Several design-based studies have scrutinized how various forms of digital support tools can support students' work in school science (Furberg, 2016). An effective method for knowledge setting must be simplifying, producing a new proposition, and increasing information manipulation to scaffold teachers and students through automatic analysis and feedback (Ludvigsen et al., 2016). There are three basic principles in the approach which must focus on experience and context which make students to wish and to be able to study (readiness), the instruction must be well structured so it can be easily understood by students, and learning must be planned to facilitate extrapolation and to fill the understanding gap up.

Yogyakarta is a province considered as the best learning center in Indonesia since a long time ago. Nationally, internet traffic in Yogyakarta is the highest in Indonesia. It shows that society in Yogyakarta have good IT awareness and literacy. However, it can't be neglected that the welfare between city and village has not spread evenly including the quality of education. Yet, a smartphone can commonly be found at schools in the rural area. In contrast, it's still lack of a policy that supports learning by integrating this technology in the school teaching and learning. In the future, it can be an obstacle for learning change that suits to the characteristics of the 21st century learning.

Considering various problems in the rural area in the digital era, it needs to explain how the students' comfort when involving in learning that utilizes ICT is. The index digital data shows that utilization of social media highly increases year by year. It indicates the comfort on virtual interaction is high in various circles. Therefore, the utilization of social media as learning interaction media is also predicted high. This research objective is to find out how students' response when they involve in learning using social media. Several types of social media are used for learning, so it can be seen the different effects of the social media in the level of students' acceptance in learning.

RESEARCH METHOD

The design of this study is a descriptive quantitative exploratory research to find out how the students' response when learning using social media as a mobile learning system is implemented.

The population is 7 grade student at Bantul Regency, Yogyakarta Province, Indonesia. The sampling technique is purposive sampling which select the student who uses smartphone. Number of sample was 82 students (28 students for Socrative, 14 students for Line@, 27 students for WeChat, and 13 students for Edmodo).

All samples are taught mathematics using a different social media. It can be called as fully mobile learning. Teacher and Students interact on learning the mathematics only through the smartphone based application. The learning duration is about 2 hours per day, 3 times per week for 2 weeks.

The data collection of student's response used USE questionnaire which measured whether the implemented learning model using social media could be well received by students and appropriate learning expectations. The Likert scale from 1 to 4 was used at the questionnaire. The questionnaire contained 4 factors i.e Usefulness (8 items), Ease of use (11 items), Ease of learning (4 items), and Satisfaction (7 items). This questionnaire was adapted from Lund (2001).

All data are analyzed statistically using SPSS. The result of the student response to certain learning media is compared using one way analysis of covariance or one way- ANOVA at significant level 0.05.

RESULTS AND DISCUSSION

Table 1 shows the descriptive result of the student response after certain mobile media were implemented on their learning. From this table, it can be analyzed which one gets higher response than others.

Table 1. Descriptive Statistic

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min.	Max.
						Lower Bound	Upper Bound		
Usefulness	Socrative	28	3.0829	.53591	.10128	2.8751	3.2907	2.00	3.88
	Line@	14	3.0907	.31131	.08320	2.9110	3.2705	2.75	3.75
	WeChat	27	3.0630	.33015	.06354	2.9324	3.1936	2.25	3.63
	Edmodo	13	3.3108	.37021	.10268	3.0871	3.5345	2.50	3.88
	Total	82	3.1138	.41724	.04608	3.0221	3.2055	2.00	3.88
Ease to Use	Socrative	28	3.1400	.54811	.10358	2.9275	3.3525	2.09	4.00
	Line@	14	2.9164	.38442	.10274	2.6945	3.1384	1.82	3.55
	WeChat	27	2.7156	.24627	.04739	2.6181	2.8130	2.09	3.27
	Edmodo	13	2.9723	.47870	.13277	2.6830	3.2616	2.18	3.73
	Total	82	2.9355	.45622	.05038	2.8352	3.0357	1.82	4.00
Ease to Learn	Socrative	28	3.2946	.55300	.10451	3.0802	3.5091	1.50	4.00
	Line@	14	2.8571	.67734	.18103	2.4661	3.2482	1.00	3.50
	WeChat	27	2.7500	.35355	.06804	2.6101	2.8899	2.25	3.50
	Edmodo	13	3.0577	.52195	.14476	2.7423	3.3731	2.25	3.75
	Total	82	3.0030	.55763	.06158	2.8805	3.1256	1.00	4.00
Satisfaction	Socrative	28	3.2054	.51394	.09713	3.0061	3.4046	2.00	4.00

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min.	Max.
						Lower Bound	Upper Bound		
	Line@	14	3.1529	.45981	.12289	2.8874	3.4183	2.00	4.00
	WeChat	27	3.0204	.45575	.08771	2.8401	3.2007	2.00	3.86
	Edmodo	13	3.2692	.54449	.15102	2.9402	3.5983	2.00	4.00
	Total	82	3.1456	.49142	.05427	3.0376	3.2536	2.00	4.00
Total score of USE	Socrative	28	3.1801	.45204	.08543	3.0049	3.3554	2.30	3.89
	Line@	14	3.0037	.40396	.10796	2.7705	3.2370	1.92	3.64
	WeChat	27	2.8864	.25011	.04813	2.7874	2.9853	2.40	3.37
	Edmodo	13	3.1517	.37432	.10382	2.9255	3.3779	2.48	3.78
	Total	82	3.0488	.38981	.04305	2.9631	3.1344	1.92	3.89

From the collected data of the student response after involving on learning using the certain social media, the characteristics of the mean can be figured out based on Table 1. The descriptive statistics of the data is shown by Figure 1.

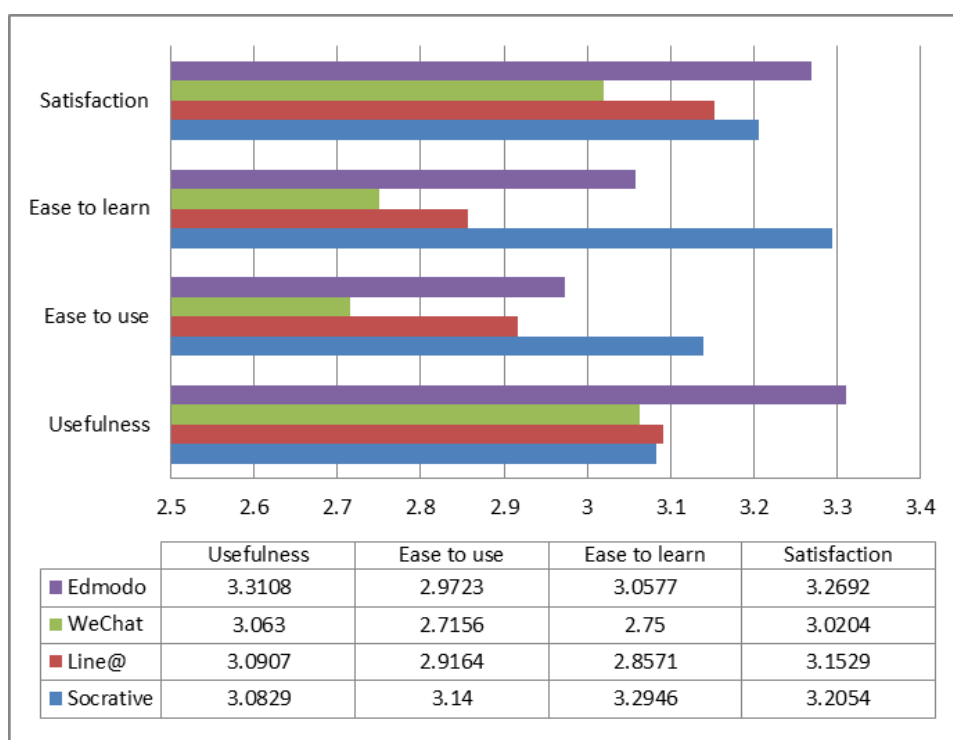|	Usefulness	Ease to use	Ease to learn	Satisfaction
■ Edmodo	3.3108	2.9723	3.0577	3.2692
■ WeChat	3.063	2.7156	2.75	3.0204
■ Line@	3.0907	2.9164	2.8571	3.1529
■ Socrative	3.0829	3.14	3.2946	3.2054

Figure 1. Comparison of the result of the descriptive statistics

Based on the figure 1, the student response is good (higher than 2.5) for all social media used. The means for usefulness and satisfaction factors are higher than 3 for all social media. Yet, for the ease to use only Socrative gets response higher than 3.0, Edmodo and Socrative get response higher than 3.0 for the Ease to learn factor.

Furthermore, all these differences can be calculated for its significance using the ANOVA statistics. The table 2 shows the result of this statistic calculation.

From the figure 1, it can be seen that all media used are responded quite high (between 2.75 to 3.31). It shows that students now tend to be more comfortable with mobile learning. It is an important phenomenon for schools when adapting the learning environment according to the 21st century learning. It can also be concluded that learning adapting student's daily condition which is close to mobile technology e.g. smart phone and tablet tends to motivate student enthusiasm better. With the higher student learning interest, the better competence can be achieved by students.

In detail, the result of statistical analysis (table 1) shows that there is a significant influence of learning media used in mobile learning activities (see table 1, row of Total score of USE). There is a difference among students who use Edmodo, WeChat, Line@ and Socrative. The response of students using WeChat in learning tends to be lower compared to other media. It may occur because this application is new for students in learning. The result data on Ease to use factor and Ease to learn for WeChat is the lowest of all. This lowest result can be explained that student who used WeChat were not so familiar on it. This situation should be considered on the result comparison analysis. The role of teacher to arrange some activities to scaffold the student on using the learning media is very important (Ludvigsen et al., 2016) so student become familiar to the learning strategy and activity.

Table 2. Analysis of Variance

		Sum of Squares	df	Mean Square	F	Sig.
Usefulness	Between Groups	.608	3	.203	1.172	.326
	Within Groups	13.493	78	.173		
	Total	14.101	81			
Ease to Use	Between Groups	2.500	3	.833	4.526	.006
	Within Groups	14.359	78	.184		
	Total	16.859	81			
Ease to Learn	Between Groups	4.447	3	1.482	5.574	.002
	Within Groups	20.740	78	.266		
	Total	25.187	81			
Satisfaction	Between Groups	.723	3	.241	.998	.399
	Within Groups	18.838	78	.242		
	Total	19.561	81			
Total score of USE	Between Groups	1.361	3	.454	3.234	.027
	Within Groups	10.946	78	.140		
	Total	12.308	81			

Based on Table 2 on the last column, it can be known that usefulness and satisfaction factors are not significantly different. It means that all applications have same opportunity (usefulness and satisfaction) to be used in learning. But for the ease to use and ease to learn, there are different response between applications. Socrative app is the best one on both citeria (see also Table 1 for the mean score). The second one is Edmodo. To implement this finding, schools have to create policies to support the utilization of mobile application in learning sustainably. This arrangement will really support the student success in the 21st century learning environment (Gulden et al., 2012; Sulisworo et al., 2017; Tarawneh et al., 2011; Yadegaridehkordi et al., 2015).

CONCLUSION

Analyzed data from USE questionnaire, student gave high positive response on using social media for their mathematics learning particularly on usefulness and satisfaction factors. Generally, students gave the same response when using different mobile applications. The student comfort in mobile learning occurs because the activities using mobile technology have been experienced in the student daily life. In the policy development to apply mobile learning, it needs to consider the student familiarity in using the application. Furthermore, social media especially that one supported by learning management system has opportunity to be used as learning tool to enhance learning quality for mathematics subject in rural area.

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