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Integrating Information and Communication Technology in Elementary Schools: Teachers' Attitudes and Barriers

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Abstract: Unquestionably, the rapid development of ICT has had a significant impact on various areas of human life including education in the past few decades. The use of Information and Communication Technology (ICT) to support educational activities in schools has increased significantly in several developing countries as in the case of Indonesia. The study aims to examine the attitudes of teachers of elementary schools located in all districts in West Kalimantan, one of the provinces on the Island of Kalimantan, Indonesia, towards ICT as a medium to support teaching and learning activities which includes the ease of use, effectiveness and satisfaction. This study investigates how elementary school teachers view ICT as a supporting tool for classroom learning activities and the barriers faced regarding the use of the technology in teaching and learning activities. A total of 102 elementary school teachers were involved in this investigation by acting in response to a questionnaire and 13 participants were selected voluntarily to take part in in-depth interviews about their attitudes on the use of ICT as a tool for educating activities and the barriers these teachers encountered. The findings indicate that elementary school teachers had a positive attitude towards the employment of ICT for instruction along with the various barriers they faced during teaching and learning activities.

Abstrak: *Tidak dapat dipungkiri perkembangan teknologi informasi dan komunikasi yang pesat telah memberikan dampak yang signifikan terhadap berbagai bidang kehidupan manusia termasuk pendidikan dalam beberapa decade terakhir. Pemanfaatan teknologi informasi dan komunikasi untuk mendukung kegiatan belajar dan mengajar di sekolah meningkat secara signifikan di beberapa Negara berkembang seperti halnya di Indonesia. Tujuan dari penelitian ini adalah untuk mengkaji sikap guru sekolah dasar yang berada di seluruh kabupaten di Kalimantan Barat, salah satu provinsi di Pulau Kalimantan, Indonesia, terhadap teknologi informasi dan komunikasi sebagai media penunjang kegiatan belajar dan mengajar yang mencakup kemudahan penggunaan, efektivitas, dan kepuasan. Studi ini menyelidiki bagaimana guru sekolah dasar memandang teknologi informasi dan komunikasi sebagai alat pendukung kegiatan pembelajaran di kelas dan hambatan yang dihadapi guru terkait pemanfaatan teknologi informasi dan komunikasi dalam kegiatan belajar dan mengajar. Sebanyak 102 guru SD dilibatkan dalam*

penelitian ini dengan cara menjawab kuesioner dan 13 partisipan dipilih secara sukarela untuk mengikuti wawancara mendalam tentang sikap mereka terkait pemanfaatan teknologi informasi dan komunikasi sebagai alat penunjang kegiatan belajar dan mengajar beserta hambatan-hambatan yang dihadapinya. Hasil penelitian menunjukkan bahwa guru sekolah dasar bersikap positif terhadap penggunaan teknologi informasi dan komunikasi untuk pembelajaran dengan berbagai hambatan yang mereka hadapi selama kegiatan belajar dan mengajar.

Keywords: *Attitude, Barrier, ICT*

INTRODUCTION

It is undeniable that the rapid development of Information and Communication Technology (ICT) has had a significant impact on various areas of human life, including education in the past few decades. Munir & Herawati, (2019) claim that the use of ICT is a must in this Industrial Revolution 4.0. The use of ICT to support instructional activities in schools in developed countries has also significantly increased (Orlando 2014; Qasem and Viswanathappa, 2016) and in developing countries, as in the case of Indonesia, the application of ICT in the instructional process has started to develop rapidly since in 2004 as ICT was made a new subject in the 2004 secondary school curriculum. However, in the 2013 school curriculum, the Indonesian government removed the ICT subject and took the view that it should not be treated as a separate course but integrated into all school subjects.

Along with the amalgamation of the ICT subject into all school subjects, teachers in a way are expected to integrate the ICT into their instructional activities, such as the use of internet networks, computers, laptops, LCD projectors, tablet computers, online/ offline applications, smartphones, internet phones, hardware, software, podcasts and other online audio-video learning resources. Studies revealed that the merging of ICT into teaching and learning activities has proved to have a considerably positive impact on both instructors and students. Several studies found that the use of ICT in the classroom during the learning process had a sizeable impact on the academic success of high school students in Chemistry (Hussain, Suleman, Din, and Shafique, 2017) and was able to facilitate students in developing language competence, such as reading skills (Wang & Smith, 2013), listening skills (Edirisingha, Rizzi, Nie, & Rothwell, 2007), and other language components, such as vocabulary mastery (Stockwell, 2010). Other researchers also found that the incorporation of ICT during the instructional process had an affirmative effect on student motivation (Pasey, Rogers, Machell& McHugh, 2004), increased student involvement (Caruso & Kvavik, 2005; Gunuc & Kuzu, 2014 & Baz, 2016), helped students to develop ideas during learning activities (Galloway, 2008), built positive attitudes among students and teachers towards instructional activities (Baz, 2016), facilitated teachers in improving the quality of instruction (Ghavifekr&Rosdy, 2015; Finger & Trinidad, 2002 & Young, 2003) and helped teachers to be able to create a more meaningful learning atmosphere (Grabe & Grabe, 2007; Finger and Trinidad 2002).

Regarding the utilization of ICT in educational activities, some researchers suggested that ICT will become an essential part of education for future generations (Grimus, 2000 &Yelland, 2001). Identifying challenges that may arise in integrating ICT in schools will be a vital movement to improve the quality of instruction (Ghavifekr, Kunjappan, Ramasamy, & Anthony, 2015).

Regardless of the benefits of ICT for instructional activities in schools, several studies also found that teachers faced several barriers in utilizing technology tools in the instructional process. In several other developing countries, such as Namibia and

several others African countries, it was found that the major barriers that the teachers encountered when integrating technology in instructional activities included physical and cultural factors, circumscribed technological infrastructure such as access for internet, shortage of electricity power supply, inadequate hardware and software as well as low bandwidth (Hennessy, Harrison, and Wamakote, 2010). Mahdun, and Safriyanti (2019) found that an unstable internet connection, frequent blackouts, limited ability and knowledge to design instructional activities based on ICT due to lack of training, limited ability to keep up with rapid technological advances, lack of availability of laptops and LCD projectors in schools, and insufficient time for educators to collect information or create their own learning media were some of the barriers encountered by junior or senior high school teachers in several rural areas in Indonesia in using ICT to sustain instructional activities in the classroom.

Several teachers reported that low technical support and a lack of knowledge about software and online sites that can support instructional activities were among the major issues faced by pre-school teachers in Malaysia regarding the employment of ICT in the classroom (Kamaruddin, 2017). Meanwhile, Hasan and Sajid's (2013) research showed that a lack of self-confidence was another barrier that many teachers faced in addition to a lack of knowledge related to how to benefit tools of technology for educational interactions. Teachers' perceptions and motivation towards the integration of information and communication tools in learning were also two other major issues that were considered as they affected the successful application of technology in the classroom (Qasem and Viswanathappa, 2016; Ghavifekr and Rosdy, 2015).

Moreover, teachers' favourable attitudes regarding the mixing of technology in instruction and learning activities were also a crucial determinant of the application of ICT in instructional activities (Sugar, Crawley, and Fine, 2005; Moganashwari & Grains, 2013 & Baz, 2016), and Venkatesh and Davis (2000) argued that basically teachers' positive attitudes towards the application of technology in teaching and learning activities depend on how easily teachers view the use of ICT equipment to support teaching and learning activities in the classroom. Sim and Theng (2007) found that teachers' positive attitudes towards the use of technology and information had caused teachers to reduce their dependence on the use of printed books in teaching and learning activities. According to Mensah, Okyere and Kuranchie (2013), attitudes can be interpreted as psychological views, both positive and negative that affect one's interpretation of people, situations, objects, and attitudes that develop as a result of one's experiences. A positive attitude towards the use of ICT in classroom learning is likely to produce good learning outcomes and vice versa as Gardner in (Hosseini&Pourmandnia, 2013) claimed that negative attitudes can lead to decreased motivation. Silviyanti and Yusuf (2015) reported that negative attitudes are among the barriers that can reduce teachers' motivation to use ICT in education. Angers and Machtmes (2005) claimed that the effective use of ICT in teaching and learning activities is influenced by teachers' personal belief and concern in using technology. Therefore, to increase teachers' motivation in using ICT in instructional activities, teachers need to have technical skills and pedagogical knowledge to integrate ICT into instructional activities.

Nevertheless, various studies on teachers' attitudes and barriers in amalgamating technology to facilitate instructional activities in schools were generally conducted only in developed countries. In fact, studies on the same topic in developing countries such as Indonesia are still very limited and mainly focus on secondary schools (Mahdun, Hadrina, and Safriyanti, 2019, Al-Munawwarah, 2014, and Hadriana, 2017). To fill this gap, similar studies that focus on teachers' attitudes and

barriers in the use of ICT in primary schools need to be carried out. This is not only because the learning facilities in Indonesia as a developing country are different from those in developed countries but also because the objects of research are at different educational levels. Therefore, this study focuses on teachers in primary schools in the West Kalimantan region, which is one of the provinces in Indonesia.

The results of the research indicates the authorities with a better perspective of on the importance of examining the attitudes and barriers of teachers, especially elementary school teachers who amalgamate ICT in instructional activities because of the various benefits it brings to improve the quality of learning, especially at the basic education level. Providing basic education institutions with ICT facilities to support teaching and learning activities should be a priority for the Ministry of Education and Culture, especially the Office of Education and Culture of West Kalimantan Province, Indonesia, as an effort to enhance the quality of education in West Kalimantan.

METHOD

This study used an approach of mixed methods that combines quantitative and qualitative methods because it aims to obtain more detailed and in-depth information about the problems in research (Fraenkel, Wallen, & Hyun, 2011), especially the attitudes of elementary school teachers in West Kalimantan province in the use of ICT in educational activities, and to examine the barriers that come with it.

To obtain quantitative data, a questionnaire regarding teachers' attitudes and barriers in using ICT during instructional activities was distributed to elementary school teachers in West Kalimantan by visiting several schools and through social media such as WhatsApp in the form of Google Form. The questionnaire employed in this investigation was adapted from Kamruddin et.al (2017), Mahdun et.al (2019) and Ghavifekr et.al. (2016) which was translated into Indonesian. The data collection instrument is a questionnaire using a five-point Likert scale consisting of *Strongly Disagree, Disagree, Neutral, Agree and Strongly Agree* statements. The questionnaire consists of 2 parts with a total of 18 statements. The first part contains 9 statements about teachers' attitudes towards the use of technology and information which include effectiveness, ease of use and satisfaction. The second part of the questionnaire also contains 9 statements that identify the difficulties elementary school teachers have when utilizing ICT in classroom activities. After about 1 month, 102 primary school teacher respondents from a number of elementary schools in West Kalimantan, consisting of 14 districts / cities, participated in answering the questionnaire. Then, the data collected from respondents were processed with the SPSS version 20 application to be converted to descriptive-statistical data where the percentage was calculated to answer research questions number 1 and 2.

Next, to support quantitative data collected through the questionnaire, qualitative data also needed to be collected. To obtain qualitative data on the attitudes and barriers of elementary school teachers in using learning media, especially ICT, semi-structured interviews were held. The selection of respondents for qualitative data collection was done randomly from the questionnaires obtained. Of the 15 respondents who were contacted to be interviewed, only 13 were willing to volunteer to have in-depth interviews regarding topics related to the research problems. Before collecting the interview data, the respondents were asked for permission to record the interview with a smartphone for transcription, and the respondents' names would be anonymized in the data analysis process. The interview was estimated to last for 5-10 minutes in the place previously agreed upon so that the process could run smoothly. The data from the interviews were then processed with content analysis because Fraenkel et al. (2011) argued that content analysis is very helpful to be used

to analyze interview data in the form of written transcription. Audio interview data recorded with a smartphone was then transcribed and read repeatedly in order to obtain in-depth understanding and select qualitative data (interviews) that support quantitative data.

RESULTS AND DISCUSSION

Results

Attitudes of Primary School Teachers in West Kalimantan Province on the Use of ICT in Teaching and Learning Activities

The findings indicated that in general primary school teachers in West Kalimantan Province showed a positive attitude towards the application of ICT in instructional activities in schools. Statistical data obtained from the questionnaire containing statements of teachers' attitudes towards the employment of ICT with choices *strongly disagree = 1, disagree = 2, neutral = 3, agree = 4 and strongly agree = 5* showed the average score of 4.38. Based on this score, it can be concluded that the primary school teachers in West Kalimantan province revealed favorable attitudes towards the utilization of ICT to aid teachers and students' activities in the classroom at their schools. The classification of the score of the attitudes of elementary school teachers in West Kalimantan province towards the use of ICT is based on *favorable, neutral* and *unfavorable* categories adapted from previous research. (Kamaruddin, Abdullah & Idris, 2016).

Table 1
Teachers' Attitudes towards ICT tools in Teaching and Learning Activities

No	Statement Items	Response					Mean Score
		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
1	I find ICT tools are easy to operate to support my educational activities in the classroom.	0	0.91	8.86	39.09	51.14	4.27
2	In my view, ICT tools make educational process more effective.	0	0.44	4.61	36.84	58.11	4.42
3	I think the application of ICT tools can make teaching and learning activities more delightful and fascinating.	0	0.43	2.58	32.62	64.38	4.52
4	I find that the utilization of ICT tools can facilitate me to create various classroom activities.	0	0.44	2.64	43.08	53.85	4.41
5	I think the employment of ICT tools can improve my teaching and learning performance.	0.22	0	2.69	51.12	45.96	4.33
6	I think ICT device can assist me to explain the lesson more clearly.	0	0	7.43	44.14	48.42	4.31
7	I find that the application of ICT tools can help me to control pupils' learning activities.	0	0.43	9.76	45.12	21.69	4.47

8	I think, the employment of ICT tools in instructional activities can improve students' learning motivation.	0	0.45	4.72	47.64	47.19	4.32
9	In my view, ICT tools can facilitate me to improve my pedagogical professional development.	0	0.44	1.99	47.79	49.78	4.38
Overall							4.38

Score: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

As shown in table 1, the majority of teachers agree that using ICT tools to support educational activities in the classroom is easy (90.23%, M = 4.27). In line with these results, the qualitative data from one of the teachers' respondents was as follows:

> **"For me, teaching with the help of technology is not difficult because I like IT, and I have an OB who can help prepare the tools. Each time I want to teach, I simply tell him, and everything will be prepared."**

Most of the teacher respondents agreed that instructional activities in the classroom with the help of technology makes the learning process more effective (94.95%, M = 4.42). In line with this quantitative interpretation, one of the teacher respondents said:

> **"I think ICT makes teaching more effective because my presentation can be supported by motion pictures from the video.**

Furthermore, the majority of teacher respondents agreed (97%, M = 4.52) that teaching with the support of technology makes the learning atmosphere in the classroom more enjoyable. This view is supported by what the teacher respondents said in the interviews:

> **… the students appeared to be more enthusiastic about learning. Especially a video is played… everyone wants to sit in the front row. They said, "Great, the teacher is playing a video."**

> **… love to use ICT, because it is easier in the learning process and students are also more interested in the media being displayed.**

The majority of teacher-respondents approved that with the support of ICT, a teacher can create varied instructional activities (96.93%, M= 4.41). To support this finding, one of respondents stated that:

> **…. With the help of ICT, I can prepare varied instructional activities because learning with help of videos make students more excited and more focused on the lesson.**

Most of the teacher-participants agreed that the utilization of ICT tools can increase their instructional activities in the classroom (97.08%, M= 4.33)

> **… makes it easier for me to teach… it's easier for students to understand the material with technology support than without it, sir**

In addition, the respondents agreed that technology devices can support teachers to elucidate their learning materials more

obviously (92.56%, M=4.31). In line with this, one of participants declared that,

> **…with the help of ICT, I can present the important points and explain them to my students, sir. For example, it has been presented in the video and then practiced with concrete objects, sir.**

Moreover, the respondents stated that the utilization of ICT tools in the classroom can help teachers to control students' learning activities (66.81%, M= 4.47). To support this finding, one of the participants declared:

> **yes..with videos or pictures from the PPT (Power Point) instructional activities are easier to carry out because students are more focused on watching videos and looking at pictures, sir.**

Similarly, the majority of respondents agreed that technology employment in the classroom for educational purposes has a significant influence on students' motivation to learn (94.83%, M=4.32). In line with this quantitative finding, one respondent confirmed that

> **In my opinion, students learning motivation increases, sir, because with ICT, you can use various kinds of pictures or videos so that students are happy with the learning that we provide, sir.**

Nevertheless, most of partakers came to an agreement that, ICT has a vital role for developing their professionalism in teaching and learning (97.57%, M: 4.38).

> **… ICT (ICT) is very helpful ..sir… because nowadays every teacher is required to be able to use ICT in teaching, so with the help of ICT, teachers will be easier to present the material that is difficult to understand by students, sir.**

It can be concluded that majority of elementary school teachers in west Kalimantan province have a favorable attitude toward the amalgamation of ICT in classroom activities in the classroom since the overall mean score is 4.38 and according to Kamaruddin, Abdullah and Idris (2016) it is classified as favorable.

Teachers' Barriers in Integrating ICT Tools in Educational Activities

Table 2 illustrates the findings in the form of statistical data which shows information related to the barriers that primary education teachers in West Kalimantan province encounter when integrating ICT in educational activities at the elementary school level. The format of response and score for each item is strongly disagree = 1, disagree = 2, neutral = 3, agree = 4, and strongly agree = 5. In general, the level of difficulty met by elementary school teachers in using ICT faals into the *moderate* category because the mean score is 3.54 (Kamaruddin, Abdullah and Idris, 2016.

Table 2
Barriers Faced by the Elementary School Teachers in Incorporating ICT tools in Teaching and Learning Activities

No	Statement Items	Response					Mean Score
		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
1	I think problem with technical support (operator/technician) is one of important issues relating to the employment of ICT tools in the classroom.	0	3.54	18.23	51.65	26.58	3.83
2	I have a barrier of time in organizing ICT tools in teaching and learning activities.	4.03	18.12	25.17	51.01	1.68	2.89
3	Inadequate knowledge about how to utilize ICT tools in teaching and learning is one of my weaknesses.	6.91	21.82	26.18	37.82	7.27	2.66
4	I have some problems in selecting appropriate teaching approach to use ICT tools in teaching and learning activities.	1.63	22.22	26.47	43.14	6.54	2.97
5	In my view, I have lack of knowledge relating to software or websites that support educational activities.	4.08	21.09	23.47	46.26	5.1	2.85
6	In my view, lack of ICT tools in school e.g LCD projector, internet network, and desktop computer can decrease teachers' interest to use ICT tools in the classroom.	0.76	8.59	8.33	34.34	47.98	3.84
7	I think unstable internet connection can demotivate me to use ICT tools in teaching.	0.75	6.98	6.73	41.9	43.64	3.89
8	I find that the availability of sufficient electrical power supply is important to support teaching and learning with ICT tools.	0.21	0	0.64	33.19	65.96	4.56
9	I think ICT tools based training for teaching and learning is necessary to be implemented regularly.	0	0.44	3.95	38.6	57.02	4.42
		Overall					3.54

Score: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

Table 2 shows that 78.23% (Mean = 3.83) of primary school teachers in West Kalimantan province have problems with technical support (operator/technician) particularly relating to the amalgamation of ICT tools in the classroom. In line with this finding, one of the respondents stated his experience:

> **Sometimes…the operator forgets to prepare supporting cable…for my laptop (certain laptops need a HDMI cable). So, I cannot perform my teaching with technology.**

Another respondent shared her experience:

> **I am a senior teacher. I am not good at technology but I like to use ICT in teaching sometimes so I need assistance from the operator.**

Relating to restriction of time in benefitting ICT in instructional activities, 52.69% (M= 2.89) of respondents considered it as a barrier. This view is supported by one of the following participants:

> **For older teachers…,managing teaching time with technology is a problem….sorry …limited ICT skills.**

Less than half of the respondents stated that lack of familiarity with ICT tools in instructional activities is one of their weaknesses (45.9%, M= 2.66). In line with this, a senior teacher-respondent stated that,

> **I like to use technology sometimes in teaching..but I have limited knowledge to integrate technology in most of my teaching activities.**

Moreover, less than half of the participants (49.68, M= 2.97) agreed that selecting proper approach for ICT amalgamation in teaching and learning is one of the barriers they found in their daily routines in the school. To support this finding, one of the respondents shared her experience

> **If you ask me, what approach do I use in my technology-based teaching… I don't know… what approach I should use.**

The participants agreed that limited knowledge of software or websites for assisting teaching and learning activities hinders their instruction performance (51.36%, M= 2.85). In line with this agreement, one of the teacher-participants shared her view:

> **Honestly, I sometimes use technology in my classes..but I am an older teacher, familiarity of websites and software for teaching is one of my weaknesses.**

Additionally, the majority of participants agreed (82.32%, M=3.84) that lack of infrastructure and devices such as LCD projector, internet network, and desktop computer has significant effect to their enthusiasm to use ICT tools in the classroom.

> **… What makes me lazy to teach using ICT… that is ……. If the internet network is slow ……**
>
> **....in the village in Kapuas Hulu (one of the districts in West Kalimantan), there is no internet network and we have limited number of laptops and LCD projectors in the school. ..so we have to take turn in using them …. sometimes this situation weakens my motivation to**

integrate technology in my lessons.

The respondents maintain that the instability of internet connection is one of the barriers that can discourage teachers to utilize ICT in teaching (85.54, M=3.89). Relating to this issue, two of participants shared their perspectives:

> **In our village in Sambas (one of the districts in West Kalimantan), internet connection is slow. We have to go to a cafe with faster internet connection in the market area to have a good signal.**
>
> **Our school is located in a distant area. It is quite far from the city of Kabupaten (district). Internet network is unstable. We have to go to the city of kabupaten to get a stable signal**

The majority of the respondents had an agreement that sufficient electricity power supply is essential to assist technology-based teaching and learnings (99.15, M=45.56). Relating to this issue, some respondents stated as follows:

> **In our village, in the interior of the Sanggau area, electricity has just been available this year (2020). Previously, if you wanted to teach using a laptop, an LCD Projector, and played videos, you had to start the Genset (power generator engine) first.**
>
> **In our place in the rural area of Putusibau, the lights often go out. So if you are teaching using technology ... the lights suddenly go out… so I can't continue.**
>
> **I sometimes teach using ICT, sir, in the form of a laptop and a projector but not very often because in our area (Sambas District, particularly suburban areas) it is difficult to have internet signal / network, and it is also hampered by power outages.**

Lastly, most of the respondents agreed that (95.62, M= 4.42) training on the employment of ICT for teachers needs to be carried out regularly to support educational activities in the classroom. The teachers took the view that they need to have training and mentoring in order to be able to use technology optimally during instruction, such as using software, online and offline applications, online learning resources, selection of online video contents and other presentation media besides Microsoft PowerPoint.

> **I think I lack knowledge in teaching with ICT. Because I only know how to use PowerPoint and searching for online learning resources is also difficult for me.**
>
> **…… I really want to be able to make my own learning media. I want to be able to edit videos related to the materials I teach.**
>
> **I really want to learn to find and use educational games to make my teaching more interesting and fun.**

In line with the three teachers above, another teacher added:

> **Yes… if possible, training should be provided by the government…on how to use ICT to support teaching and learning activities.**

Based on the findings above, it can be concluded that elementary school teachers in West Kalimantan province are still having difficulties (at a moderate level) in how to use ICT optimally in order to be able to present lesson material better. The lack of knowledge and skills among the teachers in the application of ICT to support instructional activities is an important issue to address.

Discussions

In general, this study provides essential evidence on issues related to teachers' attitudes towards assimilating ICT in instructional activities in primary schools and the barriers they face during the learning process.

The statistical data displayed in table 1 has proved that elementary school teachers in West Kalimantan province indicated a favorable attitude towards ICT integration in teaching and learning activities. The average score of teachers' attitudes towards the utilization of ICT in teaching and learning activities is 4.38 and this score indicates a *positive* category. In addition, data from the interviews also revealed that the majority of primary school teachers in West Kalimantan province had perceived positively on the application of ICT in academic activities. This study supports previous findings where the majority of respondents had positive attitudes towards the employment of ICT in instructional activities (Moganashwari & Grains, 2013).

Other findings also signified that quantitatively the majority of respondents agreed that learning based on ICT is effective to increase students' learning motivation and involvement in learning so that it has an impact on improving the quality of learning processes and outcomes, and the results are in line with previous studies where technology-based learning had a positive effect on student motivation and involvement in learning (Pasey, Rogers, Machell & McHugh, 2004; Grosso, 2015; Caruso & Kvavik, 2005; Gunuc & Kuzu, 2014; Baz, 2016).

The respondents' attitude towards the use of technology in teaching and learning activities in terms of ease of use is also positively reflected in the quantitative findings. A number of participants agreed that they had no difficulty teaching their classes with the support of ICT. The results of the interviews also demonstrated that in some schools, teachers did not have significant difficulties in teaching with the support of technology. Some schools also provided technical support to help the teachers utilizing ICT devices for their teaching.

The respondents' positive attitudes were also reflected in the satisfaction in applying ICT in teaching and learning activities. The respondents felt satisfied when teaching with the support of ICT because the learning atmosphere became more enjoyable and made it easier for them to control student learning activities. Moreover, the presence of technology also facilitated the teachers to present material more clearly to students. Therefore, these findings support the previous research, which claimed that the amalgamation of ICT during the learning and teaching process could help teachers create a more meaningful learning atmosphere (Grabe & Grabe, 2007).

Furthermore, this study also investigates the barriers faced by teachers during classroom instruction with the support of ICT. Quantitative data (Table 2) shows that the level of difficulty of elementary school teachers in West Kalimantan province in using ICT in instructional activities is moderate.

The availability of supporting facilities and infrastructure such as the availability of technicians to help prepare for instructional activities and adequate supporting devices such as laptops, LCD projectors were among the crucial issues related to the major barriers faced by teachers when carrying out the learning process in the rural areas of West Kalimantan Province. This phenomenon is in line with the studies conducted in other developing countries such as Namibia, where the availability of facilities and infrastructure

in the form of technology that supports learning has become a major issue which hinders the technology-based teaching and learning process (Hennessy, Harrison, and Wamakote, 2010). Furthermore, Munir & Herawati (2019) suggest that the availability of support system is one of important competence in online teaching.
. In addition, the lack of facilities of information communication technology to support instructional activities in West Kalimantan province has reduced the motivation of elementary school teachers to utilize ICT in classroom instructional activities.

Another important issue to consider regarding the application of technology in instructional activities is the availability of a stable internet network. Some teachers complained about the slow internet network in their area, especially in schools located in rural areas. A lot of elementary school teachers in the rural areas have complained about the difficulty of downloading materials related to the subject they teach. They had to go to a location with a stable internet network to obtain learning materials from online sources.

In addition to internet network problems, another barrier that is often faced by elementary school teachers in the rural areas of West Kalimantan province is the availability of electricity. Lack of electricity supply and rotating outages have made teachers more selective in choosing the time to implement ICT-based instruction. This finding is in line with a study by Mahdun, Hadrina, and Safriyanti (2019) where one of the barriers faced by teachers when teaching with ICT support especially in developing countries is the lack of electricity energy or rotating outages.

Another issue that also hinders teachers from implementing technology-based instruction is lack of knowledge about online learning resources (educational games, learning games), and lack of skills in preparing audio-visual based learning media as well as lack of training to use technology in teaching as a professional development activity.

Other barriers faced by teachers when teaching with the help of ICT, although insignificant, were allocation of time, limited knowledge of using ICT devices, choosing the right learning approach in order to integrate ICT and knowledge related to software or gadgets that can support teaching and learning activities. The results of the statistical data (mean score) with regard to the barriers mentioned above indicate that the score fell into the *low* category and half of the respondents did not consider these issues as a barrier for them to integrate ICT in instruction.

In light of these phenomena, it is necessary for teacher training institutions to update their educational curriculum with courses that cover knowledge and skills of using ICT in instruction so that elementary school teachers will be competent in using technology to design and carry out instructional activities and regular training in the use of ICT for in-service teachers also need to be provided.

CONCLUSION

It can be concluded that the majority of teacher-respondents elucidated a positive attitude towards the employment of ICT in educational activities.

In addition to the effectiveness of ICT in supporting instructional activities, the majority of teachers also did not have significant difficulties in incorporating ICT in their instruction which is supported by the quantitative data where the difficulty level of incorporating ICT in the learning process was classified into the *moderate* category and the qualitative data proved that the barriers associated with the application of ICT in teaching and learning activities were mostly encountered by elementary school teachers in the rural areas. Based on the quantitative data, the attitudes of elementary school teachers in West Kalimantan province were in the *high* category, and in addition, the data derived from the interviews also supported the

findings of the quantitative data. The majority of teachers agreed that the application of ICT is effective in supporting instructional activities in the classroom. Teachers felt that the utilization of ICT in instructional activities encourages students' engagement with the lesson.

Furthermore, in terms of satisfaction in ICT-based instruction, it can be concluded that the teachers were satisfied with ICT-supported instructional activities because they were able to present the material in a more meaningful and fun way. This study only examines 2 variables, namely teachers' attitudes and barriers in using ICT in teaching learning activities in elementary schools. Further research involving more variables such as expectations, readiness, and the level of teachers' mastery of ICT to facilitate teaching and learning activities at a higher level of education needs to be conducted by involving more respondents.

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