

Developing Elementary School Teacher Competence in Making Music Learning Media Using Scratch Application: An Action Research

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Abstract. The development of technology and information demands elementary school teachers to be able to make and teach technology-based musical instruments so that the development of technology and information can be used in the learning process. Elementary school teachers also have problems teaching musical composition using ensemble musical instruments. Teachers also lack strategies and media to teach musical instruments, so they need to have ideas for developing technology-based musical instruments. This study aims to develop the elementary school teachers' ability to innovate and make music learning media using a computerized system. The research design used was action research. The participants were 38 teachers from nine regencies and cities in West Java, Indonesia. The results showed that the teachers were able to complete the task of making technology-based learning media, which means that they were able to develop their technological abilities to make music learning media. Teachers can easily use and master the Scratch application to make music learning media. It can be concluded that with structured and controlled training, elementary school teachers can develop themselves and innovate well.

Keywords: teacher competence; teachers innovate; technology literate teachers; computerization for teachers; teacher and Scratch application

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INTRODUCTION ~ Learning media is a fundamental element in learning music in elementary schools because it greatly influences student competence. Meerbaum-Salant et al. (2013) stated that the use of media is a major requirement in the music learning process. In reality, however, not all elementary schools in Indonesia have complete facilities and means of learning music. Based on the survey results of 38 participants, only 13 (34.2%) schools had complete learning facilities and the remaining 25 (65.9%) had incomplete learning facilities. This condition is exacerbated by only a few teachers trying to develop their own learning media. Lack of teacher competence and motivation in developing instructional media is also a cause of the non-optimal music learning in elementary schools. As a result, students had not achieved the required competence. This is certainly a problem for music education in Indonesia.

A training program for elementary school teachers is one solution to overcome this problem. However, based on survey results in Sumedang Regency, West Java province, in 2020 the

local government Education Office rarely conducted training programs to improve teacher musical competence. In fact, in the last two years there had been no training program at all (Julia, Supriyadi, & Iswara, 2020). This condition encourages a training program for developing music learning media using Scratch application for elementary school teachers so that they can improve their competence and knowledge about music learning media.

Previous research proved the importance of training program for elementary school teachers. Julia et al., (2020) conducted a study on non-specialist music teachers by implementing a five-step critical reflection. The results showed that the teachers' knowledge of basic music theory increased. They could also use several applications that support music teaching so that they can improve skills in teaching music.

Calderón-Garrido et al., (2019) conducted a scientific review of the influence of technology in the educational revolution in the last ten years in Spain. The results showed that students at elementary level can improve their musical abilities significantly. At middle school level, students could strengthen their knowledge of traditional music. Meanwhile at the university level, online learning had become a new trend, allowing the entry of new experiences.

Özkandemir (2019), examined the effect of Scratch programming language and Makey Makey electronic card used in coding and robotics lessons on note reading and writing in primary school 1st, 2nd and 3rd grade music lessons. There were 156 students in the research. According to the results of the 12-week education process, it has been determined that there was an improvement in note reading and writing activities at all grades. In addition, it has been specified that the students enjoyed this learning process and did the exercises gladly.

Biasutti et al., (2015) conducted a research to increase the confidence of non-specialist primary school music teachers through an intensive program. Training was given to 23 elementary teachers from four different countries, who were studying at European universities. The results showed that there was an increase in the quality of effective attitudes in teaching music in elementary school and that the teachers valued the methodological approach, practical learning ideas, and how the course met their educational needs. Teachers were also able to provide solutions to social problems in communication, topics/activities, methods and organization.

Based on previous research, the results of research have not been obtained that examine the development of music learning media based on the Scratch application, especially in Indonesia. Therefore, the main objective of this research is to improve the ability of elementary school teachers to develop music learning media by utilizing technology. This study seeks to investigate the problem through the following questions: (1) Can elementary school teachers improve their ability to develop music learning media? (2) Can elementary

teachers use technology for teaching music? (3) Will a series of reflective-critical steps change the paradigm of elementary school teachers to be more creative in teaching music?

THEORETICAL FRAMEWORK

Teacher Competence

Research showed that mastery of content and approaches are critical to teaching so that music teachers have a foundation for the instruction (Townsend, 2011; Augustine & Wong, 2016; Maguraushe, 2015; Concina, 2015; Rauduvaitė & Wang, 2018). When teachers have content knowledge, knowledge of the curriculum, and pedagogical knowledge, they have a sound knowledge base (Shukman, 1987; Mariaye, 2012). Other research (Anwar, 2015; Chireshe, 2011; Leung & Wong, 2005; Penn-Edwards, 2010) also established that good training of music teaching is attributable to the teachers' musical capability, philosophy, pedagogy, and character. Furthermore, the music training involves making reachable the aesthetic meaning of music (Davis, 2005; Fitzpatrick, 2011; Karlsen, 2011; Martin et al., 2013; Reimer, 2003; Smithrim & Upitis, 2005; J.-C. Wang & Humphreys, 2009; Wiggins, 2007).

The music teachers' inspiration is also critical to their efficiency in teaching music in the classroom. Confidence, which is an indication of security emanating from grounding in a discipline, is also a motivator to the teacher (Akuno, 2019; Akuno, 2012; Human & van Niekerk, 2014; Njooora, 2015). Music teachers need good education to achieve subject matter mastery and face challenges when teaching, and that empowers them to deliver confidently (Akuno, 2012). This means that sufficient music teacher education and training will lead to improved confidence. Interest in work, good results, and boosted confidence can make the music teacher productive. In this research, music teacher motivation was central to their construction of their own personal identity, self-efficacy, as well as how their authorities perceive them. Self-concept is critical to effectiveness through their belief in their own ability to provide and develop education (Berberick et al., 2016; Button, 2010; Legette et al., 2016; Schmidt, 2013; Wong & Lau, 2018).

Technological Literacy

Teaching is closely related to the abilities that, as the OECD (Organization for Economic Co-operation and Development) said to be in demand in the labor market, is called 'intangible advantages' such as 'knowledge-based capital' (Barreneche et al., 2016; Hasse, 2017; Magnussen et al., 2019; Magnussen & Stensgaard, 2018; Minoi et al., 2019). The OECD advocates that through ICT-related education, training and re-skilling, people can be prepared with the suitable abilities to make use of ICTs and to manage risks to their online social and economic actions, along with the perspective to foster entrepreneurship, employment, and e-inclusion (Arbix et al., 2017; OECD, 2015; Hasse, 2017b; Nimrod, 2018; Truong & Sweetman, 2018).

Various technology in education, such as pens, books, blackboards, and chalk, have been around as long as schools and students have existed. However, electronic educational technologies should be seen as a political agenda. Today, many new software and hardware have been produced by technology companies (such as Apple, Lego, Microsoft etc.) who have a commercial interest in education. The electronic educational technologies include the hardware that allows access to digital resources and networks, and the using the resources and network (Davies & Eynon, 2013; Eynon & Geniets, 2016; Hartnett, 2017; Navarro et al., 2018; Papatraianou et al., 2014; Shao & Crook, 2015). Thus, these technologies are more than just material objects.

In practice, technologies in education have changed education unexpectedly. It has been challenging for schools to connect materials and practical work systems. The reason for the difficulties, in part, is the teachers' lack of skills and understandings in integrating new technologies in their teaching practice. School managers thought that this is a matter of teachers' technical skills; however, since demands of new technologies are in fact beyond the material, there is a need for technological literacy. Some believed that the issue would fade away as digital natives replace older teachers (Casillas et al., 2020; Chandrasoma & Lee, 2013; Fehér, 2020; Natesan et al., 2020; Prensky, 2001; Tortosa-Pérez et al., 2020; Zhang, 2020). Yet, little evidence suggests that this will resolve the problem (Helsper & Eynon, 2010; Ng, 2012; Pearce & Rice, 2013; Selwyn, 2012; Thompson, 2013; S. K. Wang et al., 2014). As a result, it is important for teachers to cope with the effect of technologies in teaching and learning in school, and to understand that this is more than just a matter of technical skills.

Technology-Based Teaching Media

Teachers are tasked to design rich and relevant learning for students who actually have access to any learning resources on their own, at any time. Teachers also face difficulties because of the pressure of government regulation, intensive testing, expanding teaching quantity, student language and cultural diversity, and reduced respect for the profession from the society (Baskerville, 2011, 2012a, 2012b; Pransky, 2009; Sanford et al., 2012; Trittel et al., 2014). Learning is also difficult because students have to acquire the skills, knowledge, understandings, and attitudes to prepare them for the always changing workforce driven by technology (Baskerville, 2012a; Jukes et al., 2010; Kelly et al., 2008; Kivunja, 2014; Pearlman, 2010). Teachers need to focus on the constantly developing technology to engage students and ensure that the education given is relevant to the society in which they will live (Montrieux et al., 2015; Uluyol & Şahin, 2016; Vanderlinde & van Braak, 2010, 2011).

Online teaching and learning are now the demand in the age of information (Blasco-Arcas et al., 2013; Dağhan & Akkoyunlu, 2016; Oncu & Cakir, 2011; Verdú et al., 2012). Moreover, in the past two decades, investment in educational technology has happened worldwide

based on the notion that technology can promote effective learning and support higher academic achievement, yet there has not been much evidence to support this (Blasco-Arcas et al., 2013; Dağhan & Akkoyunlu, 2016; Oncu & Cakir, 2011; Verdú et al., 2012). However, information and communication technology (ICT) can encourage important reflection about learning, where learning outside school may result in people questioning the teaching and learning models in schools (Austin et al., 2010; Biasutti & EL-Deghaidy, 2015; Clarke, 2013; Hadjerrouit, 2013; Haugerud, 2011; Henderson et al., 2013).

Significant factors in the use of technology to support learning have been identified by years of research. The factors have been integrated into theoretical frameworks and models, such as the constructionist theory, in which knowledge is actively constructed and created. This is possible if the learners are active in building an external artefact that they can reflect upon and share with others. Internet and ICT advances allow the creation of such artefact and learning (Adell, 1997; Cordova & Lepper, 1996; Cuban et al., 2001; Papert, 1993). In constructionist view, computers are necessary to support experimentation and active building of knowledge through creation, reflection, and sharing. Students have a part in directing their learning (Alonso et al., 2010; Jara et al., 2009; Moreno et al., 2007; Romero Ariza & Quesada Armenteros, 2014), and in exchanging ideas to build a public artefact (Adell, 1997; Cordova & Lepper, 1996; Cuban et al., 2001; Papert, 1993). Meanwhile, teachers are knowledge facilitators instead of being knowledge providers (Adell, 1997; Cordova & Lepper, 1996; Cuban et al., 2001; Papert, 1993).

METHOD

Research Design and Collaboration

The action research design was carried out by gathering information and then improving the learning methods of the research subject (Creswell, 2002). This design was used because the data were collected using self-reflection questions to gain more understand about the practice (McTaggart, 1994). This research aims to develop critical steps to improve teacher understanding. This is in line with Creswell (2002) stating that the purpose of action research is to explore practical problems to develop the solutions. Using action research, teachers are also believed to be able to increase their enthusiasm and self-confidence (Jenkins Dr & Crawford, 2016; Pelton, 2010). Moreover, this research follows stages of action research.

The research began with collecting information from the participants. Then, based on the information, the participants were trained to provide insight and improve understanding in developing learning media. Based on the stages, this research led to action research; therefore, action research was selected as the design of this research.

An important point in action research is collaboration (Creswell, 2002; Jaipal & Figg, 2011; Leeman et al., 2018). To fulfill this point, this research activity was socialized until the

collaborators joined. Based on the survey results by Julia et al. (2020) in the past two years there had been no government effort to carry out music training for elementary school teachers in Sumedang Regency. This condition was the reason to offer training for elementary school teachers. In the implementation, of this research, a colleague assisted with preparing the training facilities, infrastructure, and conditioning the participants during the training.

Research Subject and Location

This research was conducted in Sumedang Regency, West Java. West Java Province consists of 27 regencies with Sumedang as the center of the research location. This Regency is divided into three regions based on the level of progress, namely urban, transitional, and rural regions. The target participants were initially elementary school teachers in Sumedang. However, after being socialized through social media such as Whatsapp, Instagram, and Facebook, there were many positive responses from teachers outside Sumedang Regency. Therefore, it was decided that the participants were not only in Sumedang, but also from outside the regency. However, the research location was still centered in Sumedang where the researchers live and work. The research location is shown in Figure 1.



Figure 1. Research Location

The participants of the training program were 38 teachers from nine regencies and cities. Based on the survey results, 30 (78.9%) teachers had taught music and 9 (21.1%) have never taught music. Most participants (27) were from Sumedang, and the rest are from Bogor (3), Cirebon (2), Banyumas, Blora, Cimahi, Indramayu, Majalengka, and Magelang (1 each). Based on gender and age, the participants consisted of six (15.8%) males and 32 (84.2%) females. Two (5.3%) participants were aged between 21-25 years old, 22 (57.9%) were between 26-30 years old, six (15.8%) were between 31-35 years old, two (5.3%) were between 36-40 years old, three (7.9%) were between 41-45 years old, one (2.6%) were between 45-50 years old, and two (5.3%) were between 50-55 years old.

Research Procedure

Based on the research design, this research had three stages, namely the pre-action, action, and post-action stages. The pre-action stage consisted of survey and the initial stage of data analysis. This survey was distributed to the participants before the training activities. The action stage consisted of training and practical use of the Scratch application. The post-action stage consisted of a survey and evaluation. The action stage produced six critical-reflective steps in the process of increasing teacher competence to develop learning media, namely exploration and motivation, introduction to the Scratch application, elaboration, confirmation, revision and evaluation, and discussion of findings from a series of training activities.

After the training, the participants were assigned to fill out an online survey. The survey consisted of several open questions, and Likert, and Gutman scales. This survey was aimed to identify the knowledge and ability of teachers of the training material and to identify their views in developing music learning media after the training. In its implementation, the training was conducted via Zoom meeting added with a WhatsApp group as a means for discussion. Zoom meeting was used because when the training was held, in Indonesia, especially Sumedang Regency, the Covid-19 pandemic had occurred. Therefore, all activities that gather large numbers of people were prohibited. While the WhatsApp group was used because it was easy to operate and was the main application for everyone to communicate. Google Form was also used for the survey. These media were chosen because of they were familiar to use by the teachers, easily accessible via smartphones, could minimize data inaccuracies by utilizing one entry point, eased the work of the researchers, and they only required basic computer skills (Laskowski & Laskowski, 2016).

RESULTS

The steps taken to produce critical and evaluative thinking about developing application-based music learning media were carried out in several planned and structured processes. The processes involved data collection, pre-action analysis, six-stage action, and post-action analysis. The following are detailed elaborations of the action processes.

Pre-action Analysis

Before the training, the participants filled out a pre-action survey to identify their knowledge and skills in using and developing application-based learning media in teaching music in elementary schools. Based on the survey results, the information obtained was divided into two categories, namely, confidence in teaching music and the use and development of music media.

Table 1 shows the participants' responses to the questions and statements related to their experience and confidence in teaching music. It can be seen that of the 38 participants, 30

(78.9%) had taught music and eight (21.1%) had never taught art. Meanwhile, in terms of competence, 3 (7.9%) participants felt incompetent, 15 (42.1%) felt less competent, 17 (44.7%) felt competent, and two (5.3%) felt very competent. Almost all participants agreed that teaching music was easy and fun with 26 (68.4%) participants agreeing, four (10.5%) strongly agreeing, six (15.8%) rather disagreeing, and only two (5.3%) disagreeing.

Table 1. Confidence in Teaching Music

| Question | Yes | No | | | |
|-----------------------------------|--------------------------|-----------------|------------------------|--------------|-----------------------|
| Have you ever taught music? | 30 | 8 | | | |
| Statement | Strongly Disagree | Disagree | Rather Disagree | Agree | Strongly Agree |
| I am competent in teaching music. | 0 | 3 | 15 | 17 | 2 |
| Teaching music is easy and fun. | | 2 | 6 | 26 | 4 |

Table 2. The Use and Development of Music Learning Media

| Question | Yes | No | | | |
|---|--------------------------|-----------------|------------------------|--------------|-----------------------|
| Have you ever used an application to develop music learning media? | 4 | 34 | | | |
| Have you ever known Scratch application before? | 16 | 22 | | | |
| Does your school provide adequate facilities or media for learning music? | 14 | 24 | | | |
| Statement | Strongly Disagree | Disagree | Rather Disagree | Agree | Strongly Agree |
| I use learning media when teaching music. | 0 | 1 | 7 | 21 | 9 |
| Learning media really help me with teaching music. | 0 | 0 | 1 | 18 | 19 |
| Students understand better when I teach using learning media. | 0 | 0 | 1 | 19 | 18 |
| There are many applications that can develop music learning media. | 0 | 3 | 5 | 20 | 13 |

Table 2 describes the participants' knowledge regarding the development of technology-based learning media. To the statement "I use learning media when teaching the music", one (2.6%) participant responded disagree, seven (18.4%) disagree, 21 (55.3%) agree, and nine (23.7%) strongly agree. This shows that most of the participants always used learning media when teaching music. However, not all schools have adequate learning facilities and media. Only 13 (34.2%) participants had adequate facilities at school while the rest were inadequate. After further investigation, the teachers had various solutions to this problem, including by using audio-visual media, YouTube, smartphones or laptops, and asking students

to bring them from home. Of the 38 participants, only four (10.5%) participants ever used applications to develop music learning media, and the rest had never used them. After further exploration, there were various applications they had used, such as Contact, Cubase, EZ Keys, Halione Sonic 3, VST Instrument, and only one participant had used Scratch. However, almost all participants agreed that there were many applications that could be used to develop learning media, with 13 (34.2%) participants strongly agreed, 20 (52.6%) agreed, 5 (13.1%) rather disagreed, and only 3 (7.9%) disagreed. In fact, 22 (57.9%) participants had known Scratch before and only 16 (42.1%) had not known it.

Action: Music Learning Media Development Using Scratch Application

Referring to the most urgent aspect for music teachers to know and master, six critical steps were applied. Through these six steps, the teachers' needs and problems were reflected (Julia, Iswara, et al., 2019; Julia, Supriyadi, et al., 2020; Julia & Isrokatun, 2019; Supriyadi & Julia, 2019). The following are the six critical action steps to improve the music teachers' ability to develop technology-based learning media.

Step 1: Exploration and Motivation

The results of the pre-action survey showed that most schools did not have adequate music learning facilities and media. However, almost all participants did not try to develop their learning media. They only tried to use any available media such as asking students to bring them from home, using YouTube, and using smartphones and laptops. Only two out of 38 participants tried to develop learning media through applications. Even so, most of them admitted that there were many applications that they could use. In fact, half of them were familiar with Scratch before the training. The development of learning media has not been implemented due to several things such as a lack of awareness of the importance of making learning media and lack of ability to use applications. Therefore, their perception had to be changed. To attract their interest and attention, several examples of learning media were shown. All of the learning media displayed were in the Scratch application. The participants were shown various functions and advantages of these learning media, thereby increasing their motivation to learn them.

Step 2: Introduction of Scratch Application

At this step, the participants were given an explanation about Scratch starting from its functions, advantages and disadvantages, to how to use it. The activity began by explaining about the advantages and disadvantages. Scratch is a programming application used by young people (Meerbaum-Salant et al., 2013). The application is simple and easy to use, it does not require high computer specifications, and it has many features that can facilitate users to be more creative. The disadvantage is that the results or products from the application cannot be imported into other forms. Users can only use the created media in

the application. The next activity was a step by step explanation of how to use the application. The explanation began with the introduction of the icon, the tools functions, how to create and enter images, how to record and enter sounds, to how to give commands or code. During the activity, the participants were monitored by the collaboration team, noting which parts were difficult for the participants to understand and giving them the opportunity to ask questions. Figure 2 shows the appearance of the Scratch application.

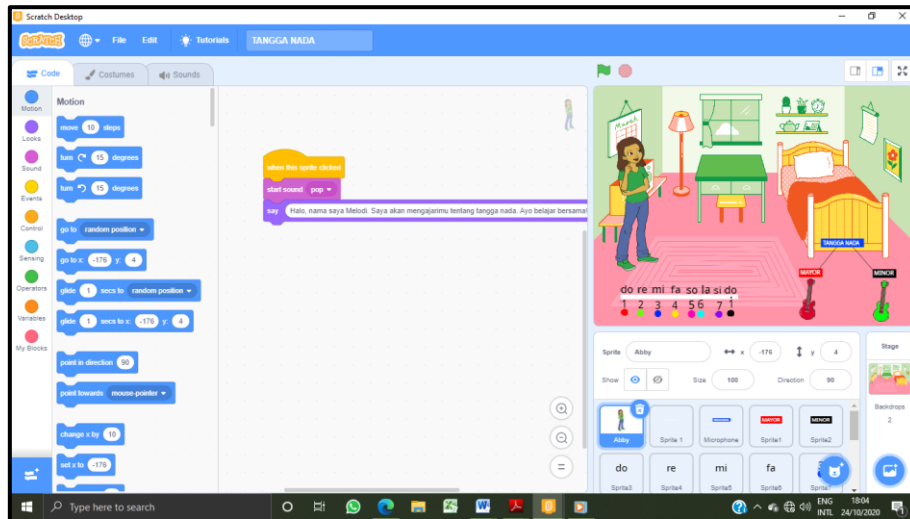


Figure 2. Scratch Application Interface

Step 3: Elaboration and Building Communication using Social Media

After the participants understood how to use Scratch, they were given the opportunity to explore the application. They were directed to make various kinds of music learning media based on the Basic Competencies in the 2013 Curriculum for Elementary School. At this stage, the participants created a discussion group on WhatsApp named Training Group and Scratch Workshop. In this group they discussed various ideas such as reviewing the training materials that were uploaded on YouTube, reporting the progress of making the media, reporting any obstacles and difficulties during making the media, and so on. At that time, the collaboration team was always ready to provide assistance for the participants who had problems, especially those who were elderly because they lacked adequate skills in using the application. Some of them also expressed their regret that they had missed a series of training activities due to their work schedule.

One of the topics discussed was training certificates. From the discussion, it was revealed that one of the reasons for them to take part in the training was to receive a certificate as a trainee. For them, a certificate was proof to include in their annual report as government officers. The certificate was also a supporting element for the credit score to raise their level. Seeing the activeness of the participants, seminar certificates were given to them at the end of the training.

Step 4: Confirmation and Evaluation

The second face-to-face activity was carried. Several participant representatives presented their work. Their presentation were creative and innovative that they exceed expectations. They could use the application easily and even used it further than described in the training. One of the participants, for example, made a complete *gamelan* with various musical instruments such as *saron*, *bonang*, *gendang*, *gong*, *jenglong* and *arumba*. The media had a potential to be developed further. This media allowed users to play *gamelan* online. An example of the music learning media made by one of the participants is illustrated in Figure 3.

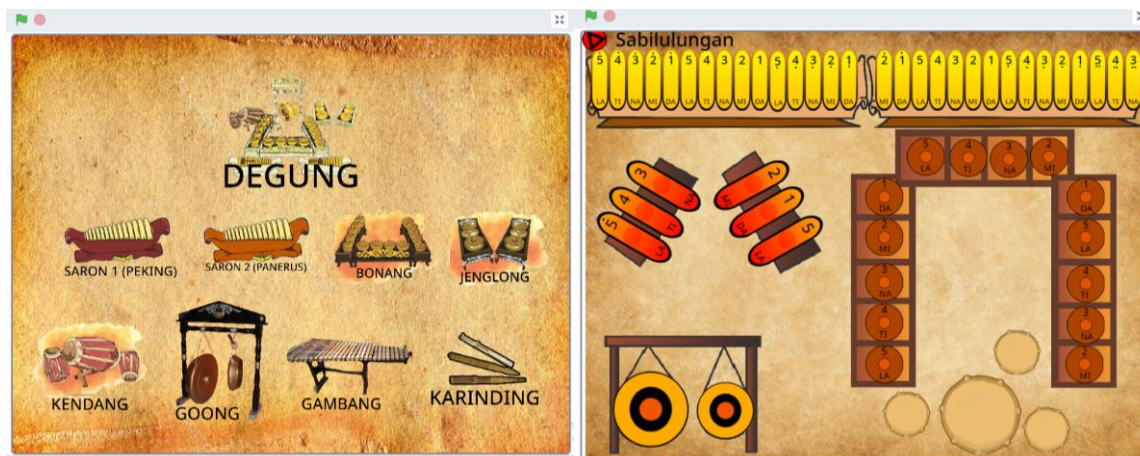


Figure 3. Degung Learning Media

Several participants, however, still experienced difficulties. Most of them did not understand the function of each tool. To solve this problem, one of the participants were asked to simulate directly how to make the media step by step and the other participants watched carefully. At this stage, there were no finished products of learning media. All of the media had to go through a revision process to produce good music learning media. For this reason, additional time was provided for the participants to revise their products.

Step 5: Revision

The participants revised their products based on input from the presenters, such as inaccurate tone, non-proportional form, inappropriate coding, sounds that failed to play, and movements that are not suitable. They seemed very excited to be able to finish the product on time. This was observed when many participants asked questions either through personal chat or Whatsapp groups. In this situation, the collaboration team was always on hand to help those who are in trouble.

Step 6: Reflection

The last face-to-face activity was carried out at this stage. Several participant representatives presented their work. The activity continued with reflection through questions and statements given to participants via google form. These statements and questions also served as a survey

tool to collect post-activity information in this research. One of the participants gave a testimony, "I feel very happy and proud because I, who initially did not know about this application, was finally able to complete the task with good results even though there were still many shortcomings. Of course, by taking Scratch Training, I gained new knowledge and can share this experience with colleagues at school." Another participant stated, "First, maybe a little confused in using the application; but when it was applied in making music instruments it was very interesting and later it will be easier to introduce musical instruments to students." There was also a participant who expressed, "It is great to get new knowledge and challenges. Hopefully this application can solve the problem that I experience regarding the limited musical accompaniment at school. Hopefully in the future I can take part in other workshops which certainly add to my knowledge as a teacher who must be dynamic following the changing times."

After all participants filled out the survey form, the activity was officially closed. Next, the collaboration team checked each submitted assignment to determine eligible certificate recipients.

DISCUSSION

Post-action Analysis

At the end of the activities, all participants were able to make music learning media that can be used in teaching. This shows that the participants were able to complete the product well. Not only that, almost all teachers planned to use the Scratch application to develop music learning media. This was revealed from the survey results in an open statement "I plan to use the Scratch application to make music learning media." Based on the statement, 14 (36.8%) participants strongly agreed, 21 (55.3%) agreed, and only three (7.9%) rather disagreed. After further investigation, a participant said that "Scratch will help the learning process and attract students' interest." Another participant said that "the Scratch application is quite easy to use and can help make the music learning process more enjoyable." These statements were enough to provide an indication that the teachers' ability to develop music learning media has increased. In addition, it also showed that the teachers' understanding of the importance of technology in supporting the facilities and infrastructure for learning music has changed. The teachers understood that learning supported by technology will be easier (Julia et al., 2020; Julia et al., 2019). Therefore, it can be concluded that elementary school teachers can improve their ability to develop music learning media.

Regarding the use of the Scratch application, based on the survey through an open question "I can use the Scratch application easily," it is known that four (10.5%) participants strongly agreed, 16 (42.1%) agreed, 17 (44.7%) rather disagreed, and one (2.6%) disagreed. These results illustrated that for some people, Scratch was easy to use while for some it was not easy

to use. After further investigation, several answers were obtained. One participant said, "This scratch application is very simple with simple coding, very helpful and saves time." Another participant said, "more time is still needed to learn more about the use of coding functions." In addition, there was also a participant who said "Initially it was a bit difficult, but after trying so many times, (I) became accustomed and motivated to use the application." This illustrates that, essentially, all participants were able to use the Scratch application. However, in the process, there were participants who could understand it very easily, while some took longer. It depended on the participants' understanding and ability to use computers. Therefore, it can be concluded that elementary school teachers can utilize technology for teaching music.

Based on the results of the post-action survey, it was found that 36 (94.7%) participants admitted that the Scratch application was very helpful when teaching music. Not only that, 36 (94.7%) participants agreed that the application could be created in such a way that it could overcome the limitations of music learning media. In the end, 100% of participants agreed that elementary school teachers need to be trained in using the Scratch application. After further investigation, a participant said, "Not all schools have complete musical instruments and music learning media, such as *gamelan*. However, with the Scratch application, the teachers can make an alternative *gamelan*." Another participant said, "With this application, we can introduce various musical instruments to students without having to have real instruments." Several participants said, "Elementary students need an interesting application of learning media that can stimulate their skills; so with the Scratch application, the learning becomes more creative and innovative." This is in line with Meerbaum-Salant et al., (2013) who stated that Scratch greatly facilitates learning in schools so that students only need a little time to learn a topic. However, there were also participants who said that not all educators were proficient in using digital media, especially those specific to the use of applications. Hence, it is necessary to work hard in socializing the use of various applications that can support learning. It has become a consideration to continue carrying out training activities for teachers, especially those related to the use of technology and information. Therefore, it can be concluded that the critical-reflective steps taken in training can change the paradigm of elementary school teachers to be more creative in teaching music.

CONCLUSIONS

Learning media is a fundamental in learning music in elementary level because music learning media affect student competence. However, in reality, not all elementary schools in Indonesia have complete facilities and means of learning music which is a classic problem in Indonesian education. The use of technology, especially applications in developing learning media, is one solution. Through technology, teachers can overcome the limitations of learning media by creating innovative, creative and multifunctional learning media.

In this research, the teachers were trained through six critical steps that were structured and controlled. The results showed a change in the teachers' paradigm regarding the use of technology in developing instructional media. This can be seen based on the survey results that 100% of the participants agreed that teachers need to train to use the Scratch application. In addition to helping teachers develop instructional media, mastery of technology can also have a positive influence on the ability and confidence of teachers in teaching music (Seddon dan Biasutti, 2008; Greher, 2011).

The teachers were asked, "Will the Scratch application really help when teaching music?" All participants agreed to this statement. A teacher said that the Scratch application is suitable because it will help the learning process and attract students' interest in learning music. Another teacher said that the scratch application was quite easy to use and could help make learning music more enjoyable. There are also teachers who said that the Scratch application can be created in such a way that it can overcome the limitations of music learning media. These statements indicate a change in understanding of teachers in developing learning media through technology. Using the Scratch application, teachers can create various creative and innovative learning media so that they can help teachers achieve learning goals.

Based on the results of the research, it can be concluded that the six critical steps taken in this study could change teachers' understanding in developing music learning media, especially in elementary schools. A series of processes in implementing critical steps provides knowledge and answers to the questions raised at the outset. The first question is, "Can elementary school teachers improve their abilities in developing music learning media?" The survey showed that all teachers were able to make music learning media. This illustrates that their skills in developing learning media have increased. The second question, "Can elementary teachers use technology for teaching music?" Based on the survey results in the pre-action stage, it was found that 34 out of 38 participants had never used an application in developing learning media. However, based on the post-research survey, they could use the Scratch application in developing learning media. Not only that, all participants planned to use the application in learning. This shows that elementary school teachers can take advantage of technology in teaching music. The final question, "Will a series of reflective-critical steps be able to change the paradigm of elementary school teachers to be more creative in teaching music?" The results showed that all participants were able to create creative and innovative music learning media. In addition, all participants also agreed that the Scratch application could really help them in teaching music because it can be created in such a way as to become a variety of music learning media. This illustrates that there is a shift in the teachers' paradigm in developing music learning media to be more creative and innovative.

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REFERENCES

- Adell, J. (1997). Tendencias en educación en la sociedad de las tecnologías de la información [Trends in education in the information technology society]. *Edutec. Revista Electrónica de Tecnología Educativa [Electronic Magazine of Educational Technology]*, (7), a007–a007. <https://doi.org/10.21556/edutec.1997.7.570>.
- Akuno, E. A. (2019). *Music education in Africa: Concept, process, and practice*. Routledge.
- Akuno, E. A. (2012). Perceptions and reflections of music teacher education in Kenya. *International Journal of Music Education*, 30(3), 272–291. <https://doi.org/10.1177/0255761412437818>.
- Alonso, F., Manrique, D., Martínez, L., & Viñes, J. M. (2010). How blended learning reduces underachievement in higher education: An experience in teaching computer sciences. *IEEE Transactions on Education*, 54(3), 471–478. <https://doi.org/10.1109/te.2010.2083665>.
- Anwar, A. A. (2015). The Effects of Leadership Styles, Organizational Climate, Environmental Aspects and Organizational Commitment and Job Satisfaction on the Lecturers' Performance of Kopertis III in Jakarta Haris Maupa. *Scientific Research Journal*, 3(9), 2201–2796.
- Arbix, G., Salerno, M. S., Amaral, G., & Lins, L. M. (2017). Avanços, equívocos e instabilidade das políticas de inovação no Brasil [Advances, misunderstandings and instability of innovation policies in Brazil]. *Novos Estudos CEBRAP*, 36(3), 9–27. <https://doi.org/10.25091/s01013300201700030002>.
- Augustine, C., & Wong, C. (2016). Music Teaching Readiness among Non-Specialised Music Teachers in Government Preschools. *Malaysian Journal of Music*, 5(2), 54–69.
- Austin, R., Smyth, J., Rickard, A., Quirk- Bolt, N., & Metcalfe, N. (2010). Collaborative digital learning in schools: Teacher perceptions of purpose and effectiveness. *Technology, Pedagogy and Education*, 19(3), 327–343. <https://doi.org/10.1080/1475939x.2010.513765>.
- Barreneche, A., Keenan, M., & Saritas, O. (2016). An OECD horizon scan of megatrends and technology trends in the context of future research policy. *A Report Prepared by the OECD Directorate for Science, Technology and Innovation, Commissioned by Danish*

Agency for Science, Technology and Innovation (DASTI), Copenhagen.

- Baskerville, D. (2011). Developing cohesion and building positive relationships through storytelling in a culturally diverse New Zealand classroom. *Teaching and Teacher Education*, 27(1), 107–115. <https://doi.org/10.1016/j.tate.2010.07.007>.
- Baskerville, D. (2012). Integrating on-line technology into teaching activities to enhance student and teacher learning in a New Zealand primary school. *Technology, Pedagogy and Education*, 21(1), 119–135. <https://doi.org/10.1080/1475939X.2012.659887>
- Berberick, D. M., Clementson, C. J., Hawkinson, J. K., & Rolandson, D. M. (2016). A Comparison of Principal Practices and Music Educator Perceptions Regarding Teacher Evaluation. *Bulletin of the Council for Research in Music Education*, 209, 43–62. <https://doi.org/10.5406/bulcouresmusedu.209.0043>.
- Biasutti, M., & EL-Deghaidy, H. (2015). Interdisciplinary project-based learning: an online wiki experience in teacher education. *Technology, Pedagogy and Education*, 24(3), 339–355. <https://doi.org/10.1080/1475939x.2014.899510>.
- Biasutti, M., Hennessy, S., & Vugt-jansen, E. De. (2015). Confidence development in non-music specialist trainee primary teachers after an intensive programme. December 2014, 143–161. <https://doi.org/10.1017/S0265051714000291>.
- Blasco-Arcas, L., Buil, I., Hernández-Ortega, B., & Sese, F. J. (2013). Using clickers in class. The role of interactivity, active collaborative learning and engagement in learning performance. *Computers & Education*, 62, 102–110. <https://doi.org/10.1016/j.compedu.2012.10.019>.
- Button, S. (2010). Music teachers' perceptions of effective teaching. *Bulletin of the Council for Research in Music Education*, 25–38.
- Calderón-Garrido, D., Cisneros, P., García, I. D., Fernández, D., & De las Heras, R. (2019). La tecnología digital en la educación musical: una revisión de la literatura científica [Digital technology in music education: a review of the scientific literature]. *Revista Electrónica Complutense de Investigación En Educación Musical - RECIEM [Complutense Electronic Journal of Research in Music Education - RECIEM]*, 16, 43–55. <https://doi.org/10.5209/reciem.60768>.
- Casillas, M., Ramírez Martinell, A., & Morales Flores, C. (2020). Los saberes digitales de los bachilleres del siglo XXI [The digital knowledge of the high school graduates of the XXI century]. *Revista Mexicana de Investigación Educativa [Mexican Journal of Educational Research]*, 25(85), 317–350.

- Chandrasoma, R., & Lee, J. E. (2013). A current approach to EFL writing: identity and learning in the classroom. *Studies in English Language and Literature*, 39(3), 189–219. <https://doi.org/10.21559/aellk.2013.39.3.009>.
- Chireshe, R. (2011). Effective and ineffective lecturers: University students' perspective in Zimbabwe. *The Anthropologist*, 13(4), 265–269. <https://doi.org/10.1080/09720073.2011.11891207>.
- Clarke, L. (2013). Virtual learning environments in teacher education: A journal, a journey. *Technology, Pedagogy and Education*, 22(1), 121–131. <https://doi.org/10.1080/1475939x.2012.731632>.
- Concina, E. (2015). Music Education and Effective Teaching: Perspectives from a Critical. *Research Studies*, 13(14), 15. <https://doi.org/10.20533/licej.2040.2589.2015.0251>.
- Cordova, D. I., & Lepper, M. R. (1996). Intrinsic motivation and the process of learning: Beneficial effects of contextualization, personalization, and choice. *Journal of Educational Psychology*, 88(4), 715. <https://doi.org/10.1037/0022-0663.88.4.715>.
- Creswell, J. W. (2002). *Educational research: Planning, conducting, and evaluating quantitative*. Prentice Hall Upper Saddle River, NJ.
- Cuban, L., Kirkpatrick, H., & Peck, C. (2001). High access and low use of technologies in high school classrooms: Explaining an apparent paradox. *American Educational Research Journal*, 38(4), 813–834. <https://doi.org/10.3102/00028312038004813>.
- Dağhan, G., & Akkoyunlu, B. (2016). Modeling the continuance usage intention of online learning environments. *Computers in Human Behavior*, 60, 198–211. <https://doi.org/10.1016/j.chb.2016.02.066>.
- Davies, C., & Eynon, R. (2013). *Teenagers and technology*. Routledge.
- Davis, S. G. (2005). That thing you do! *Compositional Processes of a Rock Band*. *International Journal of Education & the Arts*, 6(16), 1–19.
- Development, O. for E. C. and. (2015). *OECD digital economy Outlook 2015*. Organisation for Economic Co-operation and Development.
- Eynon, R., & Geniets, A. (2016). The digital skills paradox: how do digitally excluded youth develop skills to use the internet? *Learning, Media and Technology*, 41(3), 463–479. <https://doi.org/10.1080/17439884.2014.1002845>.
- Fehér, P. (2020). "Húsz év múlva"—A digitális oktatás helyzete, eszközei, trendjei világszerte

- ["Twenty years from now" - The situation, tools and trends of digital education worldwide]. *Gyermeknevelés Tudományos Folyóirat [Child Education Scientific Journal]*, 8(2), 350–372. <https://doi.org/10.31074/gyntf.2020.2.350.372>.
- Fitzpatrick, K. R. (2011). A mixed methods portrait of urban instrumental music teaching. *Journal of Research in Music Education*, 59(3), 229–256. <https://doi.org/10.1177/0022429411414912>.
- Hadjerrouit, S. (2013). A Framework for Assessing the Pedagogical Effectiveness of Wiki-Based Collaborative Writing: Results and Implications. *Interdisciplinary Journal of e-Skills and Lifelong Learning*, 9, 029–049. <https://doi.org/10.28945/1787>.
- Hartnett, M. (2017). Differences in the digital home lives of young people in New Zealand. *British Journal of Educational Technology*, 48(2), 642–652. <https://doi.org/10.1111/bjet.12430>.
- Hasse, C. (2017). Technological literacy for teachers. *Oxford Review of Education*, 43(3), 365–378. <https://doi.org/10.1080/03054985.2017.1305057>.
- Haugerud, T. (2011). Student teachers learning to teach: The mastery and appropriation of digital technology. *Nordic Journal of Digital Literacy*, 6(04), 226–238.
- Helsper, E. J., & Eynon, R. (2010). Digital natives: where is the evidence? *British Educational Research Journal*, 36(3), 503–520. <https://doi.org/10.1080/01411920902989227>.
- Henderson, M., Snyder, I., & Beale, D. (2013). Social media for collaborative learning: A review of school literature. *Australian Educational Computing*, 28(2).
- Human, R., & van Niekerk, C. (2014). Assessing ngoma-ness: A generic cross-cultural framework for African musical arts education. *Journal of the Musical Arts in Africa*, 11(1), 21–35. <https://doi.org/10.2989/18121004.2014.995434>.
- Jaipal, K., & Figg, C. (2011). Collaborative action research approaches promoting professional development for elementary school teachers. *Educational Action Research*, 19(1), 59–72. <https://doi.org/10.1080/09650792.2011.547688>.
- Jara, C. A., Candelas, F. A., Torres, F., Dormido, S., Esquembre, F., & Reinoso, O. (2009). Real-time collaboration of virtual laboratories through the Internet. *Computers & Education*, 52(1), 126–140. <https://doi.org/10.1016/j.compedu.2008.07.007>.
- Jenkins Dr, L. E., & Crawford, R. (2016). The impact of blended learning and team teaching in tertiary pre-service music education classes. *Journal of University Teaching & Learning Practice*, 13(3), 5.

- Julia, J., & Isrokatun, I. (2019). Technology literacy and student practice: Lecturing critical evaluation skills. *International Journal of Learning, Teaching and Educational Research*, 18(9), 114–130. <https://doi.org/10.26803/ijlter.18.9.6>.
- Julia, J., Iswara, P. D., & Supriyadi, T. (2019). The utilization of Scratch application in making music controller to introduce traditional musical instruments. *Journal of Physics: Conference Series*, (7), 1402. <https://doi.org/10.1088/1742-6596/1402/7/077011>.
- Julia, J., Subarjah, H., Maulana, M., Sujana, A., Isrokatun, I., Nugraha, D., & Rachmatin, D. (2020). Readiness and Competence of New Teachers for Career as Professional Teachers in Primary Schools. *European Journal of Educational Research*, 9(2), 655–673. <https://doi.org/10.12973/eu-jer.9.2.655>.
- Julia, J., Supriyadi, T., & Iswara, P. D. (2020). Training the non-specialist music teacher: Insights from an Indonesian action research study. *Universal Journal of Educational Research*, 8(2), 547–558. <https://doi.org/10.13189/ujer.2020.080226>.
- Julia, J., Supriyadi, T., & Iswara, P. D. (2019). Using Android-based applications to support elementary school teachers to teach songs. *Journal of Physics: Conference Series*, 1318(1), 12041. <https://doi.org/10.1088/1742-6596/1318/1/012041>.
- Karlsen, S. (2011). Using musical agency as a lens: Researching music education from the angle of experience. *Research Studies in Music Education*, 33(2), 107–121. <https://doi.org/10.1177/1321103x11422005>.
- Laskowski, L., & Laskowski, L. (2016). Google Forms and Sheets for library gate counts Google Forms and Sheets for library gate counts. *Journal of Access Services*, 13(3), 151–158. <https://doi.org/10.1080/15367967.2016.1184577>.
- Leeman, Y., van Koeven, E., & Schaafsma, F. (2018). Inter-professional collaboration in action research. *Educational Action Research*, 26(1), 9–24. <https://doi.org/10.1080/09650792.2017.1301827>.
- Legette, R. M., McCord, D. H., & Legette, L. D. (2016). Causal Beliefs of Pre-service Teachers Regarding Success or Failure in Music Teaching and Learning. *Research Perspectives in Music Education*, 18(2), 51–59.
- Leung, B., & Wong, W. (2005). Matching music teacher's self conception with students' perception on teaching effectiveness in an unfavourable secondary classroom context. *Revista Electrónica Complutense de Investigación en Educación Musical [Complutense Electronic Journal of Research in Music Education]*, 2(1), 1–12. <https://revistas.ucm.es/index.php/RECI/article/download/RECI0505110001A/8731>.

- Magnussen, R., Hamann, V. D., & Stensgaard, A. G. (2019). Educating for Co-Production of Community-Driven Knowledge. *Electronic Journal of E-Learning*, 17(3), 222–233. <https://doi.org/10.34190/jel.17.3.005>.
- Magnussen, R., & Stensgaard, A. G. (2018). Community drive: Teaching children and young people to transform cities through game and data-driven methods. *12th European Conference on Game Based Learning, ECGBL 2018 European Conference on Games Based Learning*, 354–361.
- Maguraushe, W. (2015). Insights into the Zimbabwe integrated national teacher education course: Graduates' music teaching competence. *Muziki [Music]*, 12(1), 86–102. <https://doi.org/10.1080/18125980.2015.1031452>.
- Mariaye, H. (2012). Understanding the professional images of pre service teachers. The metaphors we live and teach by. in *EDULEARN12 Proceedings*, 4140–4148. https://www.researchgate.net/profile/Hyleen_Mariaye/publication/344443215_understanding_the_professional_images_of_pre_service_teachers_the_metaphors_we_live_and_teach_by/links/5f75fb22a6fdcc00864d7d0b/understanding-the-professional-images-of-pre-service-teachers-the-metaphors-we-live-and-teach-by.pdf.
- Martin, A. J., Mansour, M., Anderson, M., Gibson, R., Liem, G. A. D., & Sudmalis, D. (2013). The role of arts participation in students' academic and nonacademic outcomes: A longitudinal study of school, home, and community factors. *Journal of Educational Psychology*, 105(3), 709. <https://doi.org/10.1037/a0032795>.
- McTaggart, R. (1994). Participatory action research: Issues in theory and practice. *Educational Action Research*, 2(3), 313–337. <https://doi.org/10.1080/0965079940020302>.
- Meerbaum-Salant, O., Armoni, M., & Ben-Ari, M. (Moti). (2013). Learning computer science concepts with Scratch. *Computer Science Education*, 23(3), 239–264. <https://doi.org/10.1080/08993408.2013.832022>.
- Minoi, J.-L., Mohamad, F., Arnab, S., Phoa, J., Morini, L., Beaufoy, J., Lim, T., & Clarke, S. (2019). A Participatory Co-Creation Model to Drive Community Engagement in Rural Indigenous Schools: A Case Study in Sarawak. *Electronic Journal of E-Learning*, 17(2), 157–167. <https://doi.org/10.34190/jel.17.3.001>.
- Montrieux, H., Vanderlinde, R., Schellens, T., & De Marez, L. (2015). Teaching and learning with mobile technology: A qualitative explorative study about the introduction of tablet devices in secondary education. *PloS One*, 10(12), e0144008. <https://doi.org/10.1371/journal.pone.0144008>.

- Moreno, L., Gonzalez, C., Castilla, I., Gonzalez, E., & Sigut, J. (2007). Applying a constructivist and collaborative methodological approach in engineering education. *Computers & Education*, 49(3), 891–915. <https://doi.org/10.1016/j.compedu.2005.12.004>.
- Natesan, S., Bailitz, J., King, A., Krzyzaniak, S. M., Kennedy, S. K., Kim, A. J., Byyny, R., & Gottlieb, M. (2020). Clinical teaching: An evidence-based guide to best practices from the council of emergency medicine residency directors. *Western Journal of Emergency Medicine*, 21(4), 985. <https://doi.org/10.5811/westjem.2020.4.46060>.
- Navarro, R., Larrañaga, E., & Yubero, S. (2018). Differences between preadolescent victims and non-victims of cyberbullying in cyber-relationship motives and coping strategies for handling problems with peers. *Current Psychology*, 37(1), 116–127. <https://doi.org/10.1007/s12144-016-9495-2>.
- Ng, W. (2012). Can we teach digital natives digital literacy? *Computers & Education*, 59(3), 1065–1078. <https://doi.org/10.1016/j.compedu.2012.04.016>.
- Nimrod, G. (2018). Technophobia among older Internet users. *Educational Gerontology*, 44(2–3), 148–162. <https://doi.org/10.1080/03601277.2018.1428145>.
- Njoora, T. K. (2015). More than just good feelings: Advocacy for music among mainstream subjects. *Muziki*, 12(1), 23–40. <https://doi.org/10.1080/18125980.2015.1031367>.
- Oncu, S., & Cakir, H. (2011). Research in online learning environments: Priorities and methodologies. *Computers & Education*, 57(1), 1098–1108. <https://doi.org/10.1016/j.compedu.2010.12.009>.
- Özkandemir, O. (2019). *İlkokul müzik derslerinde robotik ve kodlama programlarının kullanılmasına yönelik örnek bir çalışma [A sample study on the use of robotics and coding programs in primary school music lessons]* (Order No. 28242234). Available from ProQuest Dissertations & Theses Global. (2468395810). Retrieved from <https://search.proquest.com/dissertations-theses/ilkokul-muzik-derslerinde-robotik-ve-kodlama/docview/2468395810/se-2?accountid=14141>.
- Papatraianou, L. H., Levine, D., & West, D. (2014). Resilience in the face of cyberbullying: An ecological perspective on young people's experiences of online adversity. *Pastoral Care in Education*, 32(4), 264–283. <https://doi.org/10.1080/02643944.2014.974661>.
- Papert, S. (1993). *The children's machine: Rethinking school in the age of the computer*. *Choice Reviews Online*, 31(3), 31–48. <https://doi.org/10.5860/choice.31-1648>.
- Pearce, K. E., & Rice, R. E. (2013). Digital divides from access to activities: Comparing mobile

- and personal computer Internet users. *Journal of Communication*, 63(4), 721–744. <https://doi.org/10.1111/jcom.12045>.
- Pelton, R. P. (2010). *Action research for teacher candidates: Using classroom data to enhance instruction*. R&L Education.
- Penn-Edwards, S. (2010). The competencies of an English teacher: Beginning student teachers' perceptions. *Australian Journal of Teacher Education*, 35(2), 4. <https://doi.org/10.14221/ajte.2010v35n2.4>.
- Pransky, K. (2009). Beneath the Surface: The Hidden Realities of Teaching Culturally and Linguistically Diverse Young Learners K-6. *Education Review*. <https://edrev.asu.edu/edrev/index.php/ER/article/view/1096>.
- Prensky, M. (2001). Digital Natives, Digital Immigrants Part 1. *On the Horizon*, 9(5), 1–6. doi:10.1108/10748120110424816.
- Rauduvaitė, A., & Wang, L. (2018). The analysis of content of bachelor study programme of music teacher training in Lithuania: attitude of foreign and Lithuanian students. *Pedagogika*, 132(4), 197–210. <https://doi.org/10.15823/p.2018.132.12>.
- Reimer, B. (2003). *A philosophy of music education: Advancing the vision*. Pearson College Division.
- Romero Ariza, M., & Quesada Armenteros, A. (2014). Nuevas tecnologías y aprendizaje significativo de las ciencias [New technologies and meaningful learning in science]. *Enseñanza de Las Ciencias [Science Teaching]*, 32(1), 101–115. <https://doi.org/10.5565/rev/ensciencias.433>.
- Sanford, A. K., Brown, J. E., & Turner, M. (2012). Enhancing instruction for English learners in response to intervention systems: The PLUSS model. *Multiple Voices for Ethnically Diverse Exceptional Learners*, 13(1), 56–70.
- Schmidt, M. (2013). Transition from student to teacher: Preservice teachers' beliefs and practices. *Journal of Music Teacher Education*, 23(1), 27–49. <https://doi.org/10.1177/1057083712469111>.
- Selwyn, N. (2012). Social media in higher education. *The Europa World of Learning*, 1(3), 1–10.
- Shao, Y., & Crook, C. (2015). The potential of a mobile group blog to support cultural learning among overseas students. *Journal of Studies in International Education*, 19(5), 399–422. <https://doi.org/10.1177/1028315315574101>.

- Shulman, L. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard educational review*, 57(1), 1-23.
- Smithrim, K., & Uptis, R. (2005). Learning through the arts: Lessons of engagement. *Canadian Journal of Education/Revue Canadienne de l'éducation*, 109-127. <https://doi.org/10.2307/1602156>.
- Supriyadi, T., & Julia, J. (2019). The Problem of Students in Reading the Quran: A Reflective-Critical Treatment through Action Research. *International Journal of Instruction*, 12(1), 311-326. <https://doi.org/10.29333/iji.2019.12121a>.
- Thompson, P. (2013). The digital natives as learners: Technology use patterns and approaches to learning. *Computers & Education*, 65, 12-33. <https://doi.org/10.1016/j.compedu.2012.12.022>.
- Tortosa-Pérez, M., Sala, F. G., Aguilar-Bustamante, M. C., & de Oliver, J. S. P. (2020). Estrategia de posicionamiento en bases internacionales de las revistas de psicología editadas y coeditadas por el Colegio Oficial de Psicólogos de Madrid [Positioning strategy on international bases of psychology journals edited and co-edited by the Official College of Psychologists of Madrid]. *Universitas Psychologica*, 19, 1-16.
- Townsend, A. S. (2011). *Introduction to effective music teaching: Artistry and attitude*. Rowman & Littlefield.
- Trittel, M., Gerich, M., & Schmitz, B. (2014). Training prospective teachers in educational diagnostics. In *Teachers' professional development* (pp. 63-78). Sense Publishers, Rotterdam.
- Truong, N. T. K., & Sweetman, A. (2018). Basic information and communication technology skills among Canadian immigrants and non-immigrants. *Canadian Public Policy*, 44(S1), S91-S112. <https://doi.org/10.3138/cpp.2017-032>.
- Uluyol, Ç., & Şahin, S. (2016). Elementary school teachers' ICT use in the classroom and their motivators for using ICT. *British Journal of Educational Technology*, 47(1), 65-75. <https://doi.org/10.1111/bjet.12220>.
- Vanderlinde, R., & van Braak, J. (2010). The e-capacity of primary schools: Development of a conceptual model and scale construction from a school improvement perspective. *Computers & Education*, 55(2), 541-553. <https://doi.org/10.1016/j.compedu.2010.02.016>.
- Vanderlinde, R., & van Braak, J. (2011). A new ICT curriculum for primary education in Flanders: Defining and predicting teachers' perceptions of innovation attributes. *Journal*

of *Educational Technology & Society*, 14(2), 124–135.
<https://www.jstor.org/stable/pdf/jeductechsoci.14.2.124.pdf>.

- Verdú, E., Regueras, L. M., Verdú, M. J., Leal, J. P., de Castro, J. P., & Queirós, R. (2012). A distributed system for learning programming on-line. *Computers & Education*, 58(1), 1–10. <https://doi.org/10.1016/j.compedu.2011.08.015>.
- Wang, J.-C., & Humphreys, J. T. (2009). Multicultural and popular music content in an American music teacher education program. *International Journal of Music Education*, 27(1), 19–36. <https://doi.org/10.1177/0255761408099062>.
- Wang, S.-K., Hsu, H.-Y., Campbell, T., Coster, D. C., & Longhurst, M. (2014). An investigation of middle school science teachers and students use of technology inside and outside of classrooms: considering whether digital natives are more technology savvy than their teachers. *Educational Technology Research and Development*, 62(6), 637–662. <https://doi.org/10.1007/s11423-014-9355-4>.
- Wiggins, J. (2007). Authentic practice and process in music teacher education. *Music Educators Journal*, 93(3), 36–42. <https://doi.org/10.2307/4101537>.
- Wong, Y. P., & Lau, W. M. (2018). Perceived Attributes of Music Teaching Effectiveness among Kindergarten Teachers: Role of Personality. *Australian Journal of Teacher Education*, 43(9), 28–38. <https://doi.org/10.14221/ajte.2018v43n9.2>.
- Zhang, C. (2020). From Face-to-Face to Screen-to-Screen: CFL Teachers' Beliefs about Digital Teaching Competence during the Pandemic. *International Journal of Chinese Language Teaching*, 1(1), 35–52. <https://doi.org/10.46451/ijclt.2020.06.03>.