Web-Based Integrated ICT Learning Media Service for Teacher Optimization in Teaching

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Abstract: In order to develop feasible and effective integrated Information and Communication Technology (ICT) learning media service mode, current research was carried out. This model can be used to assist teacher in teaching optimization. Research and Development (R&D) proposed by Borg and Gall (2007) was further applied, in which the data were collected through evaluation by experts and teacher as well as through *Jateng Belajar* portal utilization test. The services provided were in the form of learning sources, media contributor, online class, questions bank, and online laboratory. Results discovered the application of integrated ICT learning media service model is feasible and effective in the learning process. Approximately 92% of experts and teachers claimed that the model belongs to feasible category, while the model effectiveness obtained significance level (2-tailed) of 0.000 which is less than 0.005 (significance used).

Keywords: Integrated ICT learning media development, teaching optimization, teacher

1. Introduction

Teacher is a position demands for prefossionality which is not related to learning task but also social task. It is also not only related to learning in the classroom but also learning outside the classroom (Law Number 12 of 2005, 2005). Therefore, as an educator, teacher, guider, director, and evaluator, teacher needs a professionality.

Teacher has significant role and position. Therefore, having an ICT competence can assist and support them. Optimal and appropriate utilization of ICT learning media will cause an effective learning process. Thus, in order to obtain such learning, integrated ICT learning media needs to be utilized so that teaching creativity can be improved.

An issue that has been encountered by the researchers is that there are many educational institution which is not sufficiently optimize ICT utilization during learning and teaching process (KBM) and only prioritize its cognitive aspect and insufficiently consider media as a learning support. Safiah (2017) explained the teachers' competence in utilizing ICT-based learning media that in utilizing ICT-based learning media, teacher still need much guidance in accessing the media directly from the internet. Dubey (2016) considered that quality education by utilizing ICT can provides happiness, easiness, and fastness during learning process, as well as involving the students in sophisticated and advanced skill. Factors of teachers' capability which is insufficiently creative and innovative in teaching causes the low students' learning motivation.

There are still many teachers who do not know the role and function of media, criteria in choosing media, procedure and process in choosing media, as well as utilizing media in integrated and appropriate manner. Tafonao (2018) argued that learning media is one of the methods in overcoming issues in teaching, not only to solve problems, but media can also provide comprehensive information to students.

The other issue is the learning process in the classroom which still significantly depends on the presence of the teacher. The lack of innovation from the teacher causes the lack of optimization of the presence of ICT media during learning process. Chu et al. (2019) revealed that learning multimedia is one of the important factors in improving learning quality. Forkosh-Baruch and Avidov-Ungar (2019) then added that ICY development in educational aspect demands efficiency and effectivity during learning process. Furthermore, Nofriyanti and Sari (2019) directed that the implementation of mathematics learning using smart stacking dice media in TK Rahmah Abadi is for children who know number, counting from 1 to 10, and able to have simple summation. Therefore, a relevant research is needed regarding an effective and easy service model aiming to maximize learning process.

Another issue is that there are many teachers who lack of sensitivity and ability to obtain ICT-based teaching material. Several teachers choose irrelevant and random media without considering the learning and curriculum aspects. Anshori (2017) stated that incorrect media selection can decrease the students' interest and comprehension on the learning material learnt. Sofiya, Yulianto, and Hendratno (2018) further added that successful learning occurs when the teacher has credibility in the classroom in utilizing various facilities, including the learning media. Artal-Sevil (2020) explained that the effort to increase students' learning interest and motivation is the active role of teacher in mastering ICT during the learning process.

Such issue cannot be overcame due to the absence of integrated ICT-based learning media service model which is easy, practical, and effective in supporting learning activities. Therefore, researcher offers a development of an integrated ICT-based learning media utilization service management model. Therefore, this can be a reference and guidance for the users, both the teacher and school in making efforts of obtaining and utilizing integrated ICT learning media which provides easiness and benefits in optimal and wide learning and teaching process.

2. Literature Review

2.1. Definition, Role, and Function of Learning Media

Christensson (2019) stated that learning media is graphical, photographical, or electronic equipment to comprehend, process, and compound visual and verbal information. Vitianingsih (2016) explained that learning media is simply a thing in the forms of tool, material, or condition which can be used as communication media during learning activities. Pribadi (2017) further added that learning media contains information and knowledge which can be used during learning process, so that it can become more effective and efficient. Therefore it can be concluded that learning media is a media in the forms of tool or facilities which have a function as media, channel, or bridge in communication activities (delivering and receiving message) between the communicator (one who delivers message) and communicant (one who receives message).

Amir et al. (2016) further discussed the role of media in learning process as a part which significantly determines the effectivity and efficiency in achieving the goal. Joko Sutrisno (2008) supported that the function of media is to increase learning motivation, repeat what have been learnt, provide learning stimulus, activate students' response, provide immediate feedback, and carry out suitable practice. Therefore, the role and function of learning are changing the threshold of formal education, increasing students' learning motivation, providing explanation, and giving learning stimulation, especially students' curiosity. Furthermore, according to Center for Media Literacy (2017) related learning media making, it should consider several matters, such as media is designed to construct learning content and using creative, interesting, easily-comprehend learning material which contains aesthetic values.

2.2. Concept of ICT-Based Learning Media Utilization Service Management

According to Sari & Susanto (2018), the utilization of ICT can meet the increasing demand for a product/service with electronic-based information technology services. Anshori (2017) explained that the concepts and mechanisms of ICT-based teaching and learning affect the transformation process of conventional education into digital form, both in terms of content and system. Tafonao (2018) also explained that the role of learning media in the learning is very important for educators today because it can be used to channel the sender's message to the recipient and help students. In the journal British Library (2019), it is explained that management's failure to plan for the future, causes market losses and can ultimately lead to job losses.

The service management orientation must have a long-term plan based on a future vision and new innovations. In service management, ICT utilization must be able to make changes and adopt new and innovative teaching methods that make it easier for users, especially teachers. The concept of service management in this is for consistently improve the service system for quality and results. Furthermore, it directs the improvement process and ensures that there is a continuous improvement process. Researchers need to emphasize that management work is not just supervising but leading. This means that it is not only oriented to achievement indicators, specifications, and assessments, but management must be able to encourage improving the process of using ICT services that are more optimal and better.

3. Work Flow (Methodolody)

This research employed Educational Research and Development (R & D) proposed by Borg & Gall (2007), which is a process used to develop and validate educational products. This study contains ten stages, including: 1) research and information collection; 2) planning; 3) product draft development; 4) preliminary trial; 5) trial results revision; 7) improvement of products from field trials; 8) operational field trials; 9) final product improvement; and 10) dissemination and implementation. The development stage was carried out until the final product improvement stage. It can be summed up that this was a Research and Development that has an objective to produce a service management development model by using integrated ICT-based learning media.

Research subjects were involved in the preliminary trials, field trials, and operational field trials in which Early Childhood Education (ECE) teachers became the research samples. The selection of ECE teachers was based on many considerations, including that ECE teachers are less capable of mastering the use of ICT for learning and the importance of using integrated ICT. The subject of the preliminary trial consisted of 5 ECE institutions, while the subject of the field trial consisted of 35 ECE teachers in Gajahmungkur Semarang outside the teachers who had been involved in the preliminary trial. The subjects of the operational field trial were ECE teachers in Semarang. The subjects of the operational field trial were 70 ECE teachers who were divided into two class groups. Class A was carried out online with 35 teachers, while class B was carried out offline with 35 teachers. In this operational field trial subject, the two groups were sampled using as research samples. Sampling is carried out based on a certain

area. The sample class is Class A which obtains treatment, while Class B is the control class.

Current research employed expert validation, teacher questionnaires, and writing ability tests as the research instruments. Expert validation refers to the material expert validation, teacher's questionnaire refers to an open questionnaire to assess the teaching process utilizing integrated ICT learning media that has been implemented for all trial subjects, while the test of ability utilizing media is an essay test given before and after treatment on the subject of the operational field trial.

Furthermore, the data collected were analyzed descriptively and qualitatively by describing the development of web-based learning tool products to improve the creative teaching abilities of ECE teachers at the preliminary trial and field trials. In addition, during the operational field test subject, there was an additional quantitative analysis technique, in which an independent sample t-test was carried out by using SPSS 21 application with a significance of 0.05. The count means difference test was conducted to analyze the pretest and posttest data groups of the control group, pretest and posttest of the experimental group, and posttest of the control and experimental groups.

In the preliminary study stage, the researcher conducted a literature study and field study which became the basis of the research, namely a reconstruction of a factual model of the use of ICT. The hypothetical model was prepared referring to the revised factual model based on the referenced theory as well as needs analysis and descriptive analysis of empirical conditions as a result of field surveys. The results of the development of the hypothetical model, further action is taken, which is in the form of validation and justification activities for the model design carried out by experts and potential users as well as predictive and systemic analysis of the model design which then be tested for the feasibility of the model system to be applied. The effectiveness test stage was further performed aiming to determine the effectiveness level of media service products for teachers as users.

The data used in this research retrieved from (1) preliminary study: informants, phenomena, and documents, (2) development: empirical data, theoretical concepts, and validators, and 3) evaluation: respondents filling the model feasibility instrument. Furthermore, the trial subjects were all respondents involved in the development of software products, including the media experts, Learning Technology experts, e-learning practitioners, ICT experts, and ECE teachers. This research was conducted at ECE of Gajahmungkur cluster, Semarang, Central Java Province. This research chose 35 ECE teachers in Semarang City as the subject of product trials, and the results of product trials were intended to determine the quality of the product from aspects of learning, content, appearance, and convenience. These data were collected using appropriate techniques such as documentation, interviews, questionnaires, and observation sheets.

4. Analysis and Results

The development of an integrated ICT learning media service management model to improve teacher teaching creativity used 10 development stages, those are; 1) research and information collection; 2) designing; 3) product draft development; 4) preliminary trial; 5) trial results revision; 6) field trials; 7) improvement of products from field trials; 8) operational field trials; 9) final product improvement, and 10) dissemination and implementation. These stages can be explained out as follows.

4.1. Preliminary Study Stage

Preliminary study stage was carried out through preliminary data collection on 35 ECE teachers in Semarang City, Central Java for the use of ICT in learning from several aspects, in which; the program was in good category by 55%, the curriculum was in sufficient category by 61%, service utilization was in sufficient category by 47%, and ICT competence was in good category by 62% of the participants.

The findings of this stage was as follows; 1) most teachers and managers of ECE/Kindergarden did not master the use of integrated ICT in learning, 2) most teachers did not know how to use portals in learning, 3) learning resources/learning media for PUAD/Kindergarden are needed by teachers for Teaching and Learning Process, 4) it is expected that there will be socialization and training activities for the teachers, 5) ECE teachers and managers need access to service facilities using portals.

4.2. Designing

The development of an integrated ICT utilization service management model must pay attention to various aspects, in order to assist teachers/users in increasing teaching creativity. This design stage includes; 1) compiling a concept map and material map for the development of service portals for the use of integrated ICT learning media, 2) preparing media content outlines and material descriptions, 3) making scripts for Central Java Learning portal, 4) making portal utilization modules, 5) compiling a grid of program validation instruments and Central Java Learning modules. The address for the portal display is http://jatenglearning.com is shown in Figure 1.
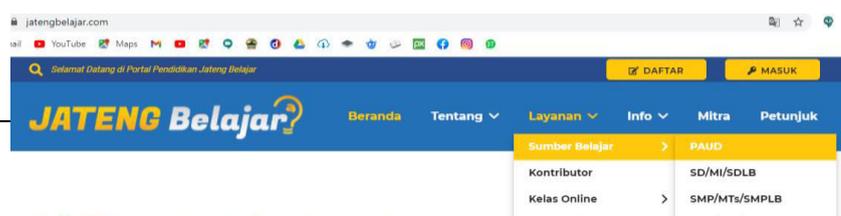
Figure 1. Homepage of *Jateng Belajar*

The Central Java Learning portal service as shown in Figure 5 consists of several menus, those are: 1) learning resources, 2) contributors, 3) online classes, 4) question bank, 5) online laboratory, and 6) activity information.

To make it easier for Central Java Learning users, the portal is equipped with a pdf version of the module and a video that can be downloaded from the user guide menu. In addition, it is accompanied by a contact person and email to facilitate consultation and quick solutions for the users' problems.

Menu instructions are made in pdf version and video tutorials as well in order to make it easier for teachers to utilize the integrated ICT learning media services. The module becomes the guide in using the Central Java Learning portal, which can also be implemented by the teachers/users in learning. Therefore, teachers can be proficient and improve their teaching creativity using the Central Java Learning service portal through the module.

The program evaluation aspect was obtained based on the field data through online class activities. The instrument was given before and after the class using a pretest and posttest. The online classes employ Moodle application model which is integrated with the Central Java Learning portal. Furthermore, to find out the Central Java Learning program, the training activities were integrated into the Central Java Learning portal. Central Java Learning facilitates teachers/users in developing their competencies through many activities. The activity agenda is informed in a separate column/feature and integrated in the Central Java Learning portal. It is expected that this can provide convenience for teachers/users to obtain information about Central Java Learning program activities. In addition, the activities results and announcements are provided in the information feature.

4.3. Product Draft Development Stage

The stage is a final product resulted from the experts' validation is produced. Expert validation was carried out so that it can be used as input in product improvement and produce a product with decent standard. The experts involved in product validation are experts in the fields of ICT, e-learning practitioners, ECE teachers and managers, as well as academics. The results of the expert's evaluation can be seen in Figure 2. The products developed include aspects; usability, ease of use, attractiveness, and content innovation.

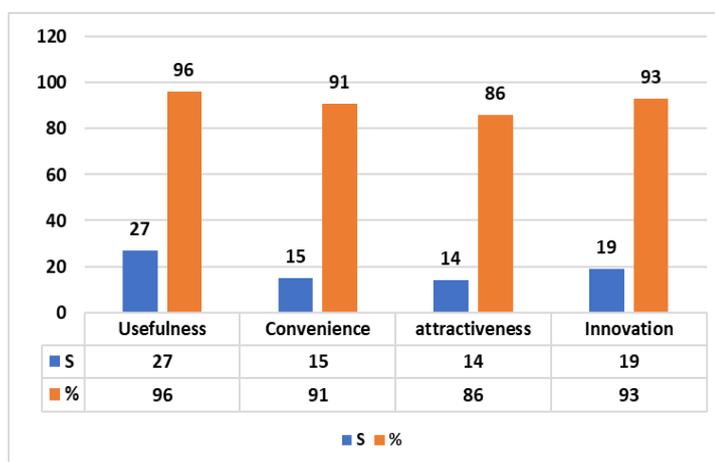|	Usefulness	Convenience	attractiveness	Innovation
S	27	15	14	19
%	96	91	86	93

Figure 2. ECE Teachers' Response on Integrated ICT Learning Media

In this case, experts provide several inputs such as the need to provide special features to make it easier to search for certain content titles in which the users can type the keywords and able to immediately find the desired content, the need for statistical data provision to find out the extent to which the portals and content are utilized by users, and the need to create online class registration forms that are easy to follow and the need to facilitate teachers who want to collaborate by sharing works through work contributors. Based on the results of expert evaluation, the Central Java Learning portal was categorized as decent by 92%. This indicates that the Central Java Learning portal can be used for the community education.

The development of the Central Java Learning portal is based on the principles of experts, in which; Agustini, Yufiarti, and Wuryani (2020) explained that the learning media used to support learning activities should be mobile compatible or desktop-based learning applications. Beach (2017) also supported the statement that the development of a professional website as a learning tool should be easy to use and access by users. In addition, Ihmeideh and Al-Maadadi (2018) claimed that ICT has the potential to support children's early development and learning. Afrida et al. (2018) stated that integrated ICT is attracting the attention of many teachers. Therefore, in order to improve teaching creativity, teachers are required to be able to integrated ICT into their learning in progress. The integrated use of ICT affects in learning as it increases teachers in teaching students. The application of ICT in learning allows learning activities to be more interactive, simulative, more interesting, providing open access to interactive materials and information through networks.

4.4. Preliminary Trial and Product Improvement

After passing the validation process and declared eligible by the experts, the next stage is conducting trials with ECE teachers. The trial was limited to 35 ECE teachers as the representatives from Gajah Mungkur Sub-District, Semarang. The teachers participated in how to use the Central Java Learning portal. After that, the teachers were also required to fill out an open questionnaire in the form of input related to training on the use of the Central Java Learning portal. The trial results obtained several inputs, including 1) the need for additional good service content, learning resources, question banks, and online labs, and 2) the Central Java Learning activity program should involve ICT practitioners. Based on this product improvement stage, it is suggested that it is important to consider the service providers for internet connectivity that can facilitate access to the Central Java Learning portal.

4.5. Field Trial and Product Improvement

Field trial was carried out after product improvements have been made according to the input during the preliminary trial. The subjects of the field trial were 35 ECE teachers in Semarang City who had been the subject of the preliminary trial. During the field trials, teachers also participated in training on the use of the Central Java Learning portal as well as the initial trial subjects. Then, at the end, they were asked to fill out an open questionnaire in the form of input related to the use of the Central Java Learning portal. Suggestions for input in the field trial stage were obtained as improvement materials, including; video content that is easy to download with short duration, enriched and variant content which includes examples of media stock and video tutorials.

4.6. Operational Field Trial and Final Product Improvement

The actual field trial was carried out after the product was improved based on the input during the limited trials. The actual field trial subjects were operationally ECE teachers in Gajah Mungkur Sub-District, Semarang. The subjects were 35 ECE teachers who were divided into two groups, one group was used as the control class, while the other group was used as the experimental class; both was determined randomly.

Prior to the operational field trial, subjects were given a pretest. The pretest was conducted to determine the initial creative teaching ability of teachers before being treated in the form of using integrated ICT learning media. Based on the data from the pretest in Figure 6, it shows that the average value of teaching creativity in the control class was 60, while the average in the experimental class was 71.1. There was also no significant difference between the control class and the experimental class, which means that the creative writing ability between the control class and the experimental class was considered the same. This is in accordance with the hypothesis testing results conducted on the data on the control and experimental class pretest results.

After the pretest, the experimental class was given training in using ICT learning media integrated with the Central Java Learning portal. The final stage after the treatment was posttest given to ECE teachers from both groups. Based on the posttest results that have been carried out, it is known that there is an increase in the average teaching creativity ability of ECE teachers after being given treatment, in which the control class obtained 79.2, while in the experimental class obtained 93.3. The average increase can be shown in the bar chart in Figure 2.
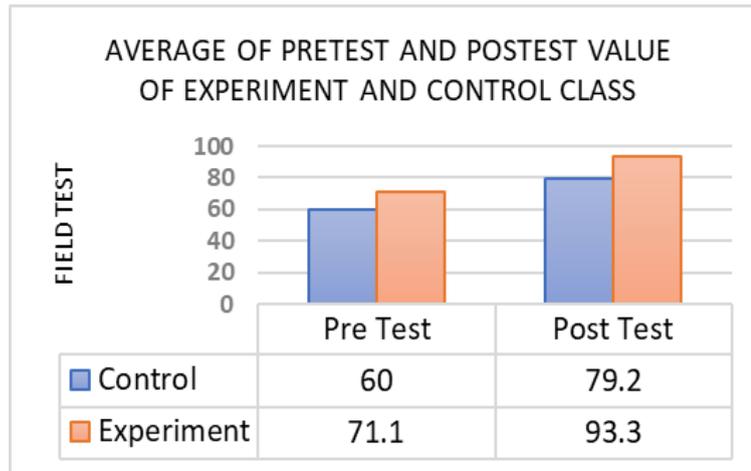
Figure 2. Pretest and Posttest Mean Score of Control and Experimental Classes

The field test, after treatment was provided to both experimental and control class, there was an increase in their score. The increase in creative teaching abilities occurred in the control class was 79.2, while in the experimental class was 93.3. In addition, there were also differences in the means of several groups of data, namely: 1) pretest and posttest of the control class; 2) pretest and posttest of the experimental class; 3) posttest of the control and experimental classes. The mean difference between these three groups were obtained after the hypothesis thesis.

Before the hypothesis testing was carried out, a hypothesis requirement test was conducted, containing normality test and homogeneity test. The normality test was carried out using SPSS 21 on all data groups, obtaining: 1) pretest result data from both control and experimental class, and 2) posttest results data from both control and experimental class. Meanwhile, the basis for decision making in the Kolgorov - Smirnov normality test is if the significance value (sig) is more than 0.05, then the data is normally distributed. However, if the significance value (sig) is less than 0.05, the research data are not normally distributed. The hypothesis proposed for the normality test is Ho in which the data are normally distributed, while Ha means that the data is not normally distributed. Table 2 presents the results of the normality test in which it can be concluded that all data are normally distributed.

Table 2. Normality Test of Posttest and Pretest of Experimental and Control Classes

	Class	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Portal Utilization Results	Pretest of Experimental Class	.159	35	.025	.932	35	.032
	Posttest of Experimental Class	.122	35	.200[*]	.958	35	.197
	Prettest of Control Class	.147	35	.053	.936	35	.042
	Posttest of Control Class	.104	35	.200[*]	.950	35	.113

a. Lilliefors Significance Correction

*. This is a lower bound of the true significance.

When the normality test was done, it was continued by the homogeneity test. The hypothesis proposed for the homogeneity test are Ho in which the data variance are homogeneous and Ha in which the data variance are not homogeneous. Homogeneity tests were carried out on several groups of data, including: 1) pretest and posttest of the control class; 2) pretest and posttest of the experimental class; and 3) post-test of the control and the experimental groups. The basis for decision making in the homogeneity test is if the significance value (sig) on the Based on Mean is higher than 0.05, then the data are homogeneous. However, if the significance value (sig) on the Based on Mean is less than 0.05, the research data are not homogeneous. The homogeneity test results of the pretest and posttest data of the control group can be seen that the significance obtained was 0.14, which is greater than 0.05 (the level of significance used). This indicates that H_o is accepted and H_a is rejected. Thus, it can be concluded that the pretest and posttest data variance for the control class are homogeneous.

Further homogeneity test was carried out on the pretest and post-test data results of the experimental class. It can be seen that the significance obtained was 0.300, which is greater than 0.05 (the level of significance used). Therefore

it indicates that H_o is accepted and Ha is rejected. Thus, the data variance are homogeneous. The last homogeneity test was carried out on the post-test data from both control and experimental classes, it can be seen that the significance obtained was 0.818 which is greater than 0.05 (the level of significance used). This indicates that H_o is accepted, while Ha is rejected. Thus, it can be concluded that the data variance are homogeneous.

Since all data were found to be normally distributed and homogeneous, further hypothesis testing was carried out on three groups of data, those are: 1) pretest and post-test of the control class; 2) pretest and post-test of the experimental class; 3) post-test of the control and experimental class. Furthermore, hypothesis testing was carried out with the assistance of SPSS 21, in which Ho: means there was no difference in mean between the two groups, while Ha means there was an average difference for the two groups. The hypothesis testing results that have been carried out on the control class pretest and post-test data show that the significance level (2-tailed) was 0.000 which is smaller than 0.05 (the significance used), this indicates that H_o is rejected, while H_a is accepted. Thus, it can be concluded that there was an average difference between the data from the pretest and post-test results of the control group.

Hypothesis testing was then carried out on the pretest and post-test data of the experimental group. The hypothesis testing that have been carried out results obtained that the significance level (2-tailed) was 0.000 which is smaller than 0.05 (the significance used). This indicates that H_o is rejected, while H_a is accepted. Thus, there is an average difference between the data from the pretest and post-test results of the experimental group. The last hypothesis test was carried out on the data from the post-test results of the control class and the experimental class. The hypothesis test results showed that the significance level (2-tailed) is 0.000 which is less than 0.05 (the significance used), indicating that H_o is rejected, while H_a is accepted.

Therefore, there is an average difference between the post-test results of the control class and the experimental class. Furthermore, after conducting operational field trials, improvement of the final product was carried out. Improvements were made to all developed products, including services: 1) learning resources, 2) media contributors, 3) online classes, 4) question banks, and 5) online laboratory. These improvements are also for the support of the activity info menu, partnerships, and instructions for their use.

4.7. Effectiveness of Integrated ICT Learning Media

The integrated ICT learning media service model is one of the learning innovations that can be used in training the ability to utilize learning. Taimalu and Luik (2019) conducted a study on the integration of ICT in learning, involving 54 teachers as the research samples. The results of the current research discovered that there was significant effect of ICT integration on teachers and professional development programs. Muianga et al (2018) added that ICT tools are used more to facilitate learning process in educational institutions, because the use of ICT tools allows students to learn collaboratively, and ICT can help teachers learn. Victor and Bolanle (2017) explained that the use of ICT for student learning can expand students' knowledge and improve their overall learning experience. Sari and Rasyidah (2019) emphasized that integrating ICT in learning has an important role. The role of ICT is to enhance interdisciplinary learning.

The Ministry of Education and Culture (2020) explains that ICT is a leading communication tool and a facilitation tool which affects teaching and learning activities positively. Therefore, it is necessary to optimize the use of ICT in learning since it will have a significant effect on student learning outcomes. A teacher is required to create an ICT-based learning media that can help students understand the learning material. Lawrence and Tar (2018) explains that, the adoption and integration of ICT into learning environments provides more opportunities for teachers and students to work better in the global digital era. ICT has the potential to play an increasingly important role in education whether it is in classrooms, administration, etc. Hence, competent teachers are necessary. Additionally, as explained by Nurlaili (2018), teachers should be technically equipped and trained to master the skills of how to innovate and develop media according to the needs of the topic and character of their students.

Therefore, the service model of utilizing integrated ICT learning media developed in the current research integrates ICT learning media services in the learning process. These services will assist and provide convenience for teachers in optimizing their teaching. Thus, this service model also increases the use of ICT learning media integrated with learning. The integrated ICT learning media service model in addition to implementing technology in the learning process, is also effective in improving student learning outcomes.

5. Conclusions

The development results of the integrated ICT learning media service model were concluded as suitable to be used in the learning process. Teacher also gave a positive response to the integrated ICT learning media service model. In addition, the integrated ICT learning media service model is also effective in improving the creativity of ECE teachers. This can be seen from the significant average difference between the two groups before and after

treatment was provided.

The advantages of the product developed is that it can be used by ECE teachers for free, since it is integrated with several services. Teachers automatically increase their teaching and learning experience by applying information technology better. In addition, the integrated ICT learning media service model can also prepare teachers to utilize technological advances in their daily lives.

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