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## The Effects of Project Based Learning Model with Android on Scientific Literacy and Digital Equipedness/ICT Literacy

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### Abstract

This research aimed at finding out the effects of project based learning with an android medium on: (1) the scientific literacy and (2) digital equippedness /ICT literacy for grade VII students of SMPN 2 Mataram, SMPN 6 Mataram, and SMPK Kesuma Mataram. This research was a quasi-experimental design with a nonequivalent control group design. The instruments of the study were multiple choice test of scientific literacy and observationsheets of digital equippedness/ICT literacy. The data of scientific literacy gain score were analyzed by Independent Sample t-Test on 5% significant level and the data of digital equippedness/ICT literacy were analyzed by descriptive analysis. The results of analysis on Independent Sample t-Test with 5% significant level showed that the significant score was lower than 0.05, i.e. 0.000 on three targeted schools. It was found that digital equippedness/ICT literacy observation on three targeted schools was in a very good category. The study revealed that the project based learning model with an Android had significant effects on: (1) scientific literacy, and (2) successfully equipping the students with the digital/ICT literacy.

**Keywords:** Project based learning; Android media; Scientific literacy; Digital/ICT literacy.

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## **1. Introduction**

Many scientific writers said that the main key to our science education was the scientific literacy, because it gave the effect on the improvement of the science and technology in the daily life [5]. The Scientific literacy played important role in the human daily life [21]. Scientific literacy is the fundamental scientific ability for the individual to understand the scientific law, theory, and phenomena which can be used the source of information [6]. The indicator of scientific literacy, according to [15], covered: 1) having the knowledge and understanding the scientific concept and process, 2) seeking, asking, and finding the answer to the question raising from the curiosity in the daily life, 3) being able to read and understand and providing the conclusion validity to the article that had relation to the science, 4) being able to evaluate the scientific information quality, 5) being able to conclude, to show, and to evaluate the opinion.

The result of the TIMSS 2011 study on the eighth grade students' scientific literacy in Indonesia indicated low scores, which was 406 out of 500 [10]. The similar result was shown by the [17] study on the scientific literacy of the 15-year-old students in Indonesia which was low or under the average scores, i.e. 307 of 500 [17]. The factor that caused the students to gain low scores for scientific literacy in those two studies was that many test materials in those two tests could not be found in the Indonesian Elementary and Middle Education Curriculum. This result indicated that it needed curriculum improvement and development, especially the Elementary and Middle Education Curriculums so that it could be expected to enhance the essential ability the students need for developing their country in the XXI century.

Finally, in 2013 the Elementary and Middle Education Curriculum in Indonesia changed to the Curriculum 2013. This curriculum was expected to produce and to create the generation that mastered the 21<sup>st</sup> Century skills. The 21<sup>st</sup> Century skills that should be mastered by the students was diversified into three, namely foundational knowledge (to know), Meta knowledge (to act) and humanistic knowledge (to value). One aspect of the foundational knowledge is the digital/ICT literacy [12]. The digital/ICT literacy is the ability to process, to utilize the information, and to solve the problem through critical thinking [11]. The indicator of the digital/ICT literacy consists of accessing, processing, integrating, evaluating, making/creating and communicating [3].

One of the successes in learning is determined by the success of the educator in choosing the learning strategy [14]. The learning strategy here refers to the employed learning model and media. The learning model suggested in the Curriculum 2013 is the model which uses the scientific approach, among others, the project based learning model. The project based learning model is the learning model which utilizes the project as the core for learning activities, and makes use the problem as the starting step to collect and integrated the new knowledge based on the real experience. The syntax of the project based learning, according to [15] covers: 1) proposing the question from the phenomena in the surrounding area; 2) designing the steps in accomplishing the project; 3) making the schedule for project implementation; 4) gathering, analyzing and interpreting the data using mathematics, informatics, computer technology and computation thinking; 5) writing reports and presenting the project; and 6) evaluating the process and project result.

In the syllabus of the Curriculum 2013, the Natural Science in grade VII in the odd semester, one of the main

materials which is taught and related directly to the daily life is the energy in the life system. Some lesson materials in the main material of energy in the daily life cover the photosynthesis, the energy transformation, and the cell metabolism. Those lesson materials require students to acquire the knowledge through the discussion and direct inquiry on the real problem. The materials and the process of Natural Science learning are adjusted to the characteristic and syntax of the project based learning model, hence it is expected that this learning model can facilitate the Natural Science learning, especially on the materials of energy transformation, cell metabolism, and photosynthesis.

The learning media which can support the implementation of project based learning is among others digital/ICT based media. [19] stated that the use of the digital/ICT in the project based learning can develop the learning result and the key competencies of the students which cover: ability to communicate, to think, to solve problems, to apply life skills, and the ability to use the technology. Electronic learning (e-learning) is one of learning media which is based on digital/ICT. E-learning is the instruction delivered in the form of digital equipment through the laptop, computer or smart phone that are meant to support the learning [4]. The research on the device of Natural Science learning on the basis of project based learning model through e-learning media has been conducted by [16] and [7]. The results of the two researches showed that the device of Natural Science learning on the basis of project based learning model through the e-learning were feasible and effective to enhance the scientific literacy and digital/ICT of the junior high school students. However, this device of learning has not been disseminated widely, so it is needed to conduct the advanced research to disseminate that research result. The dissemination of the learning device can be carried out through the android -based application. This dissemination will facilitate anyone to access the learning device without being constrained by time and location where the people is situated. Android is the linux-based mobile operating system. This operating system facilitates the programmer to make new application inside the system [13]. One of the application created is the android -based learning application. This application can be used as the learning media which supports the students to access the knowledge and information. The result of the survey by [20] indicated that the number of the users of an android system application between September 2015 and September 2016 in Indonesia reached 72.34%. The preliminary observation was the distribution of the questionnaire on the use of the hand phone in the pilot project junior high schools in Mataram; it was identified that the users of the Android smart phones reached 92 of 105 students. But the use of the android smart phones was more on the communication, even more in the school area there were not any android-based learning media yet. Therefore, the android-based learning media should be created and functioned. Based on the above description of the background of the problem, the research entitled “the effect of the Natural Science learning on the basis of project based learning on the scientific literacy and Digital Equippedness / ICT Literacy” should be conducted.

## **2. Method**

This research is the quasi-experimental research with nonequivalent control group design. This design employed two classes as the research sample, one of which was selected as the control class, and the other as the experimental class. The experimental class was given treatment the project-based Natural Science Learning using Android and the control class was treated as the conventional model, namely, the common learning with the teacher in school.

The research implementation period was in November 2016 in the academic year 2016-2017. The location of the research was in the three curriculum 2013 pilot project junior high schools in Mataram, they were SMPN 2 Mataram, SMPN 6 Mataram, and SMPK Kesuma Mataram.

The population of this research were all pilot project junior high schools for implementing the Curriculum 2013 in Mataram, Province of Nusa Tenggara Barat. The samples of this research were all the seventh grade students in SMPN 2 Mataram, SMPN 6 Mataram, and SMPK Kesuma Mataram using the purposive sampling.

The learning device that was employed in this research was adapted from [16]. Scientific literacy was measured by using the multiple choice test instruments and the Digital Equippedness/ICT Literacy was observed by using the non-test observation sheet. The data of scientific literacy was n-gain scores which would be analyzed in statistic using Independent Sample t-Test in the significance level on 5%. This analysis would be done by using software SPSS 20.0 for Windows. The determination of the criteria for scientific literacy improvement was based on the criteria of normalized gain scores according to [8], as follows: a)  $0.70 \leq g < 1.00$  (high), b)  $0.30 \leq g < 0.7$  (medium), c)  $g \leq 0.30$  (low).

The data of Digital Equippedness/ICT Literacy was analyzed descriptively. The determination of The project-based Natural Science Learning using Android was said to give significant effect to equip the students with the digital/ICT literacy if the result of analysis of the observation on the Digital Equippedness/ICT Literacy based on the accomplishment of the task and the aspect of the Digital Equippedness/ICT Literacy were in the *good criteria* and/or *very good criteria*.

The determination of the Digital Equippedness/ICT Literacy category of the students as the result of observation was based on the criteria of the judgment according to [2]. The judgment criteria of the students' digital equippedness/ICT Literacy on the ground of the observation sheet was showed in **Table 1**.

**Table 1:** The judgment criteria for the students' digital equippedness/ICT literacy based on the Observation Sheet

Interval	Value	criteria
$80.40 < X$	A	Very Good
$66.80 < X \leq 80.40$	B	Good
$53.20 < X \leq 66.80$	C	Sufficient
$39.60 < X \leq 53.20$	D	Poor
$X \leq 39.60$	E	Not Good

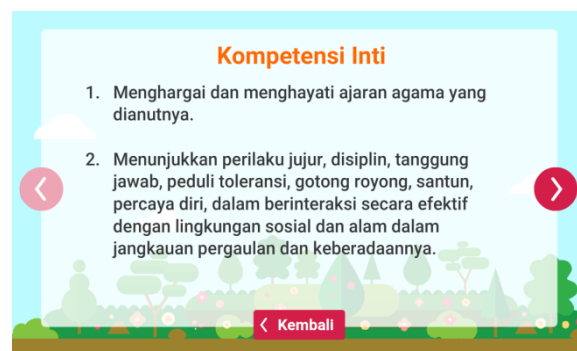
Android media in this research was the media for dissemination of the Natural Science learning device using project based learning through e-learning to improve the scientific literacy and equip the digital/ICT literacy. Android media in this research was also used as the supporting media for the students to access the website [www.sciencertm.edu20.org](http://www.sciencertm.edu20.org) which was the e-learning in this research, and to obtain the lesson materials which

was practical and flexible. The content menu in the android media was adopted from the research product by [16]. Android media in this research had been validated and declared valid by the media expert. The indicator of android media creation in this research covered:

- 1) Format was judged by the conformity of the color and the view of the picture. The adaptedness of the color covered the color of menu button, operation button, and the background. While the view of the picture covered the color, sharpness, and the picture information.
- 2) Integratedness was judged by the conformity of the whole view sequence of the menu button and the operation button.
- 3) Balance was judged by the conformity of the size and the lay out. As for the size conformity that was judged covered the proportion of the button size, pictures, and the text.
- 4) Shape was judged by the use of the letter's type, size, and color.
- 5) Color was judged by the color lightness which covered the choice of colors for the button, background view for the text, letters which did not disturb the view.
- 6) Attractiveness was judged by the attractiveness of the views of the symbol, letters, button and the screen.

Android media in this research was named "Scientific Apps" which contained the elements of texts and pictures. The creation of android media utilized the software Adobe Flash Professional CS 6 with the file format "apk", the size of application was 1.208 kb, and the lowest android OS for executing this software was Android 2.3 gingerbread. Android media Scientific Apps consisted of five main menu, namely, competency, material, LKPD, quiz, and profile.

The menu "Competency" in the Scientific Apps contained the Core Competency, Basic Competency, and the learning indicators.



**Figure 1:** Layout view for Competency Menu

The menu "Material" in Scientific Apps contained the materials of energy transformation, cell metabolism, and photosynthesis



Figure 2: Layout of Material Menu

The menu "LKPD" in Scientific Apps was directly linked to the employed website in this learning, so that the students could directly access the tasks which were given through the smart phone.

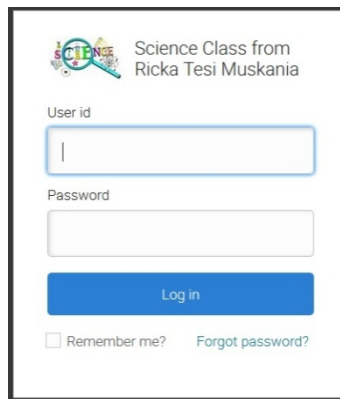


Figure 3: Layout view for LKPD Menu

The menu "Quiz" contained the multiple-choice test items with four answers as many as five items, and were always randomized automatically by the system. This test items were done in 30-minute period, and the scores would appear after all the test item had been answered or when the time limit was over. The menu "Profile" contained the identity of the media creator.



Figure 4: The layout of the Quiz Menu

### 3. Result

This research analyzed the effect of The project-based Natural Science Learning using Androidon scientific

literacy and Digital Equippedness/ICT Literacy of students in grade VII in SMPN 2 Mataram, SMPN 6 Mataram, and SMPK Kesuma Mataram. The result of data analysis in this research is presented as follows: The achievement of the scientific literacy of the students in the three schools was measured using the scoring instrument in the form of multiple choice test as many as 25 items with four choices of answer which were given in the pretest and posttest in the control and experimental classes. Following is the data of the scientific literacy achievement of each school,

**Table 2:** The students' scores of Scientific Literacy in SMPN 2 Mataram

Kriteria	Control		Experimental	
	Gain Scores	N-Gain	Gain Scores	N-Gain
Min	16.00	0.21	32.00	0.43
Max	60.00	0.85	72.00	1.00
Mean	36.10	0.56	51.40	0.72
SD	10.27	0.16	10.07	0.14

The mean value of n-gain scores of the control class on 0.56 was included in the medium criteria, and the mean value of n-gain scores of experimental class on 0.72 was included in the high criteria.

**Table 3:** Scientific Literacy Scores of the Students in SMPN 6 Mataram

Kriteria	Control		Experimental	
	Gain Scores	N-Gain	Gain Scores	N-Gain
Min	8.00	0.11	12.00	0.19
Max	52.00	0.81	72.00	1.00
Mean	30.12	0.46	41.49	0.62
SD	13.29	0.20	14.72	0.23

The mean value of n-gain scores of the control class on 0.46 was included in the medium criteria, and the mean value of n-gain scores of the experimental class on 0.62 was included in the medium criteria.

**Table 4:** Scientific Literacy Scores of the Students in SMPK Kesuma Mataram

Kriteria	Control		Experimental	
	Gain Scores	N-Gain	Gain Scores	N-Gain
Min	4.00	0.05	12.00	0.19
Max	52.00	0.68	68.00	0.94
Mean	26.34	0.38	44.36	0.63
SD	12.02	0.17	14.50	0.21

The mean n-gain scores of the control class on 0.38 was included in the medium and the mean value of n-gain scores of the experimental class on 0.72 was included in the medium criteria.

*Hypothesis Testing*

The Analysis carried out to test the hypothesis of effect of the Natural Science learning using project-based learning with android on the scientific literacy of the students utilized the Independent Sample t-Test.

However, before testing the hypothesis, the assumption test was conducted in the form of normality and homogeneity.

**Table 5:** The Result of Hypothesis Testing

Gain Scores	Statistical Test	Sig.	Criteria
SMPN 2 Mataram	Kol-Smirnov (control)	0.086	Normal
	Kol-Smirnov (Experimental)	0.108	Normal
	Levene's test	0.707	Homogeneous
	Independent sample t-test	0.000	Significant
SMPN 6 Mataram	Kol-Smirnov (control)	0.200	Normal
	Kol-Smirnov (Experimental)	0.200	Normal
	Levene's test	0.573	Homogeneous
	Independent sample t-test	0.001	Significant
SMPK Kesuma Mataram	Kol-Smirnov (control)	0.112	Normal
	Kol-Smirnov (Experimental)	0.131	Normal
	Levene's test	0.139	Homogeneous
	Independent sample t-test	0.000	Significant

*The Descriptive Analysis of the Digital Equippedness/ICT Literacy*

The students' digital equippedness/ICT literacy in the three schools was measured using the instrument in the form of observation sheets which were given only to the experimental class.

The observation result on the digital equippedness/ICT Literacy was analyzed based on the task accomplishment and the aspect of the digital equippedness/ICT Literacy. The data of the observation result which was based on the analysis of the task accomplishment of the students in the three schools is presented in the percentage number in Table 6.



**Table 6:** Percentage of Observation Result on the Digital Equippedness/ICT Literacy Based on the Task accomplishment

Task	Percentage (%)		
	SMPN 2	SMPN 6	SMPK Kesuma
I	64.64	52.24	58.67
II	100	94.29	82.14
III	100	100	100
IV	100	100	100
V	100	100	100
Mean	92.93	89.31	88.16

The percentage of the mean value of the students' digital equippedness/ICT literacy in SMPN 2 Mataram based on task accomplishment was 92.93%. The percentage of the mean value of the students' digital equippedness/ICT literacy in SMPN 6 Mataram based on the task accomplishment was 92.93%. The percentage of the mean value of the students' digital equippedness/ICT literacy in SMPK Kesuma Mataram based on task accomplishment was 92.93%. The three percentages of the mean value of the digital equippedness/ICT Literacy based on task accomplishment were included in **very good criteria**.

The data of the observation result based on the analysis of every aspect of the digital equippedness/ICT Literacy in the three schools is presented in Table 7.

**Table 7:** The Percentage of the Observation Result Based on the Analysis Aspect of the Digital Equippedness/ICT Literacy

Task	Percentage (%)		
	SMPN 2	SMPN 6	SMPK Kesuma
Access	91.16	87.24	87.12
Manage	100.00	100.00	100.00
Integrate	100.00	100.00	100.00
Evaluate	100.00	100.00	100.00
Create/make	100.00	100.00	100.00
Communicate	100.00	100.00	100.00
Mean	98.53	97.87	97.85

The mean percentage of the students' digital equippedness/ICT literacy in SMPN 2 Mataram based on the aspect of equippedness was 98.53%. The mean percentage of the students' digital equippedness/ICT literacy in SMPN 6 Mataram based on the aspect of equippedness was 97.87%. The mean percentage of the students' digital equippedness/ICT literacy in SMPK Kesuma Mataram based on the aspect of equippedness was 97.85%. The three mean percentages of the digital equippedness/ICT Literacy based on the aspect of equippedness were included in the **very good criteria**.

#### 4. Discussion

This research proposed two formulated problems so that the discussion covered: 1) the analysis of the effect of The project-based Natural Science Learning using Android on the scientific literacy of the students; 2) the analysis of the effect of The project-based Natural Science Learning using Android on the digital equippedness/ICT Literacy of Students.

*The analysis of the effect of project-based Natural Science learning using android on the Junior High School Students' scientific literacy*

Project-based Natural Science learning using android gave a significant result in influencing the scientific literacy of the students. This was proven by the hypothesis testing of the three schools using the independent sample t-test showed that the significance score was less than 0.05 hence the  $H_0$  was rejected. The effect that was generated in this research was in the form of the improvement of the scientific literacy of the students which was indicated by the gain scores. This result was in accordance with the research that was conducted by [16] and [7], that was, the Natural Science learning on the basis of project based learning through e-learning could enhance the students' scientific literacy.

The result of the research showed that The project-based Natural Science Learning using Android could improve the students' scientific literacy in the aspect of knowledge of science. This result was obtained because through the model of the Project Based Learning with android, the students could train their scientific literacy. The result could be elaborated as follows:

- a. In the phase of asking the question from the surrounding phenomena, the students were trained to acquire the ability to inquire, to ask, to find the answer to the curious question in the daily life, and also to obtain the ability to access the information. This phase was supported by the android media which provided the information for the students.
- b. In the following phase, namely, to design the step to accomplish the project, making the schedule of project implementation, and the report writing and the project presentation, the students were trained to acquire the understanding of scientific concepts and the process needed to participate in the society of digital (Science and Technology) era.
- c. In the phase of gathering, analyzing, and interpreting the data using mathematics, informatics, technology, and the computation thinking, the students were trained to acquire the ability to inquire, to ask, and to find the answer to the curious question in the daily life, and also the ability to read and understand the articles concerning the science in the popular press. This phase was supported by the android media which provided the information for the students.
- d. In the phase of writing the report and project presentation and the phase of evaluating the project and the project result, the students were trained to acquire the ability to evaluate the quality of scientific information based on the source, and also to possess the ability to make conclusion, to indicate and evaluate the opinion based on the evidence.

In general, the application of the project-based Natural Science Learning using Android would generate more active, creative, critical students who were able to solve the problem based on the daily life. Those strengths were indicated by the students' activities during the learning in class, from the beginning of activities to find the daily problem which would be selected as the project up to the activity of presenting the product which was the result of the work and thought of the students. This statement is in line with [18] which said that project based learning could make the student become active, have the ability to solve the problem through accomplishing the project, and give the students chance to think critically and creatively.

Besides, the project-based Natural Science Learning using Android could make the learning activity more fun, flexible, and provide wider knowledge of science. The students obtained the knowledge, not only from the lesson books, but also from the android media which was provided by the teacher. This result is in accordance to the opinion by [9] who stated that the project based learning enabled the students to utilize the technology to support their learning. That result is also in line with [1] who said that the use of media learning which was applied in the android device could improve the motivation to learn, the understanding of concepts, and give rise fun to the students.

Following is the more detailed discussion about the result in each of the school:

- a) The analysis of the effect of the project-based Natural Science Learning using Android on the students' scientific literacy in SMPN 2 Mataram.

The result of testing the independent sample t-test in SMP Negeri 2 Mataram revealed that the obtained significance score was 0.000 ( $\text{sig} < 0.05$ ) with the mean value of the gain scores of the experimental class on 51.40 and the control class on 36.10. This result showed that the project-based Natural Science Learning using Android gave significant effect to the students' scientific literacy in SMP Negeri 2 Mataram. The given effects were in the form of improvement of the students' scientific literacy. The improvement of the students' scientific literacy in di SMP Negeri 2 Mataram for the experimental class was included in the high criteria which was indicated by the mean value of n-gain scores on 0.72, while for the control class was included in the medium criteria with the mean value of n-gain scores on 0.56.

- b) The analysis of the effect of the project-based Natural Science Learning using Android on the students' scientific literacy in SMPN 6 Mataram.

The result of testing the independent sample t-test in SMP Negeri 6 Mataram showed that that the obtained significance score was 0.001 ( $\text{sig} < 0.05$ ) with the mean value of gain scores in experimental class on 41.49 and in the control class on 30.11. This result showed that The project-based Natural Science Learning using Android gave significant effect to the students' scientific literacy in di SMP Negeri 6 Mataram. The given effect was in the form of improvement of the student' scientific literacy. The improvement of the student' scientific literacy in SMP Negeri 6 Mataram in the experimental class was included in the medium criteria which was shown by the mean value of n-gain scores on 0.62, and in the control was included in the medium criteria with the mean value of n-gain scores on 0.46. Even though the criteria of the scientific literacy improvement in the

two classes were the same, the scores of the two classes had pretty big difference. In addition, the gained mean score of the pretest in the experimental class on 32.46 was lower than in the control class on 34.23, and the gained mean scores of the posttest in the experimental class on 73.94 was higher than that in the control class on 64.35.

- c) The analysis of the effect of The project-based Natural Science Learning using Android on the students' scientific literacy of the in SMPK Kesuma Mataram.

The result of testing the independent sample t-test in SMPK Kesuma Mataram showed that the gained significance score was 0.000 ( $\text{sig} < 0.05$ ) with the mean value of the gain scores in the experimental class on 44.36 and in the control class on 26.34. This result showed that The project-based Natural Science Learning using Android gave a significant effect on the students' scientific literacy in SMPK Kesuma Mataram. The given effect was in the form of improvement of the student' scientific literacy. The effect was the students' improvement in their scientific literacy. The improvement of the student' scientific literacy in SMPK Kesuma Mataram in the experimental class was included in the medium criteria which was shown by the mean value of n-gain scores on 0.63, and in the control class was included in the medium criteria with the mean value of n-gain scores on 0.38. Although the criteria of the scientific literacy improvement in the two classes were the same, the scores of the two classes had a relatively big difference. In addition, the gained mean score of the pretest in the experimental class on 28.93 was lower than in the control class on 29.25, and the gained mean scores of the posttest in the experimental class on 73.28 was higher than that in the control class on 55.86.

#### ***4.1. The analysis of the effect of the project-based Natural Science Learning using Android on the students' Digital Equippedness/ICT Literacy in Junior High School***

The project-based Natural Science Learning using Android influenced significantly to equip the student with the digital/ICT literacy. This could be proved by the result of the analysis of the observation sheets on the students' digital equippedness/ICT literacy in the three schools which indicated that the observation result on task accomplishment and the analysis result of each aspect of the students' digital equippedness/ICT Literacy were in the **very good category**. The project-based Natural Science Learning using Android was said to give the significant effect to equip the students with the digital/ICT literacy if the result of the analysis of the observation on the digital equippedness/ICT Literacy based on task accomplishment and the aspect of the digital equippedness/ICT Literacy were in the **good** and/or **very good criteria**. This research result was in line with the research conducted by [16] and Endang Duwi Siti [7], who said that the project-based Natural Science learning through e-learning could equip the students with the digital/ICT literacy.

The research result revealed that the project-based Natural Science Learning using Android could equip the students with the digital/ICT literacy. This result could be obtained through the model of Project-Based Learning with android, the students could train their digital/ICT literacy, so that the given result was maximum. The result could be explained as follows:

- a. The students' ability to access could be trained through the phase to ask question about the

surrounding phenomena, and could be supported by the android media so that it could be used as the vehicle to train the students' digital/ICT.

- b. The students' ability to manage could be trained through the phase of the Project Based Learning, namely to design the steps of the project accomplishment.
- c. The students' ability to integrate could be trained through the phases of data gathering, analysis, and interpreting using mathematics, informatics, and technology, and computation thinking. In addition, being provided with the android media as the learning media, the students' digital/ICT ability could well be trained.
- d. The students' ability to communicate could be trained through the report writing, evaluation of the process, and the project presentation.

The result of this research was in line with the result of the research by [19] saying that the Project-based Learning which employed the ICT in the learning process could develop the students' ability in communicating, solving the problems, life skills, the students' ability to utilize technology and to well understand the lesson contents. The Project-based Learning gave the students opportunity to enlarge the knowledge and develop the skills through the problem solving and investigation. The related problem to the natural phenomena could be used as the main foundation to carry out the core activities of the project based learning. This result was also supported by Tecknokids (2011, p.1) which stated that the project learning using the technology could give benefits for the students to access, manage, integrate, and to make or create the information. The students would in groups seek and obtain the information from many sources which was then processed and integrated to make or create the students' work through the utilization of technology.

Following is the more detailed explanation about the research result in each school:

- a) The Analysis of effect of the The project-based Natural Science Learning using Android on the Students' digital equippedness/ICT Literacy in SMPN 2 Mataram.

The result of the observation on the students' digital equippedness/ICT literacy in SMP Negeri 2 Mataram indicated that the result of the mean percentage of the observation on the task accomplishment was sebesar 92.93% 98.53%. If they were converted using the Likert scale, the two means of the students' digital equippedness/ICT literacy in SMP Negeri 2 Mataram were in the **very good criteria**. This meant that The project-based Natural Science Learning using Android gave a significant effect to equip the students with the digital/ICT literacy in SMP Negeri 2 Mataram.

- b) The Analysis of effect of The project-based Natural Science Learning using Android on the Students' digital equippedness/ICT Literacy in SMPN 6 Mataram.

The result of the observation on the students' digital equippedness/ICT literacy in SMP Negeri 6 Mataram indicated that the result of the mean percentage of the observation on the task accomplishment was sebesar 89.31% and the analysis result of each aspect of the digital equippedness/ICT literacy was 97.87%. If they were converted using the Likert scale, the two means of the students' digital equippedness/ICT literacy in SMP

Negeri 6 Mataram were in the **very good criteria**. This meant that The project-based Natural Science Learning using Android gave significant effect to equip the students with the digital/ICT literacy in SMP Negeri 6 Mataram.

- c) The Analisis of effect of the project-based Natural Science Learning using Android on the Students' digital equippedness/ICT Literacy in SMPK Kesuma Mataram.

The result of the observation on the students' digital equippedness/ICT literacy in SMPK Kesuma Mataram indicated that the result of the mean percentage of the observation on the task accomplishment was sebesar 88.16% and the analysis result of each aspect of the digital equippedness/ICT literacy was 97.85%. If they were converted using the Likert scale, the two means of the students' digital equippedness/ICT literacy in SMPK Kesuma Mataram were in the **very good criteria**. This meant that The project-based Natural Science Learning using Android gave significant effect to equip the students with the digital/ICT literacy in SMPK Kesuma Mataram

## **5. Conclusion**

Based on the result of analysis and discussion, some conclusions could be drawn, namely:

- a) The project-based Natural Science Learning using Android could improve the students' scientific literacy in the three schools. The improvement of the students' scientific literacy could be identified through the obtained mean gain scores in the class that utilized The project-based Natural Science Learning using Android which was higher than the class that used the conventional model of Natural Science learning. Based on the analysis result of testing Independent Sample t-Test of the gain scores, it was found out that the significance score of t-Test  $< 0.05$ , i.e. 0,000. That result showed that the project-based Natural Science Learning using Android gave a significant effect on the students' scientific literacy.
- b) The project-based Natural Science Learning using Android could equip the students with the digital/ICT literacy in the three school. Based on observation result on task accomplishment and the analysis result of each aspect of the students' digital equippedness/ICT Literacy which was in the very good category, it could then be concluded that the project-based Natural Science Learning using Android gave significant effect on the students' digital equippedness/ICT literacy.

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