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# The Android-Based Learning Media Using The Trait Treatment Interaction Model as Implementation of Industrial Era 4.0

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**Abstract.** A research has been carried out on the effect of android based construct 2 learning media using the trait treatment interaction model on the physics learning outcomes of students in class XII MAN 2 Padang Pariaman. The population in this study all classes XII MAN 2 Padang Pariaman with a sample of 36 students taken using cluster random sampling techniques. The research instrument was validated by 3 validator reprehension. The hypothesis in this study was tested using the ANACOVA test which had passed the normality test, homogeneity test and average similarity test. The results of this study indicate that the physics learning outcomes of students increased from an average of 79.8 to 87.4 in class XII Science 1 and from an average of 76 to 85 in class XII Science 2.

**Keyword:** *Android Based Learning Media, TTI Model, Learning Outcomes, MAN 2 Padang Pariaman*

## 1. Introduction

The higher education system has grown exponentially in the last five decades to meet the demands of higher quality education. This aspect is gaining momentum as information communication and technology (ICT) advances (Buttar 2016). The incorporation of ICT into the education system is an active program and new movement in education. This movement portrays more modern education and its presence covers all aspects of the current third millennium (Dastjerdi 2016). The era of ICT has made the traditional ways of learning and teaching have lost meaning. Innovative teaching-learning methods are expected to carry out teaching more effectively and efficiently. ICT is the best choice for various things faster and more appropriate especially in the field of education (Kaware and Sain 2015).

In the past educational institutions usually forced students to do and accept what was said by the educator. The learning method is more dominant to the conventional method. So that learning is more dominant teacher centered. In reality, the author sees that educators in a class face a large number of students (between 15-20 people). Educators in teaching provide equal treatment to students. Interaction and seriousness of students lack in learning. It seems clear when learning begins students are actively involved, only a few people are dominated by smart students. Other students just watch without participating properly. The opportunity to ask questions and give opinions is also taken by

active students only. Students who are not active when given the opportunity they tend not to want because they feel there are smarter than them.

Educators rarely use creative and interesting learning media. Educators more often use textbooks and sometimes use PowerPoint in learning. The limited learning media in schools makes it difficult for teachers to explain what they want to convey to students. This makes learning less effective and the material delivered is not fully absorbed by students. Many students are not interested in learning because learning without media is less attractive. Many students are sleepy and feel bored, especially in following complex learning such as physics. In addition, learning physics is very difficult to understand. Physics learning contains many postulates, formulas and calculations. The learning process is only dominated by smart students, while students with moderate and low ability often feel neglected. Many students feel bored, sleepy, annoy their friends and busy with their respective activities. This results in a lack of understanding and involvement of students in the learning process so that the physics learning outcomes of students are classified as low. This can be seen from the percentage table of the results of semester I students of class XII IPA MAN 2 Padang Pariaman Academic Year 2018/2019 as follows:

**Table 1.** Percentage of semester I semester XII Science MAN 2 Padang Pariaman Academic Year 2018/2019

| No | Class | Number of Students | Limit of Competence | Not Pass The Competence Ability | Pass the Competence Ability |
|----|-------|--------------------|--------------------|------------------------------|----------------------------|
| 1. | XII IPA 1 | 17 | 80 | 7 | 10 |
| 2. | XII IPA 2 | 19 | 80 | 8 | 11 |
| 3. | XII IPA 3 | 16 | 80 | 8 | 8 |

Based on the table above it can be seen that there are still many students of class XII MAN 2 Padang Pariaman who have low learning outcomes so that they are classified as incomplete. This is caused by students not being able to participate in learning well because educators cannot provide material according to students' abilities. These problems, need to be overcome in order to improve the quality of learning in order to improve student learning outcomes. Seeing the differences in individual abilities in learning needed a learning model that considers differences in individual abilities. One learning model that is expected to accommodate and appreciate the problem is the Trait Treatment Interaction (TTI) learning model. The TTI (Trait Treatment Interaction) Model is an effective learning model used for certain individuals according to the abilities possessed by students. Trait treatment interaction model is a suitable model used to explain that students have different learning abilities (Aswirna 2018; Lee 2013; Vesta 1975). Educators need to prepare different learning models for students by adjusting the cognitive style and potential of students. One of the things to consider in choosing a learning model is the arrangement learning environment. A highly structured learning environment is suitable for students who have slow abilities. Less structured (flexible) learning environments suitable for students with high abilities. Students who lack confidence or have difficulty adjusting (anxious and inferior) tend to learn better when they are in a highly structured learning environment (Aswirna 2018; Kowollik 2009; Hunt 1975). This learning model is more effective if supported by interesting learning media such as Android-based construct 2 which is very effective in independent learning.

Construct 2 was developed by Scirra Ltd which is intended primarily for nonprogrammers who want to create a drag and drop learning game using a visual editor and behavior logic-based systems (Alom, et al 2017; Alom, et al 2016; Frydenberg 2015). Construct 2 utilizes Android which can be accessed anywhere and anytime. Android or often called smartphone is very flexible to be used by students anytime and anywhere making it suitable for independent learning or group study. Students have different abilities and learning styles. Self-learning is very fun for some students and some of them need help and additional from educators (regular teaching + tutorial) (Kubat 2018). Classroom

smartphone integration helps improve learning outcomes independently and in groups by enabling more interactive discussions among group members (Awedh, et al 2015).

So that researchers are interested in researching about the use of construct based learning media in android using the trait treatment interaction model in learning. This research is relevant to previous research conducted by Aswirna (2018) on the Application of Trait Treatment Interaction to Improve Learning of Chemistry with the results of Trait Treatment Interaction can improve the ability of academic performance of Chemistry students and Research conducted by Alom (2017) on Generic logs files and algorithms developed for educational multiplayer games with the results of instructional media construct 2 can improve social behavior refers to the involvement of students with tasks and how well students interact with others and cognitive dimensions that refer to the ways in which students manage the problem space and applying their reasoning skills. So far there has been no research that applies android-based construct learning media 2 supported by the learning model of trait treatment interaction.

This study aims to look at the effect of Android-based construct learning media 2 using the trait treatment interaction model to the learning outcomes of students and to compare learning outcomes of students before and after treatment.

## 2. Methods

This research is a quasy experimental study conducted at MAN 2 Padang Pariaman in the even semester of the 2018/2019 school year precisely in March-May 2019 with a population of all classes XII MAN 2 Padang Pariaman. The sampling technique using cluster random sampling with the results of the sample selection set the class XII IPA 1 with 17 students as the experimental class I and class XII IPA 2 of 19 people as the experimental class II.

The research variable is physics learning using the trait treatment interaction (TTI) model: independent learning (self learning) and ordinary learning + additional teaching (regular teaching + tutorial) as independent variables, learning outcomes as the dependent variable and TPA tests as moderator variables.

**Tabel 2.** *Factorial design* 2 x 2 x 2

| Treatment | | Variable | |
| Group/ Class | Variasi Pembelajaran | Covariate (X) | Dependent (Y) |
| --- | --- | --- | --- |
| Class XII IPA 1 | *Self Learning* | X1 | Y1 |
| | *Regular Teaching + Tutorial* | X2 | Y2 |
| Class XII IPA 2 | *Self Learning* | X1 | Y1 |
| | *Regular Teaching + Tutorial* | X2 | Y2 |

Data collection is done by using the student's physics learning test instrument. The learning achievement test consists of 25 multiple choices that have been validated by the validator lecturer and have been tested beforehand. Data were analyzed using anatest for problem analysis and SPSS program for data processing. Data were analyzed using Pearson correlation statistics and 2x2x2 factorial co-variance analysis (ANACOVA) techniques.

## 3. Result and Discussion

The TTI learning model has a very close relationship with learning outcomes. The TTI learning model in this study is assisted with the Android-based learning instructional media 2. The Android-based construct 2 learning media in this study was designed in the form of a slide containing atomic core material and energy sources. This Android-based Construct 2 learning media was created by Rahman

Al-Hakim. The learning media produced have been through the content validation process, media, and language. The media has also been tested for validity, practicality and effectiveness. Evaluation of the media meets the valid, practical and effective requirements so that it is appropriate for use in learning. Average validity and practicality test results for Android-based media construct 2 can be seen from the image below:
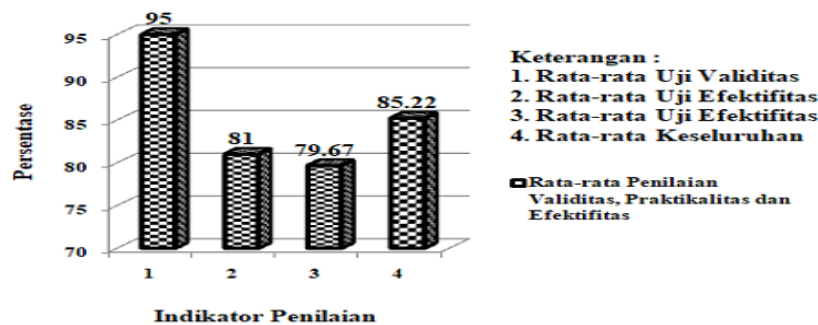


**Figure 1.** Average Test Results for Validity, Practicality and Effectiveness

Figure 1.1 explains that construct 2 learning media based on android on atomic core material and energy sources has an average value of 95 validity with a very valid category, an average practicality test 81 with a very practical category and an average value of effectiveness 79.67 with a very effective category. The overall average quality of product development test results is 85.22 so that the learning media construct 2 is based on android on atomic core material and energy sources is valid, practical and effective.

Student learning outcomes on the material of the atomic nucleus after the hypothesis test can be seen from table 3.1 as follows:

**Table 3.** The results of calculating the hypothesis test using the Anacova test

**Tests of Between-Subjects Effects**

Dependent Variable: HasiLBelajar

| Source | Type I Sum of Squares | Df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Corrected Model | 765,979[a] | 4 | 191,495 | 19,860 | ,000 |
| Intercept | 269015,111 | 1 | 269015,111 | 27899,640 | ,000 |
| TPA | 108,759 | 1 | 108,759 | 11,279 | ,002 |
| VariasiBelajar | 94,975 | 1 | 94,975 | 9,850 | ,004 |
| Kelas | 122,887 | 1 | 122,887 | 12,745 | ,001 |
| VariasiBelajar * Kelas | 439,359 | 1 | 439,359 | 45,566 | ,000 |
| Error | 298,910 | 31 | 9,642 | | |
| Total | 270080,000 | 36 | | | |
| Corrected Total | 1064,889 | 35 | | | |

a. R Squared = ,719 (Adjusted R Squared = ,683)

Table 3.1 presents an anacova test analysis on the learning outcomes of atomic nucleus students. From the above output, it can be seen that the significance figure for the TPA Sig. 0.023 0.05 then H0 is rejected and Ha is accepted. This means it can be said that there is a linear relationship between TPA and learning outcomes obtained by students. So it was concluded TPA affects the learning outcomes of students. Furthermore testing is done to determine the effect of learning variation on

student learning outcomes. The output results obtained variable learning variation Sig. 0.038 0.05, so it was concluded that H0 was rejected and Ha was accepted. This means that there is an influence of learning variation on student learning outcomes. The influence of TPA and students' learning variation on learning outcomes can also be seen from the value of R Squared = 0775 (Adjusted R Squared =, 746) so that it can be concluded the influence of these variables is perfect. Comparison of student learning outcomes given treatment in the form of self learning for students with high abilities and reteching + tutorials for students with medium and low abilities can be seen in Figure 3.1
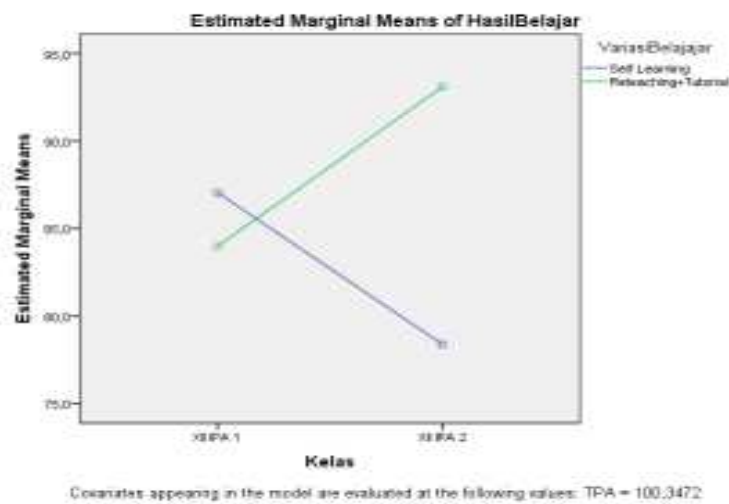


**Figure2.** Comparison of student learning outcomes using the TTI model with variations in self learning and reteaching + tutorials

Figure 4.1 shows the effect of learning variation on student learning outcomes. In the experimental class I (XII Natural Sciences 1) students who were taught with Self learning had an average value of 89 while those learned reteaching had an average value of 84. In experimental class II (XII Natural Sciences 2) students who were taught with self learning has an average value of 82 while those learned in reteaching have an average value of 88. So the comparison of student learning outcomes between experimental class I with experimental class II on self learning learning averages 89 and 82. Whereas student learning outcomes between classes experiment I with experimental class II on reteaching + tutorial learning is 95 and 82. From the results of this study it can be concluded that students who have high abilities are more suited to learn independently (self learning) and students who have medium and low abilities are more suited to learning with regular learning + additional learning (regular teaching + tutorial).

Learning outcomes of students on the atomic core material after hypothesis testing can be seen from table 3.2 as follows:

**Table 4.** Results of calculation of sample hypothesis testing

**Tests of Between-Subjects Effects**

Dependent Variable: Learning Outcomes

| | | | | | |
|---|---|---|---|---|---|
| Corrected Model | 765,979[a] | 4 | 191,495 | 19,860 | ,000 |
| Intercept | 269015,111 | 1 | 269015,111 | 27899,640 | ,000 |
| TPA | 108,759 | 1 | 108,759 | 11,279 | ,002 |
| VariasiBelajar | 94,975 | 1 | 94,975 | 9,850 | ,004 |
| Kelas | 122,887 | 1 | 122,887 | 12,745 | ,001 |
| VariasiBelajar * Kelas | 439,359 | 1 | 439,359 | 45,566 | ,000 |
| Error | 298,910 | 31 | 9,642 | | |
| Total | 270080,000 | 36 | | | |
| Corrected Total | 1064,889 | 35 | | | |
| a. R Squared = ,719 (Adjusted R Squared = ,683) | | | | | |

From the above output, it can be seen that the significance figure for the TPA Sig. 0.02 0.05 then H0 is rejected and Ha is accepted. This means it can be said that there is a linear relationship between TPA

From the above output, it can be seen that the significance figure for the TPA Sig. 0.02 0.05 then H0 is rejected and Ha is accepted. This means it can be said that there is a linear relationship between TPA and learning outcomes obtained by students. So there is the effect of TPA on the learning outcomes of students. Furthermore testing is done to determine the effect of learning variation on student learning outcomes. The output results obtained variable learning variation Sig. 0.04 0.05, so it was concluded that H0 was rejected and Ha was accepted. This means that there is an influence of learning variation on student learning outcomes.

The influence of TPA and students' learning variation on learning outcomes can be seen from the value of R Squared =, 719 (Adjusted R Squared =, 683) then the effect of variables is very perfect. Comparison of student learning outcomes given treatment in the form of Self Learning for students with high ability and reteching + tutorials for students with medium and low ability can be seen in Figure 4.2
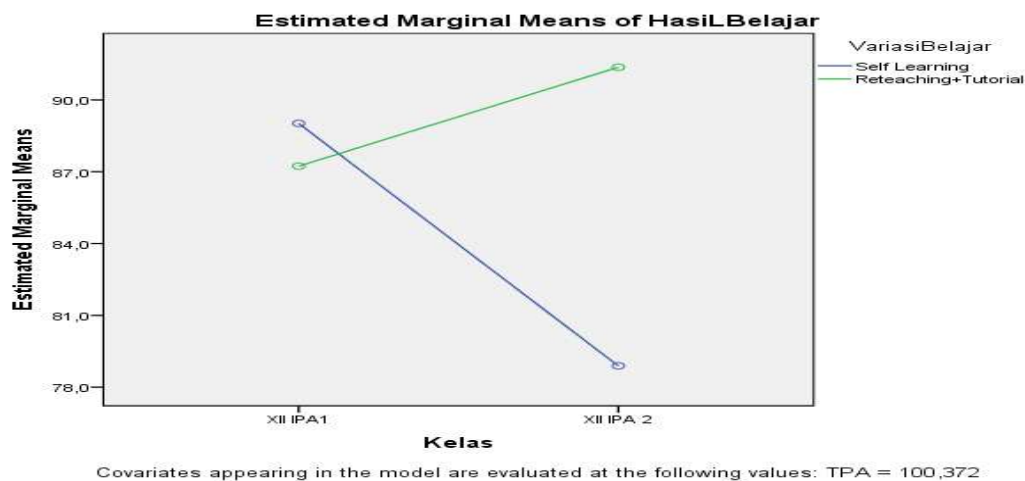


**Figure 3** Shows the effect of learning variations on student learning outcomes.

In the experimental class I (XII Natural Sciences 1) students who were taught with Self learning had an average value of 92.8 while those learned in reteaching had an average value of 82.8. In the experimental class II (XII Natural Science 2) students who were taught with Self learning had an average value of 82 while those learned reteaching had an average value of 87. So the comparison of student learning outcomes between experimental class I with experimental class II in learning average self learning 92.8 and 87. While the learning outcomes of students between the experimental class I with experimental class II on learning Reteaching + tutorials are 82.8 and 82. From these learning outcomes it can be concluded that students who have high abilities are more suitable for independent learning (Self learning) and students who have moderate and low ability are more suitable for learning with regular learning + additional learning (regular teaching + tutorial).

Student learning outcomes in experimental class I and experiment II have improved after being given treatment in the form of a Trait Treatment model Interaction with Constructure 2 learning media based on android. This can be seen in the following table:

**Table 5.** Average physics learning outcomes of students in Experiment I class (faster learner) before and after being treated

|  | Mean Test Score | |
|---|---|---|
| Group | Faster Learner | Slower Learner |
| Final Semester Score | 81,8 | 77,8 |
| Post Test Score | 91 | 83,6 |

The table above shows that the physics learning outcomes of students in class XII MAN 2 Padang Pariaman in experimental class I (faster learners) increased from an average of 81.8 to 91 for high-ability students who were treated in the form of independent learning and for capable students Slow learning with ordinary learning plus tutorials in physical learning outcomes also increased from an average of 77.8 to 83.8. For more details can be seen from the Figure below:
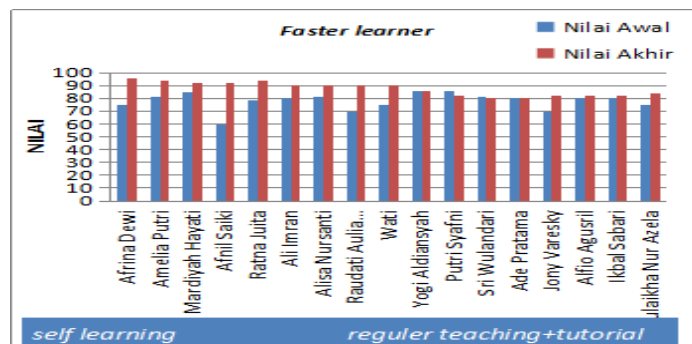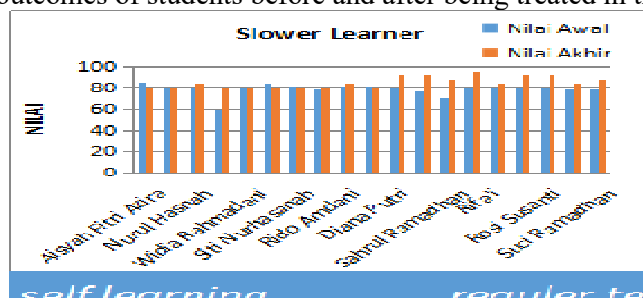


**Figure 4** Learning outcomes of students.

From Figure 4.7 it can be concluded that the learning outcomes of students have increased after being given a treatment in the form of an Android-based construct learning media 2 with a trait model treatment interaction. Student learning outcomes in the class faster learner (fast ability) in students who have high abilities are given higher learning self-learning (self learning) compared to students who are given regular learning with additional learning (regular teaching + tutorials) on low ability students So it can be concluded that students who have the ability to fast are more suitable to study independently. Student learning outcomes in the class slower learner (slow ability) has increased after being given treatment.

**Table 6.** Average Physics learning outcomes of students in Experiment II class before and after being treated

| Group | Mean of Test Score | |
| --- | --- | --- |
|  | Faster Learner | Slower Learner |
| Final Semester Score | 81,8 | 70,3 |
| Post Test Score | 82,2 | 87,2 |

The table above shows that the physics learning outcomes of students in class XII MAN 2 Padang Pariaman in experimental class II (slower learners) increased from an average of 81.8 to 82.2 for high-ability students who were treated in the form of independent learning and for participants slow-ability students who are taught with ordinary learning plus tutorials on their physical learning outcomes also increased from an average of 70.3 to 87.2. For more details can be seen from the Figure below:

**Figure 5** Learning outcomes of students before and after being treated in the slower learner class



From Figure 4.8 it can be concluded that the learning outcomes of slower learner class students increased after being given different treatment between groups of students who have high abilities and groups of students who have low abilities.

## 4. Conclusion

Learning outcomes of students who have the ability to quickly (faster learner) using independent learning (self learning) with an average value of 91 higher than ordinary learning with additional learning (regular teaching + tutorial) an average value of 83.6. Learning outcomes of students who have slow ability (slower learners) using regular learning plus additional learning (regular teaching + tutorial) are higher with an average value of 87.2 compared to self-learning (self learning) an average value of 82.2 on each learning material.

## Recomendation

Learning outcomes of students who have the ability to quickly (faster learner) using independent learning (self learning) with an average value of 91 higher than ordinary learning with additional learning (regular teaching + tutorial) an average value of 83.6. Learning outcomes of students who have slow ability (slower learners) using regular learning plus additional learning (regular teaching + tutorial) are higher with an average value of 87.2 compared to self-learning (self learning) an average value of 82.2 on each learning material.

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