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# The effects of the smart apps creator-based jire collaborative learning model on students' physics learning output in Gorontalo city

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## Abstract

The research aims to analyze the effects of the Smart Apps Creator-based Jire collaborative learning model on students' physics learning output in Gorontalo City. It was experimental research with the pre-experimental design in the form of a one-group pretest-posttest design. The population was all senior high schools, i.e., seven state senior high schools, located in Gorontalo City. Using purposive sampling, two samples, namely tenth graders from classes X MIPA 1 and X MIPA 2 SMA Negeri 4 Gorontalo and tenth graders from classes X MIPA 1 and X MIPA 2 SMA Negeri 7 Prasetya Gorontalo, were gleaned. The total number of students engaged was 112. One class acted as an experimental class, and the other class acted as the replica one. Both classes acquired the Smart Apps Creator-based Jire collaborative learning model. The Smart Apps Creator-based Jire Collaborative learning model served as the independent variable (X), while student learning output served as the dependent variable (Y). Data collection was conducted by questionnaire distribution and a learning output test. Data analyses were carried out using the simple linear regression technique. The results demonstrated the effects of the Smart Apps Creator-based Jire collaborative learning model on student learning output at a t-count of 8.208 and a 0.000 significance value under a 5% alpha. As $F_h > F_t = 67.364 > 3.93$, the learning model (X) had a significant effect on student learning output (Y). From the R-square, the model (X) had an effect on student learning output (Y) by 38.00%. Meanwhile, 62% were affected by other variables unresearched here.

**Keywords:** Jire Learning Model; Smart Apps Creator; Student Learning Output

## 1. Introduction

Law Number 20 of 2003 concerning National Education System Article 1 Paragraph 2 states that education is responsive to the needs of the ever-changing era, i.e., the 4.0 science and technology development. In addition, Ministry of Education and Culture Regulation Number 65/2013 concerning Standard Process for Primary and Secondary Education states that learning processes at schools or other education units can be held in an interactive, inspirative, fun, and challenging manner, motivating students to participate actively, conferring students with adequate space for bringing about creativity and self-independence congruent with skills and character, physical, and psychological changes and development. Implementing teaching and learning process activities requires teacher innovation, skills, and expertise to encourage students to learn.

Our observation exhibited learning process issues, i.e., ineffective implementation or use of learning models. When learning was coming about, it was teacher-centered, leaving students to be passive, and teachers did not optimally implement the learning model. The issues lead to low physics learning output, namely 50 by average when students must pass a score of 70. They also lead to a lack of cooperation among students during learning.

The Jire collaborative learning concept, according to Ntobuo (2018:2), constitutes a learning method that can solve learning process-related problems by involving students in groups. Learning groups carry out learning collaboratively

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congruent with competencies. The Jire collaborative model had been tested at the tertiary education level and demonstrated validity, practicality, and effectiveness for learning, making the model reliable to use at the level.

Syahputra et al. (2021) argue that Smart Apps Creator is an application allowing users to make Android or IOS-based mobile applications without programming codes, and the results are in html5 and exe. The application is easy to use in making interactive learning media and enables users to incorporate animating pictures or back sounds to make the contents more attractive. Smartphones are now an integral part of the learning process implementedness. And yet, students do not employ gadgets optimally to learn. Technology development demands teachers to change their ways of thinking in promoting the quality of learning, which still uses online and offline modes. Smart Apps Creator is equipped with different advantages supporting learning processes, making them more compelling in order that students can apprehend learning materials delivered by teachers easily.

Physics is one of the scientific disciplines exerting mathematical or numeric approaches to their learning processes, creating a daunting impression for students. It impacts the students' learning willingness and characters and, in turn, inflects their learning output.

Gorontalo City is one of the cities in Gorontalo Province. As featured in our observation, physics learning processes, especially in exploiting effective, creative, and fun learning models, in the city are still poor. It negatively influences student learning output, as indicated in Table 1.

**Table 1** Students' Physics Score in All Senior High Schools in Gorontalo City Odd Semester Academic Year of 2021/2022

| No. | Institution | The Number of Learning Groups in Classes X MIPA | The Number of Students | Minimum Completeness Criteria | Score | |
|---|---|---|---|---|---|---|
| | | | | | Passing | Not Passing |
| 1 | SMA Negeri 4 Gorontalo | 4 | 122 | 73 | 10 | 112 |
| 2 | SMA Negeri 5 Gorontalo | 1 | 22 | 70 | 12 | 10 |
| 3 | SMA Negeri 6 Gorontalo | 1 | 19 | 75 | 1 | 18 |
| 4 | SMA Negeri 7 Gorontalo | 2 | 47 | 70 | 6 | 41 |
| Total | | 8 | 210 | | 29 | 181 |
| Percent | | | | | 13.81% | 86.19% |

(Source: Data on Students' Scores in All Senior High Schools in Gorontalo City Academic Year of 2021/2022)

In Table 1, 13.81% of all students passed, whereas 86.19% did not. The students' learning output, as such, was still under average.

The phenomenon is the backdrop of the experimental research titled "The Effects of the Smart Apps Creator-based Jire Collaborative Learning Model on Students' Physics Learning Output in Gorontalo City".

## 2. Material and method

The research was experimental using the pre-experimental design in the form of a one-group pretest-posttest design. Sugiyono (2016:110) argues that the design entailed a pretest before treatment. Hence, the results were more accurate because we could compare before and after-treatment conditions. The design is delineated in Figure 1.

$$O_1 \quad X \quad O_2$$

**Figure 1** One-Group Pretest-Posttest Design

Description

- $O_1$ = The pretest score (before treatment)
- $O_2$ = The posttest score (after treatment)

The experimental group or the replica class was taught using the Smart Apps Creator-based Jire collaborative learning model. A before-treatment pretest and after-treatment posttest were delivered to identify student learning output. Furthermore, an observation was also conducted to investigate student characters. The evaluation results were statistically tested based on relevant references to observe whether a significant effect on student learning output arose after they leverage the Smart Apps Creator-based Jire collaborative model.

The research population covered all senior high schools in Gorontalo City. In so doing, the population consisted of seven state senior high schools. Using purposive sampling, two samples, namely tenth graders from classes X MIPA 1 and X MIPA 2 SMA Negeri 4 Gorontalo and tenth graders from classes X MIPA 1 and X MIPA 2 SMA Negeri 7 Prasetya Gorontalo, were gleaned. The total number of students engaged was 112. One class acted as an experimental class, and the other class acted as the replica one. Both classes acquired the Smart Apps Creator-based Jire collaborative learning model. The Smart Apps Creator-based Jire Collaborative learning model served as the independent variable (X), while student learning output served as the dependent variable (Y).

Data were collected using instruments. The instruments measured the implementation of the Smart Apps Creator-based Jire collaborative learning model using questionnaires and a learning output test to measure student learning output. The instruments had tested for validity and reliability to point out the reliability level of a measuring tool and the tool's accuracy in assessing objects.

We measured instrument item validity using the Pearson Product Moment (Bivariate Correlation) formula with SPSS version 16. Validity levels were analyzed using a significance test by comparing r-count and r-table. The degree of freedom (df) = n – k, where n was the number of samples, and k was the number of constructs with a 0.05 alpha. The question item was valid if the r-count was higher than the r-table ($r_h > r_t$) and r was positive. The measurement results were compared in the critical r correlation product moment table at a 5% significance level. When r-count ≥ r-table, the item was valid, but it was invalid if r-count < r-table. In measuring instrument validity, we deployed SPSS (Statistical Package for the Social Sciences) version 16 for efficient analysis. Reliability was tested using the Alpha-Cronbach formula. The r-table of product-moment dk = N – 1. The determination was achieved by comparing $r_{11}$ with the r-table. It was unreliable if $r_{11}$ < $r$-table. Instrument reliability was tested using SPSS version 16 as well.

For data analysis, we also carried out a data normality test using SPSS version 16, and the testing technique was Kolmogorov-Smirnov (One Sample KS). Considering the decision-making criteria in the normality test, when the significance level was < 0.05, data had abnormal variance, yet when it was > 0.05, data had a normal one.

Hypotheses were tested using the t-test and the simple linear regression analysis. We conducted the t-test using SPSS version 16, and the results are demonstrated in the sig. column of the coefficient table. Probability < 0.05 heralded a partial effect of the independent variable on the dependent one. Meanwhile, probability > 0.05 marked no partial effect of the independent variable on the dependent one. The t-test was employed to partially test all variables.

The second hypothesis test was the F-test. It aimed to test one of the hypotheses using simple linear regression analysis. Additionally, it was done to examine the effect of an independent variable on the dependent one. Our F-test exerted SPSS version 16, and the results are featured in the sig. column of the ANOVA table. The probability of < 0.05 indicated a significant effect of independent variables on the dependent. Moreover, it indicated no significant effect of independent variables on the dependent.

The coefficient of determination (Adjusted R-Square) was exploited for the third hypothesis test. The test focused on defining the complete variety degree or level of dependent variables apprehended by independent variables. When the test used was simple regression, an r-square was used. The coefficient of determination (Adjusted R-Squared) hypothesis was tested using SPSS version 16. The results are manifested in the Model Summary in the R-Square Table, with the equation of R-Square x 100%.

## 3. Result

### 3.1. Instrument Validity and Reliability

An analysis with SPSS version 16 was deployed to test instrument validity. The Smart Apps Creator-based collaborative Jire learning model employed instruments in the form of questionnaires with 15 question items distributed to 30 respondents.

We carried out a significant test by comparing r-count with r-table to identify instrument validity. Associated with the degree of freedom (df) = n – k, n was the number of samples, and k was the number of constructs. df = 30 – 2 = 28, with an 0.05 alpha, it was acquired an r-table of 0.36. If the r-count (please see the question item corrected total correlation column for the r-count of each question item) was higher than the r-table and r was positive, the question item was valid. Table 2 points out our instrument validity.

**Table 2** Validity Test Results of the Instrumentsof the Smart Apps Creator-Based Collaborative Jire Learning Model

| Question Item | Pearson Correlation | r-table | Description |
|---|---|---|---|
| Item 1 | 0.63 | 0.36 | Valid |
| Item 2 | 0.65 | 0.36 | Valid |
| Item 3 | 0.66 | 0.36 | Valid |
| Item 4 | 0.46 | 0.36 | Valid |
| Item 5 | 0.60 | 0.36 | Valid |
| Item 6 | 0.69 | 0.36 | Valid |
| Item 7 | 0.31 | 0.36 | Invalid |
| Item 8 | 0.39 | 0.36 | Valid |
| Item 9 | 0.32 | 0.36 | Invalid |
| Item 10 | 0.63 | 0.36 | Valid |
| Item 11 | 0.65 | 0.36 | Valid |
| Item 12 | 0.66 | 0.36 | Valid |
| Item 13 | 0.46 | 0.36 | Valid |
| Item 14 | 0.60 | 0.36 | Valid |
| Item 15 | 0.69 | 0.36 | Valid |

Source: Processed SPSS output, 2022

We can see in Table 2 that 13 question items (87%) were valid. Furthermore, based on the instrument reliability test $r_{11}$ = 0.82 with a high qualification result.

The tests for validating the student learning output test were carried out in two forms, i.e., expert and content validity. Expert validity was conducted by three lecturers who, in general, conferred a good score. Meanwhile, associated with content validity, the student learning output test instrument containing 15 question items was distributed to 30 respondents.

We did a significance test to identify validity levels by comparing the r-count with the r-table. The degree of freedom (df) = n – k. n was the number of samples, and k was the number of constructs. df = 30 – 2 = 28. With a 0.05 alpha, we earned an r-table of 0.36. If the r-count (see the Pearson Correlation column for the r-count of each question item) was higher than the r-table and r was positive, the question item was valid. Table 3 presents the results of the validity test of the student character instrument.

**Table 3** Results of the Validity Test of the Student Character Instrument

| Question Item | Pearson Correlation | r-table | Description |
|---|---|---|---|
| Item 1 | 0.28 | 0.36 | Invalid |
| Item 2 | 0.40 | 0.36 | Valid |
| Item 3 | 0.54 | 0.36 | Valid |
| Item 4 | 0.59 | 0.36 | Valid |
| Item 5 | 0.52 | 0.36 | Valid |
| Item 6 | 0.49 | 0.36 | Valid |
| Item 7 | 0.55 | 0.36 | Valid |
| Item 8 | 0.43 | 0.36 | Valid |
| Item 9 | 0.65 | 0.36 | Valid |
| Item 10 | 0.59 | 0.36 | Valid |
| Item 11 | 0.56 | 0.36 | Valid |
| Item 12 | 0.85 | 0.36 | Valid |
| Item 13 | 0.71 | 0.36 | Valid |
| Item 14 | 0.37 | 0.36 | Valid |
| Item 15 | 0.60 | 0.36 | Valid |

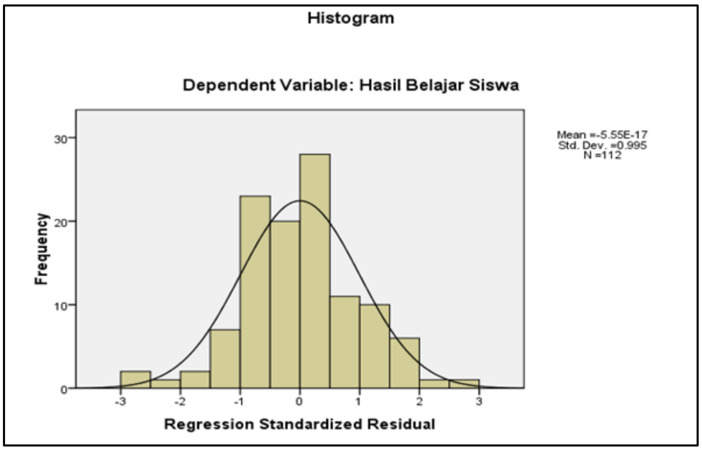
Source: Processed SPSS output, 2022

Table 3 shows that 14 question items (93%) were considered valid. The reliability of the student character instrument was measured using SPSS version 16. The reliability was measured based on an alpha scale of 0-1. We acquired the instrument reliability r11 = 0.83 with a high qualification predicated on the measurement.

### 3.2. Analysis Requirement Test

The analysis requirement test deployed the normality data test. It confirmed whether the regression models of dependent and independent variables were normally distributed. The normality test employed the Kolmogorov-Smirnov test at a sig. > 0.05. We tested data normality using a P-P Plot Normal Chart in SPSS version 16 and investigated data distribution.

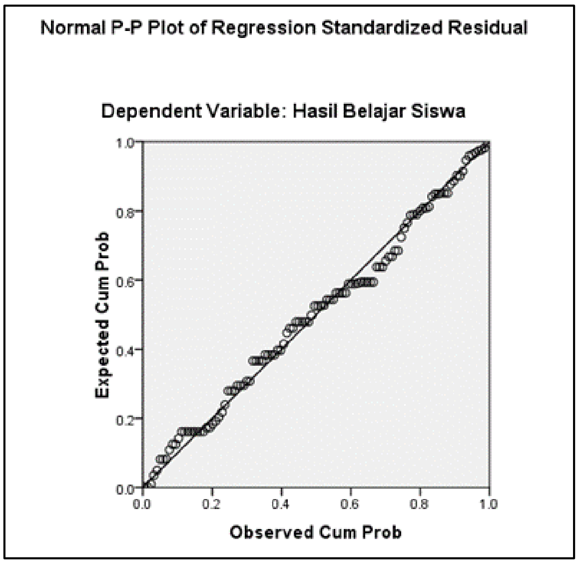
Figure 2 shows off the normality test




(Source: Processed SPSS output, 2022)

**Figure 2** Histogram Chart of the Normality Test of Variables X1 (the Smart Apps Creator-Based Jire Collaborative Learning Model) and Y (Student Learning Output)

When data distribution in Figure 2 followed a straight-line pattern, the data were normal, as signified in Figure 3




(Source: Processed SPSS output, 2022)

**Figure 3** Chart of the Normal Probability Plot of Variables X1 (the Smart Apps Creator-Based Jire Collaborative Learning Model) and Y (Student Learning Output)

The significance of variables $X_1$ (the Smart Apps Creator-Based Collaborative Learning Model) and Y (student learning output) was 0.552. Accordingly, data were normally distributed (sig. > 0.05), as suggested in Table 4.

**Table 4** Kolmogorov-Smirnov Data Normality Test

| **One-Sample Kolmogorov-Smirnov Test** | | |
|---|---|---|
| | | **Unstandardized Residual** |
| **N** | | **112** |
| Normal Parameters[a] | Mean | .0000000 |
| | Std. Deviation | 7.43499884 |
| Most Extreme Differences | Absolute | 0.075 |
| | Positive | 0.075 |
| | Negative | 0.053 |
| Kolmogorov-Smirnov Z | | 0.795 |
| Asymp. Sig. (2-tailed) | | 0.552 |
| a. Test distribution is Normal. | | |

Source: Processed SPSS output, 2022

Figure 2 demonstrates that the data residual exhibited a perfect bell-shaped normal curve. In the normal P-P Plot residual chart, data distribution did not follow a normal line (a straight one). As such, we tested the data residual using the Kolmogorov-Smirnov test to ensure the data residual was aligned with the normality assumption. Table 4 features that the data residual had followed a normal distribution. Predicated on the output results, the Kolmogorov-Smirnov value was significant at 0.552 > 0.05. Data residual, hence, were normally distributed.

### 3.3. Hypothesis Test

Hypotheses were tested using the simple linear regression technique with SPSS version 16. The analysis aimed to measure the degree of the effect of an independent variable on the dependent one and predict a dependent variable using the independent one. The research hypothesis tests were:

#### *3.3.1. t-test (Simple Linear Regression)*

The t-test (simple linear regression) was used to observe the positive effect of the Smart Apps Creator-based Jire collaborative learning model variable (X) on the student learning output variable (Y), as indicated in Table 5.

**Table 5** t-test Results

| Coefficientsa | | | | | | |
|---|---|---|---|---|---|---|
| **Model** | | **Unstandardized Coefficients** | | **Standardized Coefficients** | **T** | **Sig.** |
| | | **B** | **Std. Error** | **Beta** | | |
| 1 | (Constant) | 53.201 | 3.156 | | 16.858 | 0.000 |
| | Smart Apps Creator-Based Jire Collaborative Learning Model | 0.604 | 0.074 | 0.616 | 8.208 | 0.000 |
| a. Dependent Variable: Student Learning Output | | | | | | |

Source: Processed SPSS output, 2022

Table 5 points out the coefficient of the Smart Apps Creator-based Jire collaborative learning model variable of 0.604 at a constant of 53.201. The regression equation model earned, in so doing, was:

$$Y = 53.201 + 0.604 X1$$

We carried out an empirical test of the effect of the Smart Apps Creator-based Jire collaborative learning model on student learning output. We elicited a t-count of 8.208 and p-value (sig.) of 0.000 < 5% alpha. The figures pointed out a positive effect of the Smart Apps Creator-based Jire collaborative learning model on student learning output. That being so, the hypothesis "There is a positive effect of the Smart Apps Creator-based Jire collaborative learning model on student learning output" was accepted.

The beta in unstandardized coefficients of the Smart Apps Creator-based Jire collaborative learning model variable was 0.604. That is, the coefficient of the effect of the Smart Apps Creator-based Jire collaborative learning model on student learning output was 60.4%.

#### *3.3.2. F-test (ANOVA)*

An F-test using SPSS version 16 was conducted to research the significance of the effect of the Smart Apps Creator-based Jire collaborative learning model ($X_1$) on student learning output (Y), as presented in Table 6.

**Table 6** F-test Results

| **ANOVA**[b] | | | | | | |
|---|---|---|---|---|---|---|
| **Model** | | **Sum of Squares** | **Df** | **Mean Square** | **F** | **Sig.** |
| 1 | Regression | 3757.687 | 1 | 3757.687 | 67.364 | 0.000[a] |
| | Residual | 6135.992 | 110 | 55.782 | | |
| | Total | 9893.679 | 111 | | | |
| a. Predictors: (Constant), Smart Apps Creator-Based Jire Collaborative Learning Model | | | | | | |
| b. Dependent Variable: Student Learning Output | | | | | | |

Source: Processed SPSS output, 2022

As we can study in Table 6, the significance (Sig.) resulting from the F-test was 0.000. As Sig. 0.000 < 0.05, the Smart Apps Creator-based Jire collaborative learning model ($X_1$) influenced student learning output (Y).

The F-table of sig. 0.05, df = N – 2 = 112 – 2 = 100 (vertical/N for respondents), and df = N – 1 = 2 – 1 = 1 (horizontal/N for variables), was 3.93 (see Appendix F-table). The Creator Smart Apps-based Jire collaborative learning model ($X_1$), therefore, significantly predisposed student learning output (Y) because F-count was higher relative to F-table ($F_h > F_t$ = 67.364 > 3.93).

### *3.3.3. Coefficient of Determination (Adjusted R-Squared)*

Table 7 shows the effect of the Smart Apps Creator-based Jire collaborative learning model ($X_1$) on student learning output (Y).

**Table 7** R-Square Test Result

| Model Summary[b] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Model** | **R** | **R Square** | **Adjusted R Square** | **Std. Error of the Estimate** | **Change Statistics** | | | | |
| | | | | | **R Square Change** | **F Change** | **df1** | **df2** | **Sig. F Change** |
| 1 | 0.616[a] | 0.380 | 0.374 | 7.469 | 0.380 | 67.364 | 1 | 110 | 0.000 |
| a. Predictors: (Constant), Smart Apps Creator-based Jire Collaborative Learning Model | | | | | | | | | |
| b. Dependent Variable: Student Learning Output | | | | | | | | | |

Source: Processed SPSS output, 2022

As shown off in Table 7, the coefficient of R-Square (coefficient of determination) was 0.380. Thus, R-Square = 0.380 x 100% = 38.00%. Accordingly, the Smart Apps Creator-based Jire collaborative learning model ($X_1$) affected student learning output (Y) by 38.00%, whereas 62% was inflected by other variables unresearched here.

## 4. Discussion

The research aimed to probe the effect of the independent variables on the dependent one. We exerted two independent variables, i.e., the Smart Apps Creator-based collaborative learning model ($X_1$) and student characters ($X_2$) and one dependent variable, namely (student learning output (Y) and focused on momentum and impulse materials. Samples exploited were tenth graders from classes X MIPA 1 and X MIPA 2 SMA Negeri 4 Gorontalo and tenth graders from classes X MIPA 1 and X MIPA 2 SMA Negeri 7 Prasetya Gorontalo.

We needed an instrument to measure the effect of a variable on the other one. For measuring the effect of the Smart Apps Creator-based Jire collaborative learning model, we required a close questionnaire instrument distributed to respondents. We leveraged character observation sheets to be filled by two observers in each learning meeting as instruments to measure the effect of student characters. Finally, we designed a learning output test for all respondents after treatment. The test acted as an instrument to identify student learning output.

Before being used, the instruments should be validated. The validation was performed in two steps: expert validation carried out by three lecturers, who would affirm the instrument validity, and content validation conducted by 30 respondents.

Of 15 questions in the questionnaire instrument, based on the content validity test, 13 were valid. Meanwhile, nine question items in the student character observation instrument were considered valid, and 14 of 15 question items in the student learning output test instrument were valid.

We did reliability tests on the instruments too. The tests focused on analyzing whether the instruments were consistent. The questionnaire instrument reliability $r_{11}$, as showcased by the reliability test results, was 0.82 with a high result qualification. The reliability of the character observation instrument $r_{11}$ was 0.63 with a medium result qualification, and that of the student learning output instrument $r_{11}$ was 0.83 with a high result qualification. Our research instruments, accordingly, were valid and reliable.

Before the hypothesis test, we carried out a requirement test, i.e., a data normality test. The normality test deployed the Kolmogorov-Smirnov (One Sample KS) testing technique with the following test criteria: If sig. > 0.05, data were normally distributed. Accordingly, data were normally distributed as sig. > 0.05 (0.552 > 0.05 and 0.319 > 0.05).

After the requirement test, we tested the hypotheses. It used the t-test (simple linear regression), F-test (ANOVA), and coefficient of determination (Adjusted R-Square). The first hypothesis test demonstrated an effect of the Smart Apps Creator-based Jire collaborative learning model on student learning output. The t-test using simple linear regression with SPSS version 16 exhibited a sig. 0.000, featuring a positive effect of the Smart Apps Creator-based Jire collaborative learning model on student learning output. Additionally, the F-test (ANOVA) indicated a significant effect of the Smart Apps Creator-based Jire collaborative learning model on student learning output at an F-count higher than the F-table (Fh > Ft = 67.364 > 3.93).

## 5. Conclusion

Based on data analysis, we concluded that the Smart Apps Creator-based Jire collaborative learning model affected student learning output. It was building on the t-test using simple linear regression with SPSS version 16 manifesting a sig 0.000. The Smart Apps Creator-based Jire collaborative learning model, as such, inflected student learning output. In addition, we carried out an F-test (ANOVA) pointing out a significant effect of the Smart Apps Creator-based Jire collaborative learning model on student learning output at an F-count higher than the F-table (Fh > Ft = 67.364 > 3.93).

## Compliance with ethical standards

*Disclosure of conflict of interest*

No conflict of interest.

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