

## Educaplay Froggy Jumps: Improving Cognitive Outcomes in Three-Variable Linear Equation Systems

Isaac Akbar Alfahquari Harisma Putra<sup>1</sup>, Suwarno<sup>1\*</sup>, Hestu Wilujeng<sup>2</sup>

<sup>1</sup>Universitas Islam Kiai Haji Achmad Siddiq Jember, Indonesia

<sup>2</sup>Universitas Islam Negeri Kiai Ageng Muhammad Besari Ponorogo, Indonesia

\* E-mail: [s\\_warno@uinkhas.ac.id](mailto:s_warno@uinkhas.ac.id)

### Abstract

Educaplay Froggy Jumps media is a solution to students' low daily test scores and is important to the teaching and learning process, making students more enthusiastic and active learners. It also significantly influences the learning process, affecting students' cognitive learning outcomes. The purpose of this study was to determine the effect of using Educaplay Froggy Jumps media on students' cognitive learning outcomes on the Three Variable Linear Equation System (SPLTV) material for class X at SMKN 3 Jember. This study used a quantitative approach with a Post-test Only Control Group Design. The sample consisted of class ten's Tata Busana 1 (an experimental group) and class ten's Tata Busana 2 (a control group), selected purposively. The p-value (2-tailed) for the hypothesis test was 0.040. Based on the decision-making criteria, because the sig value (2-tailed) < 0.05, then H<sub>0</sub> is rejected and H<sub>a</sub> is accepted, so it can be concluded that there is a significant difference between the learning outcomes of the experimental class and the control class after the application of learning media in the form of educaplay froggy jumps media. This shows that the use of Eduplay Froggy Jumps media influences the cognitive learning outcomes of class X students at SMKN 3 Jember.

**Key words:** Cognitive Learning Outcomes, Educaplay Media, Froggy Jumps game, System of Linear Equations In Three Variables.

### INTRODUCTION

In the teaching and learning process, one element that supports instructional activities is instructional media. One form of instructional media is Educaplay. Educaplay is a web-based learning platform that provides a wide variety of educational games for teachers and students to reinforce what has been learned and deepen their understanding of important concepts within a lesson.

To use Educaplay media, users first access the Educaplay website, create an account, verify the account, and then select from various types of games—such as Yes or No, Froggy Jumps, Map Quiz, Matching Game, Quiz, Alphabet Game, Memory Game, Matching Pairs,

Word Search Puzzle, Crossword Puzzle, and Fill in the Blanks—according to the instructional needs and learning objectives. Teachers can then design learning materials or questions within the selected game format.

The advantages of Educaplay in the learning process include promoting active student engagement, as students do not merely receive material passively but are directly involved in thinking, experimenting, and solving problems. In addition, Educaplay is user-friendly for both teachers and students, accessible through digital devices at any time, and provides immediate feedback on students' responses, thereby facilitating faster conceptual understanding. The variety of available games also prevents

monotony in learning activities and improves students' learning outcomes.

In the context of teaching abstract material such as Three-Variable Linear Equation Systems (SPLTV), the use of Educaplay—particularly through the Froggy Jumps game—can help students understand concepts through engaging practice activities, thereby potentially enhancing their cognitive learning outcomes.

This is also supported by previous research conducted by Novia, Rahayu, and Yoga (2022), which found that the use of the TGT-type cooperative learning model based on the “corong berhitung” (counting funnel) media had a positive effect on students' learning outcomes. This was evidenced by the average percentage of students' learning outcomes calculated using a t-test, where the calculated t-value was greater than the t-table value ( $3.277 > 1.740$ ). Thus, it can be concluded that  $H_0$  was rejected and  $H_1$  was accepted, indicating a significant difference between the pretest and posttest results.

Furthermore, previous research by Wungguli and Yahya (2020) showed that students' average learning outcomes were higher when instruction used ICT-based media than when it used conventional learning models in three-dimensional geometry. These prior studies demonstrate that instructional media can improve students' learning outcomes.

However, none of these previous studies have specifically examined the effect of Educaplay Froggy Jumps as a learning media for teaching the Three-Variable Linear Equation System (SPLTV), particularly at SMKN 3 Jember.

The implementation of Educaplay Froggy Jumps media aims to make mathematics learning more interactive, engaging, and enjoyable, thereby improving students' learning outcomes.

Good learning outcomes equip individuals with the knowledge, skills, and attitudes needed to pursue further education, enter the workforce, and face future life challenges. In the 21st century, the demands placed on students' learning outcomes extend beyond mastery of academic knowledge to include a range of skills relevant to contemporary developments. Therefore, students are expected to think critically and creatively, communicate effectively, and collaborate efficiently (Fahrudin & Ulfah, 2023).

By understanding the objectives of learning outcomes, educators can design more focused and effective instructional processes and ensure that students achieve the expected levels of development as outlined in Bloom's Taxonomy Theory (Purwanto, 2019).

According to Bloom's Taxonomy, learning outcomes can be attained through three primary domains: cognitive, affective, and psychomotor. Bloom's Taxonomy provides a systematic framework for measuring and developing students' cognitive abilities during the learning process (Nursiami, 2024). Therefore, Bloom's Taxonomy plays an important role in improving the quality of students' learning outcomes by enabling educators to design more structured and effective instructional activities (Anwar, Layn, & Ardyanti, 2018).

Based on observations, students' mathematics learning outcomes at

SMKN 3 Jember are still relatively low in the cognitive domain. The cognitive domain consists of six levels: remembering (C1), understanding (C2), applying (C3), analyzing (C4), evaluating (C5), and creating (C6) (Magdalena et al., 2020).

One way to improve students' learning outcomes is to use effective instructional media. Instructional media play a significant role in enhancing students' academic achievement. One example of such media is Educaplay. Educaplay is a web-based learning platform that offers interactive activities, such as quizzes, crossword puzzles, and other educational games, tailored to specific subject matter. This media not only attracts students' interest but also helps them develop a deeper understanding of key concepts within the subject (Fernanda, Roosyanti, & Susanti, 2024).

The reason for selecting the Educaplay platform is that it is a digital instructional tool that is easily accessible to beginners and new users and offers a wide range of engaging game features, including Froggy Jumps, which has the potential to enhance students' learning outcomes.

Based on observations conducted at SMKN 3 Jember, it was found that the mathematics teacher has never implemented Educaplay Froggy Jumps as a learning media in mathematics instruction. This is not due to resistance toward instructional innovation, but rather because the media has not yet been available and will be specifically developed by the researcher to support the learning process. Therefore, the implementation of Educaplay Froggy

Jumps in this study is expected to serve as an innovative alternative that has not been used in the school before.

In general, innovative and effective instructional media are rarely, if ever, utilized. Most teachers still rely on traditional teaching methods, such as lectures and practice exercises, with minimal use of instructional media. This condition has contributed to the suboptimal cognitive learning outcomes of students. Learning processes dominated by conventional methods and limited interactive media tend to be less effective at enhancing both students' learning outcomes and their active engagement in the classroom, thereby affecting the achievement of expected learning outcomes.

Furthermore, previous studies have shown that instructional media and educational games can improve students' motivation, participation, and learning outcomes compared to instruction without interactive media support. This is particularly relevant to the topic of Three-Variable Linear Equation Systems (SPLTV), as students often struggle to understand abstract and procedural concepts.

Several previous studies have demonstrated that the use of innovative instructional media in the topic of Three-Variable Linear Equation Systems (SPLTV) and related materials can enhance the quality of learning compared to conventional instruction. Research conducted by Putry, Rahman, and Muflihah (2025), which developed Construct 2-assisted instructional media for SPLTV, indicated that the media was valid, practical, and effective in improving students' learning outcomes.

This was evidenced by a significant increase in students' average scores from very low pre-test results to high post-test results after the implementation of the media, along with positive student responses toward the interactive tool. The findings revealed a substantial improvement in students' learning outcomes following the application of Construct 2-based interactive media.

Another study conducted by Hidayati and Rakhmawati (2024) on the development of instructional media, such as MedLearn Math, also demonstrated that the media was found to be feasible for use and received very positive student responses, thereby facilitating a more effective understanding of SPLTV concepts.

In contrast to these studies, which employed specific media development platforms (such as Construct 2, video-based media, or particular applications), the present study uses a digital game-based interactive platform, Educaplay Froggy Jumps, that incorporates a play-and-learn approach not widely explored in prior research on SPLTV material. This indicates a research gap: the need to investigate whether educational game-based media, such as Educaplay Froggy Jumps, can improve students' cognitive learning outcomes in SPLTV. Therefore, this study aims to examine the effect of using Educaplay Froggy Jumps media on students' cognitive learning outcomes in the topic of Three-Variable Linear Equation Systems (SPLTV).

## METHOD

This study employed a quantitative, quasi-experimental design, specifically the Post-Only Control Group

Design (Nugroho, 2019). The research utilized a two-group posttest-only design: an experimental class that received treatment through Educaplay Froggy Jumps instructional media implemented via a direct instruction model, and a control class taught using a conventional learning model without Educaplay media support.

To ensure that both classes had relatively equivalent initial abilities despite the absence of a pretest, the researcher controlled for group equivalence by selecting samples based on nearly identical average scores in daily mathematics assessments, as well as similarities in class characteristics and instructional time. After the treatment was administered, both groups were given only a posttest to determine the effect of using Educaplay Froggy Jumps media on students' cognitive learning outcomes.

This study was conducted at SMKN 3 Jember during the first semester of the 2025/2026 academic year. The population consisted of all tenth-grade students in the Fashion Design program, from Fashion Design 1 to Fashion Design 3. The research sample was selected using purposive sampling, a sampling technique based on specific criteria (Sugiyono, 2023). The selected samples were Grade X Fashion Design 1 as the experimental group and Grade X Fashion Design 2 as the control group.

The sample selection was based on the equivalence of students' initial abilities, as indicated by the average scores of their daily mathematics assessments. Grade X Fashion Design 1, consisting of 30 students, had an average score of 79.70, while Grade X Fashion

Design 2, also consisting of 30 students, had an average score of 80.06, with a difference of 0.36, which falls into the very small difference category. Therefore, both classes were considered to have relatively equivalent initial abilities and the same instructional time allocation, making them appropriate for the study.

The primary instrument used in this study was a multiple-choice test constructed based on indicators of cognitive learning outcomes. The instrument was validated by experts using a Likert scale and was considered valid if it met the validity criteria for learning outcome test items and instructional materials, as determined by the  $V_a$  range obtained from expert validators' assessments. The instrument was declared valid when it achieved a score of  $3 \leq V_a < 4$ , and very valid when  $V_a = 4$ , thus indicating its appropriateness for use in the study. If the  $V_a$  value was less than 3, the instrument was considered invalid and required revision (Widodo et al., 2023).

In addition, the reliability of the instrument was tested using SPSS through the Cronbach's Alpha technique and was considered reliable if the alpha value exceeded 0.60 (Lestari, Karunia Eka, & Yudhanegara, 2019). Therefore, the instrument was deemed valid when the  $V_a$  value fell within the valid category.

Data were collected through the administration of a posttest and documentation of students' scores and the instructional materials used in the control class.

The data analysis in this study used inferential statistics, with IBM SPSS

version 24 for Windows. This analysis aimed to test the formulated research hypotheses. Prior to hypothesis testing, prerequisite tests were conducted as follows:

#### 1. Normality Test

The normality test was conducted using the Shapiro–Wilk test. The decision-making criterion was as follows: if the significance value was greater than 0.05, the data were considered normally distributed; otherwise, they were considered not normally distributed (Nuryadi, 2017).

#### 2. Homogeneity Test

The homogeneity test was performed using Levene's test. The decision-making criterion stated that if the significance value was greater than 0.05, the data were considered to have homogeneous variance. Conversely, if the significance value was less than or equal to 0.05, the data were regarded as not homogeneous (Setyawan, 2021).

After the prerequisite assumptions were met, the Independent Samples t-test was used to test for differences in students' cognitive learning outcomes between the experimental and control classes. The decision-making criteria were as follows: if the significance value (2-tailed) was less than 0.05,  $H_0$  was rejected and  $H_a$  was accepted; conversely, if the significance value (2-tailed) was greater than 0.05,  $H_0$  was accepted and  $H_a$  was rejected (Nuryadi, 2017).

## RESULT AND DISCUSSION

The results of the data analysis

indicate that the average posttest scores for students' cognitive learning outcomes in the experimental class, which used Educaplay Froggy Jumps media, were higher than those in the control class, which received conventional instruction.

The validation results of the test instrument by three validators showed an average Va score of 3.7, which falls into the valid category. The validation of the instructional module instrument yielded an average Va score of 3.8 and was also declared valid. The reliability test of the instrument, using Cronbach's Alpha coefficient, resulted in a value of 0.678. Since this value exceeds 0.60, the instrument is categorized as reliable.

Descriptively, the experimental class showed a more even distribution of scores, with a higher proportion of students meeting the mastery criteria than the control class. This finding indicates that, in general, students in the experimental class attained better learning outcomes after the treatment was administered.

Furthermore, inferential data analysis using statistical testing revealed a significant difference in cognitive learning outcomes between students in the experimental and control classes. These findings reinforce the inferential statistical analysis, indicating that the use of Educaplay Froggy Jumps media affects students' cognitive learning outcomes in the topic of Three-Variable Linear Equation Systems (SPLTV).

The following presents the results of the inferential statistical analysis:

1. Normality Test

The data were considered to be normally distributed if the signifi-

ficance value (Sig.) was greater than 0.05. The results are presented in the following table 1.

**Table 1. Normality Test Results**

Saphiro-Wilk			
Class	Statistic	df	Sig.
Experiment	0.950	30	0.165
Control	0.939	30	0.087

Based on the data presented in Table 1, the posttest data for the experimental class were normally distributed, as the p-value of 0.165 was greater than 0.05. Similarly, the posttest data for the control class were normally distributed, as the p-value of 0.087 was greater than 0.05. Therefore, both classes were declared to have normally distributed data.

2. Homogeneity Test

The results of the homogeneity test are presented as follows Table 2.

**Table 2. Homogeneity Test Result**

Levene Statistics	df1	df2	Sig.
2.624	1	58	0.111

Based on Table 2, the significance value is 0.111. Since 0.111 is greater than 0.05, it can be concluded that the posttest data of students' cognitive learning outcomes have homogeneous variance.

3. Hypothesis Testing

The results of the Independent Samples t-test are presented as follows Table 3.

**Table 3. Hypothesis Testing Result**

Testing	Sig.
Equal variances assumed	0.040
Equal variances not assumed	0.040

The data presented in Table 3 indicate that the significance value (2-tailed) obtained from the hypothesis test was 0.040, which is less than 0.05. Based on the decision-making criteria, since the significance value (2-tailed) is less than 0.05,  $H_0$  is rejected, and  $H_a$  is accepted.

Therefore, it can be concluded that there is a significant difference in cognitive learning outcomes between students in the experimental and control classes, indicating that the use of Educaplay Froggy Jumps media has a significant effect on students' cognitive learning outcomes.

Based on the results of the Independent Samples t-test, the significance value (2-tailed) was 0.040, which is lower than the 0.05 level of significance. Therefore,  $H_0$  was rejected, and  $H_a$  was accepted. These findings indicate that there is a significant difference between the cognitive learning outcomes of students in the experimental class and those in the control class, as well as a significant effect of using Educaplay Froggy Jumps media on students' cognitive learning outcomes in the topic of Three-Variable Linear Equation Systems (SPLTV) for Grade X students at SMKN 3 Jember.

The results of this study are consistent with those of Djihad Wungguli and Lailany Yahya (2020), who reported that students' average learning outcomes were higher when instruction used instructional media than when taught using conventional learning models in mathematics.

In another study conducted by Dewi Sepriyanti, Deden Supriatna, and Rudi Hartono in 2024, the findings indicated that students in the Educaplay

group showed a significant improvement in learning outcomes. The study reported that the use of Educaplay media contributed to an 85% increase in students' learning outcomes (Sepriyanti, Supriatna, & Hartono, 2024).

These findings are consistent with the present study's results, which demonstrate that students in the experimental class achieved higher posttest scores than those in the control class. Both studies indicate that students who used Educaplay were more actively engaged in the learning process and showed greater interest in the instructional material, which, in turn, positively influenced their learning outcomes.

The improvement in students' cognitive learning outcomes can be attributed to the characteristics of the Educaplay Froggy Jumps media, which is interactive and game-based. This media enhances students' attention and learning motivation by presenting challenging activities accompanied by immediate feedback. Moreover, the repeated practice exercises provided within the game facilitate concept reinforcement through direct error correction, thereby strengthening students' conceptual understanding.

A learning environment that resembles a game also helps create a more enjoyable classroom atmosphere, thereby reducing students' anxiety toward SPLTV material. Through active engagement in answering questions, students engage in a process of knowledge construction that contributes to improved cognitive learning outcomes.

Another study conducted by Nafa

Sekar Arum, Hartini, and Fitria Aris Dimiyati in 2023 demonstrated a significant and tangible improvement in students' learning outcomes following the implementation of Educaplay media. The study reported that learning achievement increased by 85%; initially, only 9 students achieved mastery, and this number rose to 17 students after the use of Educaplay in instruction. Students showed greater enthusiasm for learning and demonstrated better conceptual understanding. Therefore, Educaplay media is recommended as an interactive instructional tool that effectively enhances learning outcomes (Sekar Arum, Hartini, & Dimiyati, 2023).

The use of Educaplay media offers several advantages, including creating interactive and engaging learning experiences, supporting independent and distance learning, and being relatively easy to use. However, Educaplay also has certain limitations, such as dependence on internet connectivity, limited free features, and accessibility restricted to specific electronic devices such as computers, laptops, or smartphones with internet access.

Nevertheless, the findings of this study indicate that the advantages of Educaplay outweigh its limitations when implemented in the teaching and learning process. Students were observed to be more active and interactive during instruction, which contributed to improved cognitive learning outcomes.

Based on the explanations above, the researcher concludes that there is a significant difference between the cognitive learning outcomes of students

in the experimental class and those in the control class, as well as a significant effect of using Educaplay Froggy Jumps media on students' cognitive learning outcomes in the topic of Three-Variable Linear Equation Systems (SPLTV) for Grade X students at SMKN 3 Jember.

The characteristics of the Three-Variable Linear Equation Systems (SPLTV) material are abstract and procedural, which often lead students to feel bored during the learning process. Therefore, the use of Educaplay Froggy Jumps as digital instructional media creates a more engaging and interactive learning experience, helping reduce students' boredom, particularly when learning SPLTV material.

## CONCLUSION

The use of Educaplay Froggy Jumps media has a significant effect on students' cognitive learning outcomes in the topic of Three-Variable Linear Equation Systems (SPLTV) at SMKN 3 Jember.

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